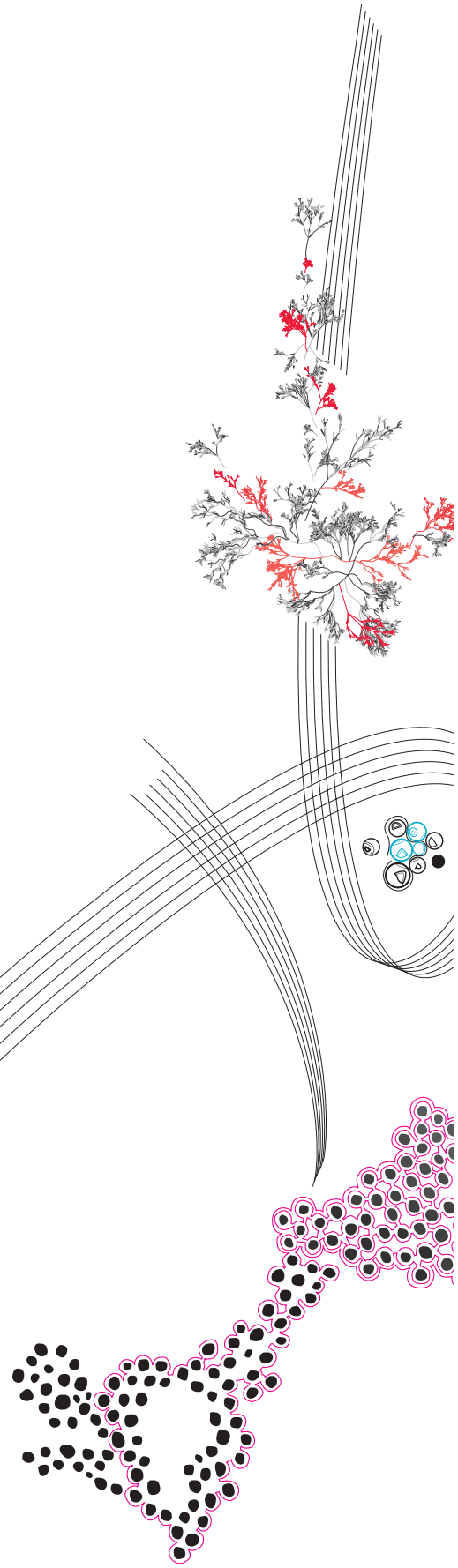

Bsc Creative Technology
Bachelor Graduation Thesis

AI-generated motivational feedback for casual runners

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Abstract

Lack of motivation is a common challenge for runners. While wearable devices and fitness applications can help motivate by providing performance metrics, their feedback is often generic and lacks personal relevance. This study aims to address this gap by exploring the integration of psychological data, such as the user's mood, with performance metrics to deliver personalised, AI-generated feedback tailored to casual runners.

Despite advancements in AI and wearable technology, current sports feedback systems rarely utilise psychological factors in their design. This exclusion of psychological data limits these feedback systems from providing meaningful and motivational insights. By combining mood-based input with performance data and AI-generative feedback, this study displays the potential for a more motivating and personalised feedback system.

The developed prototype, tested with casual runners, highlights the feasibility of integrating psychological data into AI-driven feedback systems. The findings suggest that this approach of providing feedback not only motivates but also opens opportunities for innovation in fitness and sports technology.

Keywords: Casual runners, Motivation, AI-generated feedback, Mood-based input, Wearable Technology, Sports feedback systems

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Chapter 1

Introduction

1.1 Context

Lack of motivation is a common reason why runners stop running. Wearables can help motivate by reducing the possibility of injury and enhancing performance through monitoring [1]. Sports should be an enjoyable activity, whether for competition or recreation. Many people rely on motivation to start or maintain their physical activity. Wearables have become valuable tools in tracking performance and sustaining motivation. Devices such as smartwatches provide real-time sports data, enabling users to monitor their progress. However, while the sensing of these wearables has been improving, the feedback they generate often lacks personal relevance, making it difficult for the user to interpret and confusing them. This is likely due to wearables lacking (personal) context, which prevents these devices from delivering meaningful insights [2].
Due to recent developments, integration of AI is becoming more common, with platforms like Strava using AI-generated summaries to enhance performance monitoring [3]. These AI-generated insights take factors such as past activities and performance metrics into account to enhance sports monitoring. However, the AI does not use perceived exertion, estimated power, or cadence in its summary, possibly limiting itself to delivering accurate feedback. This highlights the opportunity for improvement, such as a system that motivates casual runners through AI-generated feedback.

1.2 Challenge

This project aims to explore the capabilities of AI and how it can enhance personalised feedback in sports, with a focus on motivating casual runners. This study focuses on casual runners as the target group due to their challenge of maintaining motivation and engagement. The initial challenge is understanding what motivates a casual runner and what keeps them running. This knowledge will later be used by the system to determine what data should be collected. The next challenge is how to apply AI frameworks to generate enhanced and personalised feedback/output. Additionally, it is important to understand what type of (visual) feedback is most fitting for motivation. Do users prefer a story? Or do users prefer (polar) charts? This adds the challenge of figuring out what is most appealing to the user, finding a balance between detailed insights, and avoiding clutter.

1.3 Research Questions

The following questions need to be answered to be able to fulfil this assignment:

- What are the psychological and physical factors that influence casual runners in their motivation to train?

This question will focus on determining what influences a runner to stop or start running. The goal of this question is to assist in investigating what motivates a runner. Diving into sub-questions that will help identify what a casual runner is, what their traits are, and what feedback motivates them.

This question, however, is a research question, thus implying the need for a design question:

- How to make use of current generative AI models in combination with running data to generate motivational feedback?

This question dives into combining the knowledge of the previous question with AI. Combining the research and learnings, focusing on AI and how to output sensible feedback.

1.4 Outline

This study will be divided into 9 sections. Chapter 1 discusses the context, challenge and research questions of this project. Chapter 2 dives into the background research and State-of-the-art of related products. Chapter 3 describes the design process utilised for this study. The ideation process is outlined in Chapter 4. The final concept that comes out of Chapter 4 will be further specified in Chapter 5, going over its requirements. This final prototype will then be realised in Chapter 6. In Chapter 7, the final prototype will be evaluated with the target user group. Chapter 8 will discuss the findings of the study. In Chapter 9, the conclusion of the study is written.

Chapter 2

Background Research

2.1 Approach

This section is divided into three sections: a literature review, a State-of-the-Art search, and a conclusion. This section intends to research what is already known about the topic of casual running, reviewing papers related to this topic with the inclusion of a State-of-the-Art section displaying the types of feedback, such as phone applications or training programs, and AI models that runners could or are already using.
To acquire the necessary papers, search terms were used related to the research question and its corresponding sub-questions. Databases used to acquire these papers include PubMed, IEEE Xplore, and Scopus. Search terms used for this Literature Review are; **Casual OR Recreational Runners and their traits**, **Sports Feedback Types**, **Recreational runners wearable technology usage**, **wearables and phone applications for feedback in sports**, **Personalized feedback**.

2.2 Literature Review

This literature review examines the concept of the casual runner by exploring their definition, characteristic traits, underlying motivations, general statistics and patterns of wearable technology usage. It aims to aid the practical part of the thesis with the knowledge gained from its research.

2.2.1 Statistics of Running

According to Statista.com [4], running is one of the most popular forms of exercise; millions of people enjoy its physical and mental health benefits. In the United States, the number of runners and joggers hovers around 50 million, which is shown in Figure 2.1, and in 2024, it was ranked as the most popular sport in Japan.

Characteristic	Number of participants in millions
2023	48.31
2022	47.82
2021	48.98
2020	50.65
2019	50.05
2018	49.46

Showing entries 1 to 6 (6 entries in total)

Details: United States; Sports Marketing Surveys USA; SFIA; Digital Research; Physical Activity Council; 2010 to 2023; 18,000 respondents; 6 years and older; not including running done on a treadmill; Online interview

Figure 2.1: Number of people participating in running and jogging in the United States from 2018 to 2023

Although running is an accessible form of exercise as it needs barely any equipment compared to other sports activities, running and footwear manufacturers are some of the biggest profit makers in the world. In 2025, the revenue of the running footwear industry was estimated to be around 37 billion U.S. dollars [4], displaying the popularity of athletic running in the world. The focus of this thesis is on casual runners, displaying the need for an in-depth explanation of the target group.

2.2.2 What is a Casual Runner?

The term "casual", according to the Cambridge dictionary, can be defined as *"not regular"* or *"not serious"* [5]. In the papers of Thuany et al. (2020,2021), based on their training load, runners can typically be categorised into three categories. The category "Recreational" runner corresponds the closest to the "casual" definition of the Cambridge dictionary, as a recreational runner typically trains 1 to 3 times per week with informal and less structured exercises. Emphasising enjoyment and health benefits of running rather than performance or competitive goals [6], [7]. Aligning with the unseriousness of the term "casual". Thus, in this thesis, the terms casual and recreational will be used synonymously.

Traits of Casual Runners

The literature identifies several traits that identify and distinguish casual runners from more dedicated or competitive runners. Demographically, casual runners are often younger individuals who typically have limited experience with running, while there might be older individuals who are also casual runners. Janssen et al. (2020) identifies the trend that casual runners are often younger runners [8]. Their running experience can often be categorised by short-distance runs, which differ between 5 and 10 km. Compared to runners who prioritise competitive performance and long-term training routines, casual runners display a lower competitive orientation and less integration of running into their personal identity [9], [10]. The casual runner's approach is indicated by its emphasis on spontaneity, individual preferences, and motivations, with many preferring to run alone as this is more accessible and aligns with their busy or variable schedules, while others appreciate the short social interactions that occur during a run [11].

In the paper of Hitchings 2017 [11], 20 runners who run for at least twenty minutes, 1 to 3 times per week, were interviewed. The paper defines these casual runners as "non-runner runners" as they did not identify as runners or part of a running sub-culture.

This paper examines how casual recreational runners perceive their engagement with running, investigating its motivational and social aspects. The study found that casual runners actively distance themselves from the norms and identities associated with competitive and formal running subcultures. Instead, they maintain a limited connection with others while running, unlike runners examined in prior work, such as in Shipway 2013 [12]. These casual runners often resist external definitions of "proper" technique or performance metrics, preferring practical and self-directed approaches; they generally only sought advice when something had gone wrong, equipment needed replacing, or an injury or pain was getting worse, but even then, they showed limited interest in expert or insider opinion. Highlighting how individually oriented casual runners are. In general, these runners show a relaxed approach to running as it is an accessible form of exercise due to it requiring barely any equipment.

Motivations of Casual Runners

The motivations of a casual runner's participation in the sport are primarily intrinsic and utilitarian, satisfying their internal desire. These driving factors can be defined as follows:

- **Health and Well-being**
  A dominant motivating factor is seeking physical and psychological health benefits. Participants are often motivated by the desire to enhance cardiovascular fitness, manage weight, and decrease stress. These perceived immediate rewards function as positive reinforcement for the runners, keeping them engaged in the sport [11]. In the paper of Hitchings' 2017, an interview was performed with 20 casual runners. The interviews supported these findings, noting that the participants frequently describe running as "enjoyable" through means of their own individual terms, such as listening to music.

- **Flexibility and Accessibility**
  The low entry barrier associated with running creates another significant motivational factor. Unlike other physical activities, running requires limited (specialised) equipment. A gym or club membership is also unnecessary, supporting the fact that running is easily accessible. This inherent flexibility is especially attractive for individuals with unpredictable schedules or limited time for structured exercise [13].

- **Instrumental Self-Evaluation and Personal Achievement**
  Casual runners tend to focus on personal progress, using running as a measure of individual achievement. Unlike competitive runners who may seek external validation or social comparison among peers, casual runners evaluate success based on personal metrics such as distance covered, time of activity, or overall endurance improvement [8]. This individualistic approach is supported by the findings of Hitchings (2017), who observed that casual runners displayed a limited interest in external validation or comparison. As quoted by one participant *"There may be proper ways to run, but we run the way that works for us"*, highlighting their individualistic approach, neglecting the possibility for externally aided improvement [11].

2.2.3 Wearable Usage Among Casual Runners

Casual runners use running-related technology such as sports watches and smartphone apps, but their use is typically less intense compared to competitive runners. Casual

runners might use these tools for basic tracking rather than detailed performance analysis [8]. Clermont et al. (2020) found that runners, in general, have a strong preference for basic metrics, such as distance, speed, time elapsed, and heart rate. While advanced data metrics such as, joint motion and ground contact time, which are essential for injury prevention, are often ignored by these runners. This finding shows a common perception of the use of wearables as a tool for tracking progress rather than preventing injury. However, competitive runners did show interest in these advanced metrics [14].

Motivations for Wearable Technology

In Clermont's 2020 study, 677 participants were asked to fill out a survey researching the use and reason for self-tracking devices in running. The casual or recreational runners were categorised as runners who run less than 4 times per week. Out of the 677 participants, 327 were recreational runners. The frequency of wearables usage varied, with some recreational runners evaluating their performance directly after exercise (90.5%) while others would check after a week or even later [14].

In Figure 2.2, a table is shown displaying the motivations and interactions of recreational runners with self-tracking devices [14]. Besides reasons to use wearable technology, the table also includes useful insights such as, how often a runner checks their data, their preference in how the data is provided, what specifically motivates them to use wearables, and how wearables affect their training plans.

Question		Low Run Frequency (< 4 runs per week) (n = 327) % within Group
What is the main reason you use wearable technology? *	To improve training time.	4.9
	To deliver a personalized running plan	2.1
	To track personalized training data (e.g., pace, run times, distance, and speed).	82.9
	To track running form and running biomechanics (e.g., stride rate, stride length, vertical oscillation).	1.5
	To increase motivation to run.	7.6
	To avoid or prevent injury.	0.9
How often do you look at wearable technology data?	After every run	90.5
	Once a week	4.6
	Once a month	1.8
	Less than once a month	3.1
How do you prefer to view your wearable technology data?	In real-time, during my run	10.7
	As a summarized report, after my run	13.5
	Both 'in real-time' and 'after my run'	74.3
	No preference	1.5
What specifically motivates you from your wearable technology?	Comparing myself to others	3.1
	If I met my goal	78.8
	Information tips and suggestions	5.2
	Other	12.9
How often does looking at your data influence your future training plans/running activities?	Never	5.2
	Sometimes	28.4
	About half the time	15.0
	Most of the time	38.8
	Always	12.5
Why do you change your training plans/running activities based on the wearable technology data?	To avoid injury.	12.5
	To improve performance.	59.6
	Not sure.	7.6
	Wearable technology data doesn't change my training plans/running activities.	20.2

Figure 2.2: Motives and use of wearable technology among recreational runners

Reasons for wearable or self-tracking devices are ultimately determined by a runners individualistic approach. However, three factors return as motivations in the literature of this topic. These factors can be subdivided as follows:

- **Tracking Training Data**
  Recreational runners utilise wearables to monitor their training data, such as distance, time, and speed. They use wearables to set personal goals, and the tracking technology assists them in fulfilling their goals. This is their primary reason for using wearable technology [8], [14]. In Clermont's 2020 study, the majority of the recreational runners used wearable technology for this reason(82.9%) [14].

- **Motivating to Run**
  As seen in the survey of Clermont's 2020, 7.6% of the recreational runners noted that using wearables or self-tracking devices during running was a means of motivation for them [14]. These recreational runners would feel motivated by meeting their goals, such as achieving a specific distance or time.

- **Convenience and Usability**
  Recreational runners appreciate wearables that are lightweight and unobtrusive. Features like automatic data recording and simple interfaces (e.g. a smiley rating) are particularly appealing to recreational runners. The most common devices include GPS running watches, mobile apps, and heart rate monitors [14], [15].

Limitations of Background Research

This research has several limitations due to the characteristics of casual or recreational runners. Existing literature primarily focuses on competitive or athletic runners, resulting in a knowledge gap regarding the specific motivations and traits of the casual runners target group. The individualistic and subjective nature of motivations among casual runners further complicates the identification of common patterns. Furthermore, the inconsistent definitions of "casual" and "recreational" runners across studies causes confusion and possibly restrict comparability, requiring a need for clarification in the thesis.

Conclusion of Background Research

The exploration of casual (or recreational) runners and their interaction with wearable technology reveals several insights. Casual runners are characterised by their less disciplined and mainly intrinsic approach towards running, distinguishing them from competitive runners. Most recreational runners initiated in running due to intrinsic motivations, later discovering that running was "enjoyable", leading them to continue after fulfilling their goals. Motivations for running include accessibility and flexibility, maintaining physical and mental well-being and pursuing their personal goals.

Casual runners generally use wearable technology, such as sports watches, or use mobile apps to primarily track their basic performance metrics such as distance, time and speed. Their tracking usage is often limited in complexity, focusing on general self-monitoring rather than advanced performance analysis or evaluation. Wearables assist in supporting their intrinsic motivations, aiding them in setting and meeting goals, and monitoring progress. Casual or recreational runners often favour lightweight, simple designs that are unobtrusive and track automatically, lacking the need for manual input.

2.3 State-of-the-Art

To provide context for this project, it is important to define the methods and types of sports feedback that already exist. This subsection will first discuss the theoretical frameworks of feedback relevant to this thesis. Following this, the State-of-the-Art in sports feedback will be examined, going over commonly used mobile applications and analysing their AI integration if applicable. The State-of-the-Art will conclude in a discussion of the pleasures and enjoyments of running.

2.3.1 What is Personalised Feedback in the Context of Sport?

Personalised feedback in sport involves providing athletes with custom or personalised information based on their unique personal biomechanical data and psychological responses. This method aims to optimise training results by addressing individual needs, strengths and areas of improvement. By considering an individual's psychological factors and performance metrics, personalised feedback can help athletes achieve better emotional responses, such as; coping with setbacks. Enhancing their overall performance [16].

2.3.2 Methods of Providing Feedback

Feedback plays a crucial role in the process of behavioural modification and performance optimisation. Various methods exist for delivering feedback, for example, feedback in real-time or post-activity. This section provides an overview of known techniques of delivering feedback that are of importance in the context of this thesis.

- **Real-time Feedback**
  Real-time feedback delivers immediate evaluations and insights during an activity, enabling real-time corrections. Examples of real-time feedback include wearables devices that provide feedback on metrics such as stride, and heart rate, possibly preventing injury [1]. Highlighting how wearables can optimise running performance through alerts, motivating athletes.

- **Post-activity Learning Analytics**
  Digital data from wearables and applications can monitor user actions during sports activities. This data is analysed to highlight strengths and areas of improvement. Learning analytics generate **post-exercise** feedback in the form of personalised reports or visualisations, enabling long-term progress tracking [17].

Feedback, essential for improvement, can be categorised into real-time and post-exercise feedback. Wearable devices provide real-time cues or signals, such as sound or vibration, enabling real-time adjustments to an athlete's form. Post-exercise feedback aids in strategic planning for an athlete's next activity. Motivational feedback and machine learning-driven feedback are also crucial types of feedback in the context of the thesis. These types will be discussed below;

- **Motivational Feedback**
  Motivational feedback is a personalised approach to providing individuals with information that is personalised to their achievement goals. This form of feedback uses a range of message types, such as comparison between peers and personal improvement. The primary aim is to enhance an individuals motivation and

self-adjusting skills, guiding them in refining their performance and goals [18]. As discussed in subsections 2.2.1 & 2.2.2, most recreational runners were often motivated by setting personal goals.

- **Machine learning-driven Feedback**
  Machine learning algorithms are being trained to enable real-time feedback in sports by analysing data from wearable sensors and providing immediate insights to athletes and coaches. This type of feedback can be used to enhance performance and refine technique, as well as long term monitoring to possibly prevent injury [19].

2.3.3 Practical implementations of providing Sports Feedback

The next section goes over the State-Of-The-Art of commonly used applications that provide the user with sports feedback. This section aims to define what methods of providing feedback are used and, if applicable, what AI-generative sports feedback is provided to the user.

Mobile Applications

Strava

Strava is an American internet service and mobile app designed for tracking physical exercise. The service is designed with a strong emphasis on social networking features. Initially, Strava was created for outdoor cycling and running, however, it now supports a dozen exercise types, both indoors and outdoors [20], [21]. Strava allows users to record their activities via, GPS, analyse performance data, and share workouts with a community of athletes, if desired by the user. The platform operates on a freemium model, allowing free users to access the core parts of the application while additional features are available to paid subscribers. Strava offers several forms of feedback to users:

- **Performance metrics**
  After recording an activity, users receive in-depth data including route maps, elevation, speed, duration and heart rate. These metrics can differ depending on the device or wearable used.

- **Social feedback**
  Since Strava allows for sharing to a community of athletes, users can receive "kudos", which are likes, comments, and encouragement from friends or followers.

- **Goal tracking**
  Users can set goals and track progress over time.

In Figure 2.3, an image is shown displaying an example of the feedback that Strava can provide.

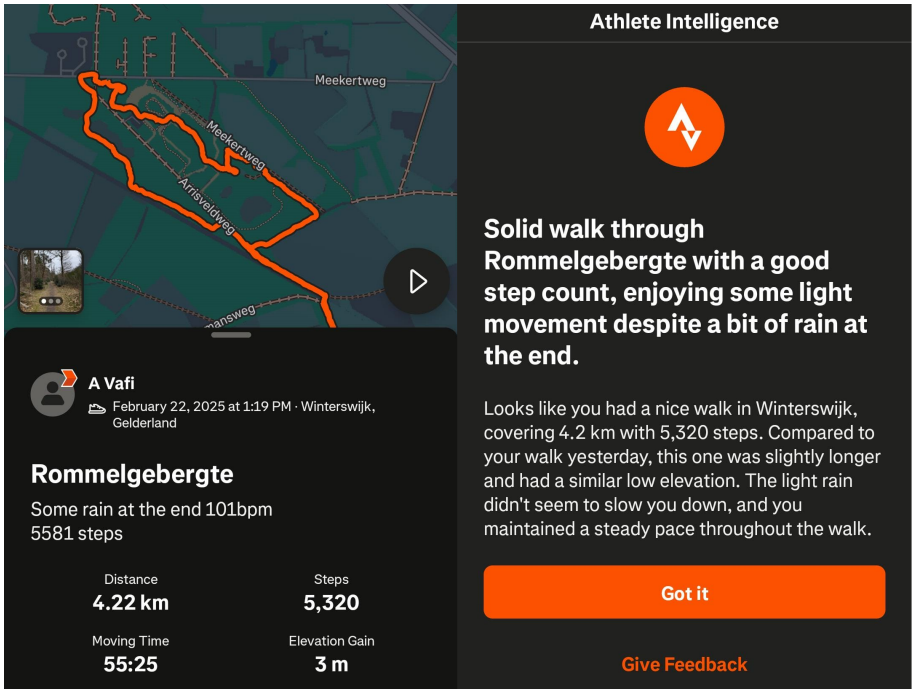

Figure 2.3: Example of feedback & metrics provided by Strava

Besides these types of feedback that Strava provides, artificial intelligence has also become a part of Strava's methods of feedback. Their AI-powered feedback is called Athletes Intelligence, this feature is part of the paid subscription plan. Strava's Athlete Intelligence analyses the user's performance data of an activity, providing an AI-generated summary of the activity. The AI uses the user-provided title and description in its generation, which can be seen in Figure 2.3, where the description states some rain at the end. Athlete Intelligence picks this up and provides this in the AI-generated summary. It is primarily aimed at newer athletes, offering guidance on whether they are on the right track [22]. The community describes that the AI-generated feedback is currently generic, sometimes inaccurate, and not always useful for experienced athletes [23].

Garmin Connect

Garmin Connect is Garmin's official application for tracking, analysing, and sharing health and fitness activities. It syncs data from Garmin devices, such as, smart watches, bike computers, and fitness trackers. The app provides users with tools to monitor their workouts, set goals, analyse their performance, and connect with a social community. Garmin Connect is available as a free service, with a new premium subscription tier called "Garmin Connect+" which unlocks additional features and their new AI-powered insights [24]–[26].

Garmin Connect has a variety of methods for delivering feedback. Initially, the home screen displays (by default) two sections: In focus, At a glance. In focus displays your most important goals. Next is the at-a-glance section, which displays a set of objective metrics in values rather than a goal. A user can add a section called "Last 7 days", which summarises statistically your activity and health metrics over the past week. In Figure 2.4, a screenshot of Garmin Connect's home page is shown. The application also supports

a feature called “Garmin Coach”, with this feature, the user can set a goal and a virtual coach, depending on the set experience, will assist the user in trying to achieve their goal. This virtual coach has a set program showing how to do certain exercises [27].

Figure 2.4: Screenshots of Garmin Connect Home screen

The main difference between Garmin Connect and Strava is that Garmin Connect provides metrics and feedback not only after an activity, but also throughout your day. Besides these features, Garmin Connect delivers feedback through several methods:

- **Detailed activity analysis**
  After completing an exercise, the user is provided with metric data like time, distance, pace, speed, elevation, heart rate, calories, cadence, VO2 max, and more. Some of these metrics require compatible wearables.

- **Goal tracking and Progress**
  The user can set goals for steps, distance, active minutes, and more. Progress is tracked over time.

- **Social Features**
  Users can share activities, join challenges, compete on leaderboards, and give or receive encouragement from friends.

Gamification is also a method of providing feedback in Garmin Connect. Garmin Connect has so-called badges, which are achievements that are awarded to the user after achieving a milestone. Badges have the ability to motivate the user to, for example, do an activity with a friend or with the community, as the “Zombie” badge can only be obtained if the user completes an exercise with a user who has the “Zombie” badge unlocked [28],

[29]. With the addition of the subscription plan: Garmin Connect+, Garmin has added "Active Intelligence", which is an AI-powered feature, designed to provide personalised insights and suggestions based on your health and activity data [25], [26].

Active Intelligence provides daily AI-generated "insights" at the top of the app's home screen, summarising trends in your activity and health metrics. Insights become more tailored as you use the system, but as of now, they are limited to summaries and do not offer deep analysis or coaching. Examples of insights include comments on your step count, stress level, or general training load, but users do not find these insights particularly useful [30], [31]. Figure 2.5 displays an example of the Active Intelligence insights. This example provides insight into the user's sleep and energy levels.

Figure 2.5: Example Garmin Active Intelligence Insight

Samsung Health

Samsung Health is a health and fitness platform available on Samsung or Android phones. The application is most compatible with the Galaxy Watch series. It tracks a wide range of activities and health metrics, offering both manual and automatic activity recording. Samsung Health also provides fitness programs such as stretching, weight loss and endurance training, with set schedules for added structure [32].

Samsung Health's feedback methods include performance metrics. The app provides detailed stats on heart rate, calories, pace, and more [32]. Figure 2.6 displays an example of an automatically recorded exercise, providing basic metrics. The application will record your route on a map if GPS is enabled. Besides the map, the application provides a chart, displaying your speed and cadence over time.

Figure 2.6: Example of Samsung Health Feedback after an exercise

Other feedback methods include: AI-generated feedback, recent updates have introduced AI-powered features that use Galaxy AI to analyse your sleep score, energy score and provide personal tips, called "Booster Cards", designed to help motivate users meet their health goals and improve wellness [33], [34]. Figure 2.7 displays examples of the Samsung booster cards. The home page of Samsung Health can be personalised based on the user's interests or focus. The four supported focuses are: overall health, sleep, exercise, and healthy weight. Changing your Samsung Health's interest affects the "Booster Card" provided insights. These "Booster Cards" are colour coded, where green targets the user's goals and exercise metrics, purple is used for the user's sleep analytics, and orange is analytics related to the user's heart rate. Regarding social features, the app has a "Together" page where users can join challenges with friends or global users, adding a community-driven motivational aspect [32].

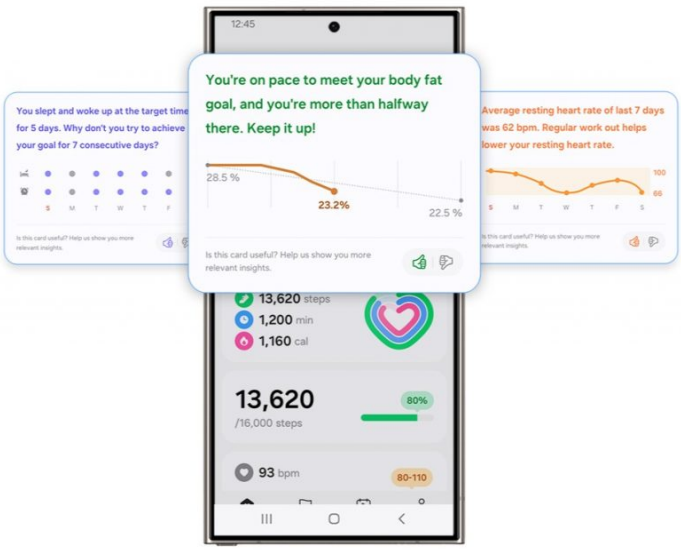

Figure 2.7: Examples of Samsung Booster Cards

Google Fit

Google Fit is Google's health and fitness tracking platform, designed for Android phones, Wear OS watches, and other supported wearables. Its goal is to give a clear view of your overall wellness by tracking metrics like activity, heart rate, sleep, and more [35]–[37]. Core features of Google Fit include:

- **Activity & Sleep tracking**
  Google Fit supports a broad range of activities and tracks the user's sleep pattern. The user's activities can be logged manually or automatically. Activities will be logged in the "Journal" tab, visible in Figure 2.8.

- **Monitoring Metrics**
  Google Fit tracks essential metrics such as time, step count, calories burned, distance, elevation, and more.

- **Heart Points & Move Minutes**
  The app encourages the user to stay healthy with its Move Minutes and Heart Points system. The user gains Move Minutes every time they are active. Heart Points are awarded from more intense activities that increase the user's heart rate. These metrics are based on the World Health Organisation and the American Heart Association guidelines [36].

- **Goal tracking**
  The platform lets users set daily or weekly goals for metrics like steps, Heart Point, and Move Minutes.

Figure 2.8: Google Fit Home screen and Journal tab

Gemini is Google's latest AI, designed to process text, code, audio, images and video [38]. Recently, Google plans to integrate Gemini into their Wear OS wearables, replacing the "Google Assistant" to a more advanced AI assistant [39]. Besides the Wear OS wearables, Google has been gradually integrating Gemini into most Android phones [40]. While Google Fit may not have an AI-generative function like Strava's Athlete Intelligence or Garmin's Active Intelligence, Gemini enables developers to experiment and, for example, create an application that uses Google's Gemini to, for example, create AI-generated workouts [41].

Alternative Applications

While there are other practical implementations of providing sports feedback, such as fitness programs like, Harlopen met Evy or TrainingPeaks. These applications are similar to the previously mentioned applications, as they provide feedback in a similar way. These applications, however, are designed with coaching and training programs as their core function [42], [43].

Conclusion of State-of-the-Art Applications

In conclusion, current sports feedback applications display varying approaches to user motivation. While most applications mentioned contain features like goal achievement tracking and basic metrics monitoring, aiding users in motivation, limitations exist, specifically in the applications of AI-powered feedback. Such as Strava's Athlete Intelligence and Garmin's Active Intelligence, which often provide generic or inaccurate summaries.

An observation made in this State-of-the-Art research is that these uses of AI do not fully utilise contextual data (highlighted with Strava in Chapter 1), and the lack of integration of psychological data, factors like a runner's emotional state or perceived exertion, are rarely used. Limiting the AI-generated feedback in providing personalised and motivational feedback. This analysis highlights the opportunity for improvement in AI-generative sports feedback.

2.4 Motivations & Pleasures of Running

The white literature that discusses motivations and pleasures behind running is quite limited, as these topics are highly subjective and dependent on the runner. Thus, this section of the State-of-the-Art will go over grey literature. Going over the common pleasures of running, what makes running rewarding and why runners run, not necessarily specifying in casual runners.

Runner's High

A "Runner's High" is a deeply relaxing and euphoric state that occurs after intense or lengthy exercise. This state is likely caused by the release of endorphins and other neurochemicals, such as endocannabinoids. Endocannabinoids, however, **may** possibly play a significant role in creating the post-run relaxation and euphoria, though research on this topic is still necessary. Endorphins are substances produced by the brain that have pain-killing effects on the body, acting as a natural pain reliever and helping produce feelings of happiness, relaxation, and pleasure. Runners who experience this "Runner's High" state report feeling less anxiety and an overall better sense of well-being after their activity. However, a "Runner's High" is difficult to measure scientifically, as the experience is highly subjective. [44]–[47].

Mental Clarity and Cognitive Enhancement

Running is recognised as an effective way to reduce stress and achieve mental clarity. The rhythmic bodily motions and breathing involved help release physical and mental tension, assisting in decreasing stress & anxiety. Runners describe running as meditative, enabling themselves to empty their mind, removing all negative emotions or thoughts, and boosting their mental health. Running can also be used as a method to take a break from technology, detox digitally, and reduce mental fatigue. [45], [48], [49].

Besides stress relief, regular running has been shown to increase blood flow to the brain, due to the strengthened heart and improved cardiovascular health. This increase in blood flow possibly assists in the creation of new brain cells, which is called neurogenesis. Exercise or running has also been proven to increase the volume of the Hippocampus, improving memory and focus capabilities [45]–[47], [50].

Accomplishment and Improved Self-Esteem

Running is a process built upon small victories that add-up into a larger sense of accomplishment. Setting and achieving personal goals, such as running a certain distance or maintaining a routine, brings a sense of accomplishment. This sense of progress is rewarding in itself. The completion of a run, no matter how small, provides runners a reminder of their capabilities, providing a positive self-image and improving self-esteem. Overcoming challenges like fatigue, self-doubt, or lack of motivation further reinforces this positive self-image [47], [48], [50].

Physical Well-being and Weight Management

Running is a powerful method of improving physical health and managing weight. As a high-intensity cardiovascular activity, it helps burn calories, making it effective for weight loss, maintaining bone density and muscle mass [44], [50], [51].

2.4.1 What Makes Running Fun?

What makes an activity enjoyable is completely dependent on the personal preference of the individual. While there is overlap between the pleasures mentioned in section 2.4, there are some factors that determine whether a runner perceives running as "fun". This section summarises additional common factors that add to the experience of running, and what runners perceive as "fun".

Boost in Mood

As mentioned in 2.4, running causes a boost in endorphins in a runner's body, causing a euphoric feeling which can be classified as a "Runner's High". This boost in endorphins leads to a relaxed feeling, improving the runner's mood [44]–[47].

Connection with Nature and Solitude

Running outdoors allows runners to disconnect from reality and connect with nature, enjoy fresh air, and have a change of scenery. Surrounding yourself with nature and breathing in fresh air can be mentally refreshing [47], [52].

Social Connection

In Chapter 2.2.2, it was mentioned that most casual runners enjoy running alone, however, this is not the case for all runners. Running can also be a social activity, which adds to its enjoyment. Joining a club, keeping up with online running communities, or simply running with a friend group, creates a sense of belonging. This feeling can be uplifting for some. Interacting with fellow runners creates a social network that helps maintain motivation and commitment to the running routine. [47]

The Thrill of Competition

For some, running is fun because they perceive it as a challenge. Competing in races or chasing personal goals adds to the excitement of the activity and improves self-esteem, as mentioned in 2.4 [47], [52].

2.4.2 Why do Runners Quit Running?

Runners often stop running or lose motivation due to several interconnected reasons, both physical and psychological. This section will go over a few common reasons why runners lose motivation.

Physical Reasons

A commonly cited reason for quitting running is injury. Injuries, as in all sports, can disrupt routines and make returning to running difficult [53], [54]. Besides injury, physical discomfort caused by overtraining is also a factor that demotivates. Pushing too hard and not allowing enough recovery can lead to burnout and physical exhaustion, making running feel more like a chore rather than a joy [55], [56].

Psychological Reasons

Running is a rewarding activity, but it is not uncommon for motivation to decrease over time. A common reason is boredom. Running can feel repetitive, especially if you always use the same route. When running stops feeling fresh or exciting, motivation can decline rapidly. Another challenge for runners has to do with setting unrealistic expectations. Many new runners expect rapid progress, but when progress comes more slowly than expected, disappointment can set in, leading to frustration and the decision to quit. [56]–[58]

A lack of structure or goals can also demotivate. Running without a clear purpose or plan can possibly feel aimless, making it harder to stay engaged. Setting goals or milestones can help provide a sense of accomplishment, which is needed to stay motivated for some. For some, the loss of social interaction can be a demotivating barrier. Running solo for some can feel isolating, reducing the fun that comes from running with others. [57], [58]

Conclusion of State-of-the-Art Pleasures of Running

The motivations, pleasures and what makes running "fun" are diverse, as it all comes down to the personality of the runner. Whether for competition, well-being, or enjoyment, running continues to benefit individuals in unique ways.

2.5 Discussion

The background research of Chapter 2 provides this project with a foundational analysis of casual runners, their engagement with wearable technology, an in-depth analysis of State-of-the-Art sports feedback applications, with an emphasis on the integration of artificial intelligence in their feedback, and a State-of-the-Art search in the pleasures of running. The literature review examines the (primarily intrinsic) motivations of casual runners, their preference for the accessibility & flexibility of the sport, and their use of wearables, which are primarily used for tracking performance metrics. Casual runners differ from competitive runners, who tend to focus more on advanced data analysis to improve performance and prevent injury. A limitation with the background research had to do with the inconsistent definitions in the literature. The terms "casual" and "recreational" runners were almost used synonymously, requiring the need for a clarification in this study.

The analysis of sports-feedback providing mobile applications, such as Strava, Garmin Connect, Samsung Health, and Google Fit, reveal a common focus on delivering core & often simple performance metrics, and goal-setting features. These features align with the casual runner's preferences discussed in the literature review and thus help said runners motivate their engagement with running. Platforms like Strava and Garmin Connect integrate AI into their feedback, providing personalised insights. This function, however, is still in its early stages. Users report that these AI-generated summaries often lack context, take data out of context, are limited, inaccurate, or fail to deliver meaningful information. The analysis of the pleasures of running identifies key factors that influence "all" runners' motivations and highlights common elements that contribute to the overall enjoyment of the activity.

These findings highlight the opportunity to better utilise the performance metrics obtained from wearables devices and user input. An observation made during this literature review, is the lack of use of psychological data. Factors like a runner's emotional state or perceived exertion are rarely used. Including these metrics could have the potential to improve the personalisation and motivational impact of AI-generated feedback.

2.6 Conclusion of Chapter

This chapter has provided a thorough overview of the current landscape of sports feedback for casual runners. The literature review highlighted the characteristics and motivations of "casual" runners, highlighting their preference for simplicity and basic performance metrics. Analysing current State-of-the-Art sports feedback applications shows that while core features meet casual runners' needs, AI-driven feedback is often lacking, providing limited or inaccurate feedback. A gap observed in the State-of-the-Art is the lack of utilisation of psychological metrics, which potentially limits the AI in creating personalised and motivational feedback.

Chapter 3

Methods and Techniques

In this chapter, different methods and techniques that are useful for the methodology of this thesis project will be discussed. This chapter follows the design process created by Mader and Eggink: "A design process for Creative Technology" [59]. This design process is an iterative process used for developing products.

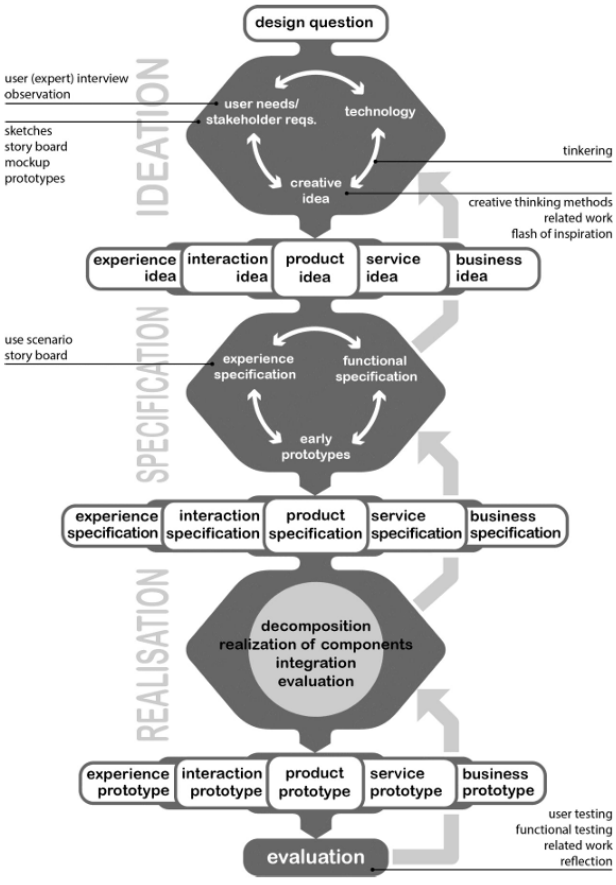

Figure 3.1: A design process for Creative Technology

Figure 3.1, displays the framework for the design process of Creative Technology. This method begins with a design question and is divided into four phases:

- Ideation

- Specification
- Realisation
- Evaluation

The figure displays that each phase starts with diverging and ends with converging, which is recognisable by each major phase's hexagonal or funnel shape. An example of this process is in the ideation phase, where first many ideas are generated (diverging), and later in the phase these ideas are then filtered (converging).

3.1 Ideation

The ideation phase is the beginning of the Creative Technology design process. It focuses on generating many ideas and defining the current problem. This phase often begins with a client request, a vague product idea, or an inspiration.
The paper of Mader (2014) [59] mentions the process of "tinkering", where technology is used to identify innovative and alternative applications for existing or new technology. During this Ideation phase, designers gather user requirements through interviews, mock-ups, sketches, and storyboards. While also exploring related work for inspiration for ideas. This phase aims to produce multiple well-defined project ideas, completed with problem requirements, user experience concepts, and, if applicable, a business model.

3.1.1 Requirements

In the ideation phase, identifying and investigating the product or project's requirements is a critical step. These requirements are essential as they help define the project's goals and constraints. Setting clear goals and constraints ensures that the final product meets the desired functionalities and users needs. One method of obtaining these requirements is by interviewing target group users, informing them about the product concept through the use of mock-ups, sketches, and storyboards.

Requirements can be categorised into functional and non-functional requirements:

- **Functional Requirements**:
  Functional requirements define the basic system behaviours and describe what the system must do to function as intended. These requirements are necessary for the product to function. Functional requirements often include specific features, for example, a smart doorbell might require the function to detect motion and send a notification. Functional requirements are the "what" of a product, describing the actions it must perform in a specific scenario. The EARS (Easy Approach to Requirement Syntax) framework can be used to write clear functional requirements. For example: *When [trigger], the [product name] shall [product response]* [60], [61].

- **Non-Functional Requirements** Non-functional requirements describe how the product should perform and focus on quality attributes such as usability, reliability and performance. These attributes ensure the product meets the user's expectations. An example of a Non-functional requirement is: "The user should be able to communicate with visitors through the app of the smart doorbell" [61].

Both types of requirements are essential for a successful product. Functional requirements are defined by the features the product must have, while non-functional

requirements reference the properties of the product. In Figure 3.2, a clear distinction between requirement types is shown.

	Functional requirements	Nonfunctional requirements
Objective	Describe what the product does	Describe how the product works
End result	Define product features	Define product properties
Focus	Focus on user requirements	Focus on user expectations
Essentiality	They are mandatory	They are not mandatory but desirable
Origin type	Usually defined by the user	Usually defined by developers or other tech experts
Testing	Component, API, UI testing, etc. Tested before nonfunctional testing	Performance, usability, security testing, etc. Tested after functional testing
Types	Authentication, authorization levels, data processing, reporting, etc.	Usability, reliability, scalability, performance, etc.

Figure 3.2: Functional vs Non-functional requirements

Once the functional and non-functional requirements are collected, they are categorised using the MoSCoW technique. This is a method that divides requirements into four categories [62]:

- **Must have:**
  These are non-negotiable requirements that are critical for the product. Without these requirements, the product would fail to function or meet the user's wants.
- **Should have:**
  These requirements are important but not vital. The product can still function without these requirements in the short term.
- **Could have:**
  These are features that would be nice-to-have but are not essential to the product's core functionality. Not having these requirements will have minimal impact on the overall experience.
- **Will not have:**
  These are requirements that are out of the scope in the context of the current product.

This method helps focus on what requirements are essential for a product, while staying within the scope of the product and aligning with the target user's interests. Following the MoSCoW categorisation of these requirements, future product concepts will be created with these requirements as constraints.

3.1.2 Outcome of Ideation phase

The result of the ideation phase is a set of well-defined and categorised requirements, including both functional and non-functional requirements. These requirements allow for idea generation while staying within the scope of the product and aligning with these constraints. After different concepts have been generated, the ideas need to be filtered. The filtering happens in the convergence phase of the ideation phase. This convergence

entitles: shrinking or reducing the design space until a final product concept is generated. The shrinking of the design space is dependent on the requirements collected in the ideation phase. The final concept can then be presented and discussed with the target users. The target users will share their thoughts and provide feedback, which is used to alter the product idea until it is finalised. A method of presenting the final idea is through the use of sketches or a story storyboard. Now that a final concept has been thought of, the ideation phase is complete. The next phase is the specification phase.

3.2 Specification

The specification phase is characterised by an evaluation process where multiple (Lo-Fi) prototypes are created and tested among users, to determine what functionalities affect the user experience, and decide which functions work effectively. The prototypes are iteratively tested, and after testing, are either discarded, improved, or merged with other prototypes to create a new prototype. This evaluation process often leads to the identification of new functional requirements, which assist in the creation of additional prototypes [59].
Compared to the engineering design approach, which often revolves around refining a single prototype until a final design is achieved, the CreaTe process highlights the need for building numerous prototypes with user experience as the driving factor. Prototypes from the Creative Technology process, often integrate electronic components, such as microcontrollers, which are designed to explore behaviours that enhance the overall user experience. This phase's iterative and user-focused approach ensures that the final design is both functional and meaningful for the user.

3.3 Realisation

The realisation phase initiates once the final product specifications are established. In this phase, the final idea of the specification phase is built into a Hi-fi prototype. Popular models like the Waterfall Model and the V-Model are often used in this phase, offering a step-by-step approach which allows for backtracking if a wrong design choice has been made. The goal of this phase is to ensure the final product matches the specifications set in the previous phase.

3.4 Evaluation

The evaluation phase is the final step in the design process, where the prototype is thoroughly tested to ensure it meets the original requirements and delivers the intended user experience. This phase often involves user testing to verify that the design decisions satisfy the user's needs and provides the desired experience.

The evaluation can often be divided into four stages. The initial stage is planning; this stage focuses on defining goals and selecting data collection methods. The next phase is implementation, in this stage, the evaluation plan is put into action. Following is the completion phase, where long-term results are evaluated. The final phase is the reporting phase, this phase involves sharing the findings and insights with the audience in a clear and impactful way [63].

Chapter 4

Ideation

This chapter will discuss the ideation process. The chapter will explore methods used for acquiring product specifications. This chapter concludes in a list of the resulting product concepts.

4.1 Initial Product Concept

The initial product concept for this project is based on Strava's Athlete Intelligence. However, as discussed in Chapter 2, Athlete Intelligence has limitations, often generating generic summaries or feedback. The client's objective for this project is to build upon these limitations by exploring the application of generative AI to enhance and innovate this type of feedback.

A key observation from Chapter 2 highlights that the current State-of-the-Art in AI-generative feedback does not fully utilise all the available metrics, including psychological factors. This information will assist the project in generating new ideas. However, this highlights the demand for the acquisition of specifications based on the needs and preferences of the target user demographic.

4.1.1 Pre-Brainstorm

Before starting the ideation process, a short background research was done, exploring what users dislike about Athlete Intelligence. Most of the users mentioned that the feedback provided came across as insincere, commenting on a simple 10-minute walk, calling it "progress is a marathon". The titles provided by Athlete Intelligence have also been shown to be generic, titles such as "Morning run" rather than something insightful or related. Other general comments mentioned were that users prefer not to have AI implemented if it does not add anything, users prefer to have the insights presented in shorter ways, and lastly, some users tend to prefer not having the insights in text as a medium [64], [65].

Following this observation, an unstructured brainstorming session was performed with a runner who runs once or twice per week. The brainstorm session was initialised with the question: "What is the problem we are trying to solve? What do we want to add?". The answer to this question would be to improve Strava's Athlete Intelligence's generic and limited feedback. The unstructured brainstorming session provided some insight into the desires of an athlete. It was mentioned that he would prefer that the AI could be used as

a coach rather than textual feedback, helping to assist the user. Providing training regimes that help improve to reach the user's next milestone. Another idea was predictive thinking, which provides the user with a goal based on their previous performances or activities.

After this, a questionnaire was created to provide the thesis with more insight, which can be found in the Appendix B. Results are included in Appendix B.

Two casual runners were asked to complete this questionnaire. Participants shared frustrations with current tools, one noted the difficulty of understanding complex or new charts and the lack of clear actionable insights. Although they have a preference for in-depth analytics, they highlighted the importance of presenting data in a simple, easy-to-understand way.

When it comes to motivation, the participants seem to be fond of positive reinforcement and reminders of their goals or the benefits of running. The opinions surrounding gamification were mixed. Some preferred in-depth data as a reward, while others enjoyed being labelled as "local legend" by their sports applications.
According to the participants, the ideal tool should offer clear feedback on areas for improvement, combine detailed insights with simplicity, and include customisation to satisfy different users.

4.1.2 Brainstorming

For the idea generation section of this project, the SCAMPER ideation method was utilised. This ideation method is a creative thinking technique that helps generate new ideas by asking questions about an existing product or concept [66]. Due to Strava's Athlete Intelligence being used as base-line and thus improving on an existing product, the SCAMPER method seemed most suitable for this thesis. In Figure 4.1, a table is shown explaining each of the SCAMPER method's angles, including guiding questions, assisting in discovering new and improved features.

Substitute	Think about substituting part of the product or process for something else.
	Typical questions: What else instead? Who else instead? What other materials, ingredients, processes, power, sounds, approaches, or forces might I substitute? Which other place?
Combine	Think about combining two or more parts of the product or process to make something new or to enhance synergy.
	Typical questions: What mix, assortment, alloy, or ensemble might I blend? What ideas, purposes, units, or appeals might I combine?
Adapt	Think about which parts of the product or process could be adapted or how you might change the nature of the product or process.
	Typical questions: Does the past offer a parallel? What else is like this? What other idea does this suggest? What might I adapt for use as a solution? What might I copy? Who might I emulate?
Magnify, Modify	Think about changing part or all of the product or process, or distorting it in an unusual way.
	Typical questions: What other meaning, color, motion, sound, smell, form, or shape might I adopt? What might I add?
Put to Other Uses	Think of how you might put the product or process to another use or how you might reuse something from somewhere else.
	Typical questions: What new ways are there to use this? Might this be used in other places? Which other people might I reach? To what other uses might this be put if it is modified?
Eliminate	Think of what might happen if you eliminated parts of the product or process and consider what you might do in that situation.
	Typical questions: What might I understate? What might I eliminate? What might I streamline? What might I make smaller, lower, shorter, or lighter?
Rearrange, Reverse	Think of what you might do if parts of the product or process worked in reverse or were sequenced differently.
	Typical questions: What might be rearranged? What other pattern, layout, or sequence might I adopt? Can components be interchanged? Should I change pace or schedule? Can positives and negatives be swapped? Could roles be reversed?

Figure 4.1: The SCAMPER method including guiding questions from [66]

The guiding questions of this table will be used during the ideation method, aiding in uncovering new features and ideas.

SCAMPER Method Brainstorming

The SCAMPER method brainstorming session allowed us to analyse the problem or base-concept from many unique angles, providing features that could enhance the user experience. The results can be seen in Figure 4.2, showing a large number of features that could be substituted, eliminated, adapted, modified or combined to improve the user experience. This mindmap has been created using Miro.com [67].

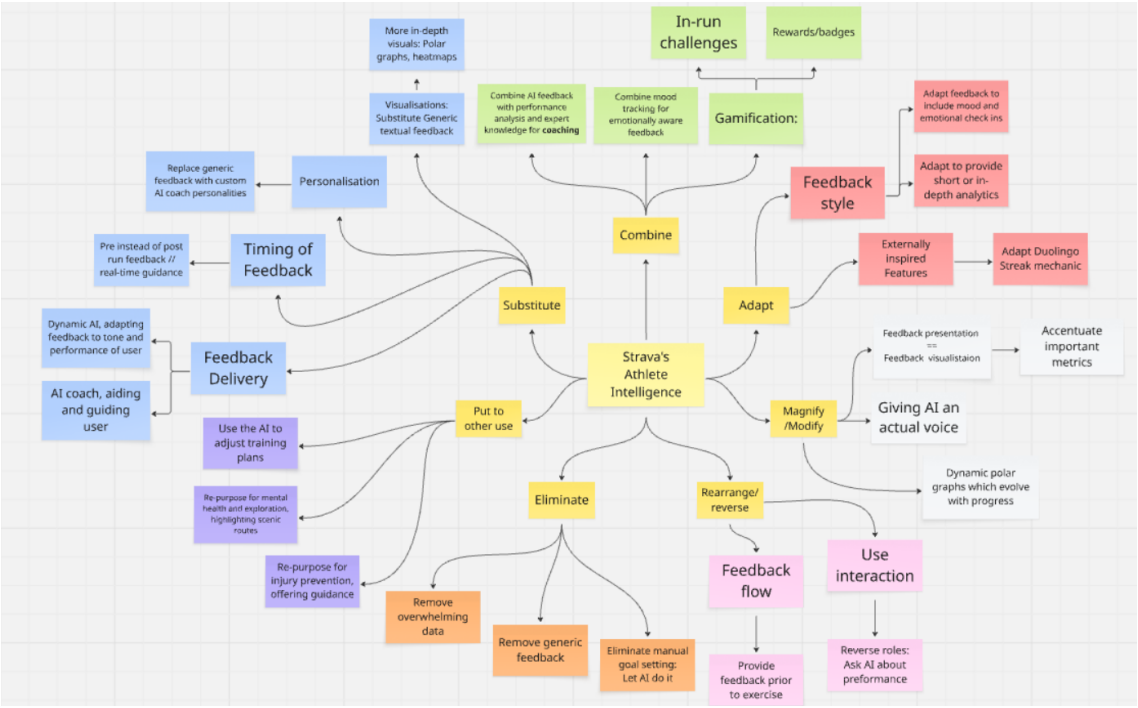

Figure 4.2: Ideation Mindmap resulting from the SCAMPER method

The mindmap, however, only displays features and examples of features that could improve the user experience, still requiring the need for concrete preliminary concepts. The next Section dives into the "how" of the preliminary concepts, describing the process of how the concept/prototype would be used.

4.1.3 Preliminary Concepts

Using the created SCAMPER method mindmap, combinations can be made between features, creating preliminary concepts for the thesis.

The AI Coach

This core idea focuses on **Substitute**: personalisation, **Substitute**: feedback delivery, **Re-arrange**, providing the user with feedback based on prior knowledge and psychological checks before starting an exercise.

The concept works as follows: The user chooses an AI coach with a specific personality, such as encouraging, analytical, or disciplinary. The AI coach, before exercise, will provide the user with advice related to the exercise. Advice or tips may vary depending on the user. Beginners may have more interest in whether they are performing correctly. After the workout, the AI coach provides feedback related to the exercise while maintaining the tone of the chosen personality. The Coach can be prompted to explain performance metrics that the user may be interested in. The goal of this concept is to overhaul the feedback system, making it more personalised and less generic.

Mood Based Trainer

This concept focuses on SCAMPER's **Substitute**: personalisation and **Adapt**: adapting feedback provided based on physical performance and emotional state. Finally, it applies the **Eliminate** principle: removing the need for manual goal-setting. It allows the AI to create personalised training plans based on the user's mood, while also textually or verbally motivating them.

While similar to the "AI Coach" concept, this idea focuses more on the mood and performance metrics of the user and less on the coach with a personality. Before a run, the user is asked to perform a quick emotional check-in. This data, in combination with performance metrics from previously tracked activities, will then be used to help provide the user with a suitable workout (e.g. distance, target speed). The goal of this concept is to focus more on the mood of the user, providing them with a suitable workout if the user is not feeling well or under the weather. This concept is also briefly mentioned in Subsection 4.1.1.

An example of an emotional check is the method of the "How We Feel" phone application. Here, the user is prompted 2 or 3 times per day at chosen intervals to provide the app with the emotion the user is feeling. How We Feel is an app designed to help users better understand their emotions by tracking their feelings and regulating emotions in healthy ways [68]. The list of emotions of this application can be seen in Figure 4.3

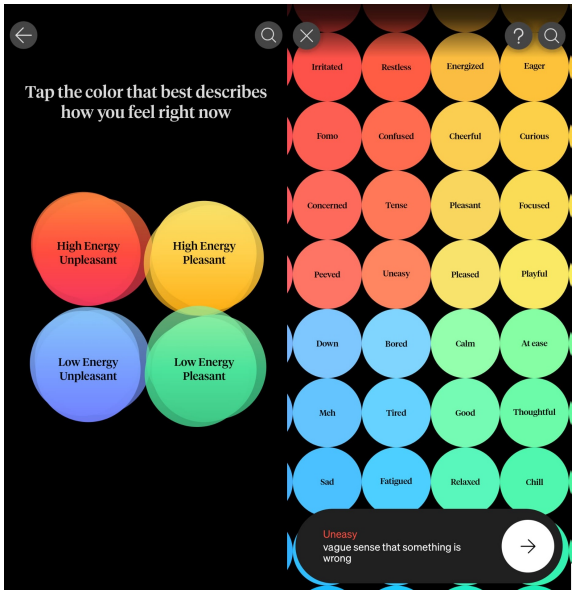

Figure 4.3: Example of Emotional Check, "How We Feel"

Progress Based Radar-Graphs

This concept centres on **Substitute**, replacing generic text feedback with radar charts to visually display progress, and **Re-arrange**, changing the feedback flow by providing two radar charts: "Yesterday's You", Summarising recent performance, and "Future You" displaying potential progress if today's exercise is completed. The **Adapt** principle is inspired by Duolingo's streak system, encouraging consistency and motivation.

This concept has a focus on making feedback less generic in terms of visuals. The feedback provided are radar graphs. Before a run the user is provided with two graphs, a "Yesterday's You" graph reflecting past performance and a highlighted "Future You" showing achievable progress. The goal of this concept is to make users maintain their engagement in the sport, helping them build a habit of regular exercise, as achieving the "Future You" can only be obtained through "daily" exercise. A similar concept can be seen in the language learning application; "Duolingo" where the user has to achieve a daily "streak" to maintain a habit and keep learning the chosen language. The streak gets removed if the user does not do one exercise per day. Figure 4.4 displays an example of what the radar charts could look like; this example has been made using Flourish.Studio [69].

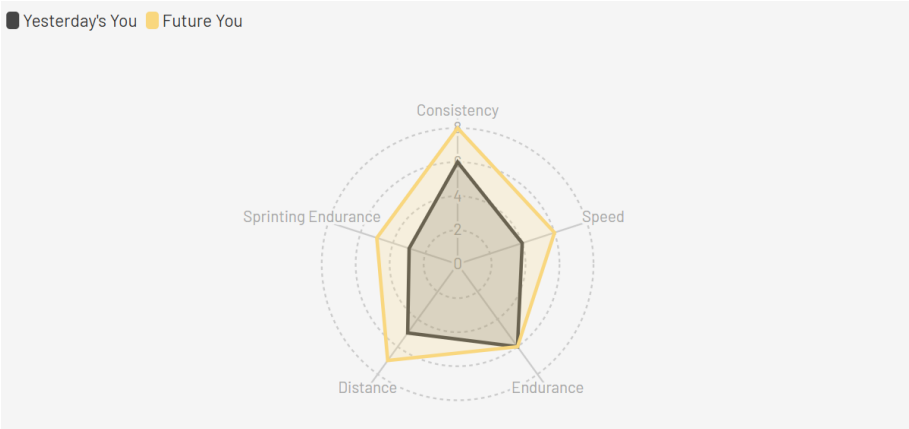

Figure 4.4: Example of Progress based Radar-Graphs

Real-Time gamified challenges

This idea grabs the **Combine**: gamification, in-run challenges, **Substitute**: Feedback delivery, using AI and **Modify**: providing the AI with a voice.

Although the previous concepts were more targeted to pre- and post-exercise feedback, this concept focuses more on real-time feedback. During running, an "opportunity" will come up where an AI voice will inform the runner about a challenge they can perform to unlock a "badge". An example could be; "Sprint the next 0.5 km to unlock a Speed Demon badge". The badges could be a method to help motivate and drive users, for example, by showing off their achievements to their friends. Garmin is a great example of gamification of sports, Garmin has a long list of badges and achievements that can be unlocked based on performance and season [24].

4.2 Final Concept

A final concept can be concluded by combining features of the preliminary concepts. This approach is useful as it allows for the addition and integration of the best features from each preliminary concept. To do this, the preliminary concepts have been filtered based on set criteria. The following criteria will help justify the elimination of parts or features of the preliminary concepts necessary to come up with a final concept.

- **Feasibility**, does the researcher of this project have the technical resources and capabilities to bring this concept to life?
- **User Centred Design**, does the concept align with the preferences and frustrations of the users? The previous findings and research from the questionnaire/brainstorming are necessary to filter using this criterion.
- **Personalisation**, looking back at the SCAMPER method, personalisation aims to determine whether the concept allows users to tailor their experience to their needs.
- **Innovation**, how will this concept be any different from what is already out there? For example, Strava's textual AI-generated feedback.
- **Alignment with project goals**, will the final concept be in alignment with this project's goals? This project aims to improve on Strava's AI-generative feedback, personalising the experience and motivating the user if possible. Thus, the final concept should be AI-oriented.

The answer to the question asked at the beginning of the brainstorming in Section 4.1.1 "What problem are we trying to solve?", provides the thesis with a clearer visual of the final concept. In short, the answer to the question would be creating a system that improves on Strava's method of providing AI-generative feedback; "Athlete Intelligence". Subsection 4.1.3 provides the thesis with a few concepts, however, not all of them align with the criteria mentioned at the beginning of Section 4.2. Filtering the preliminary concepts based on the criteria mentioned in Section 4.2, the following final concept has been ideated.

Active Influence Coach

The final concept combines key features of the preliminary concepts: "AI coach" & the "Mood-based trainer". The Active Influence Coach focuses on delivering personalised feedback before and after physical exercise.

The user begins by selecting an AI coach personality, which will dictate the tone and communication style of all feedback. Before each workout, the user is asked to complete an emotional check, and the user is asked to set a goal for their next exercise, enabling the system to combine this psychological insight with previous performance data. In addition to the coach feedback, the final concept will incorporate more visual aspects, an example would be a radar-graph displaying the user's performance after an exercise similar to the "Progress based radar-graphs" but with a focus on the current performance rather than past and future. This will help prevent making the feedback too textual.

4.3 Conclusion

This chapter explored the first section of the Creative Technology process: ideation. Insights were gathered through brainstorming sessions and questionnaires. These insights were then used in combination with the SCAMPER ideation method, which would help guide in the idea generation of the preliminary concepts.

The results from the SCAMPER method aided in the formulation of the final concept, the "Active Influence Coach", which integrates features from the AI Coach and Mood-based Trainer concepts. This tool combines personalised feedback, emotional

checks, and performance insights with visual elements to create an innovative method in AI-generative feedback, building and improving on existing tools such as Strava's Athlete Intelligence.

With the concept finalised, the next chapter will focus on listing the requirements the product should have and diving into how the user will interact with the final concept.

Chapter 5

Specification

This chapter will specify the functionalities and context of the final concept that has been introduced in Chapter 4. The final concept, the **AI Coach**, has the goal to combine data-driven insights from Google Fit with psychological inputs like mood checks, creating a tool that provides the user with insights before and after physical exercise, while providing it in a pre-set coaching tone. This chapter will describe the hypothetical user scenario, user experience through a storyboard and its functional and non-functional requirements.

5.1 Implementation Scenario

In order to gain a better understanding of how the user interacts with the final concept, a storyboard has to be sketched out, going over all the steps of the user interaction. This scenario will first be explained textually and then visually in Subsection 5.1.2.

5.1.1 Procedure

The user interaction will go as follows: The participant starts by wearing a Smart Watch(Samsung Galaxy Watch 3) provided by the researcher. The participant will then interact with the tool/prototype. The prototype will first ask what tone of AI coaching they prefer (e.g. analytical, disciplinary). Following this, the user is asked to perform a mood check (e.g. such as a slider, emoji interface, or something similar as in Figure 4.3). The participant is then required to provide a personal goal they would like to set for their next exercise (e.g. distance, duration running). After this, the prototype will provide suggestions and advice based on their mood. The participant is then asked to go for a 10-20 minute run. The Smart Watch that they are wearing will send their data from Samsung Health to Google Fit. After the run, the Google Cloud will fetch and send the Google Fit data, displaying it in the prototype. The prototype will then ask the participant to provide their mood once again and give them feedback based on the participant's sports performance and mood. The feedback will be provided in text format, in the user-set coaching tone. Besides textual AI coaching feedback, the prototype will also provide graphs displaying the participant's sports performance.

5.1.2 Storyboard

Now that the procedure has a clear structure, a storyboard can be created. A storyboard acts as a visual roadmap, guiding the audience through the intended user interaction, one shot or scene at a time [70].

A storyboard has been created based on the procedure in Section 5.1.1. The storyboard has been made from the perspective of the user. Every step of the storyboard has been numbered chronologically.

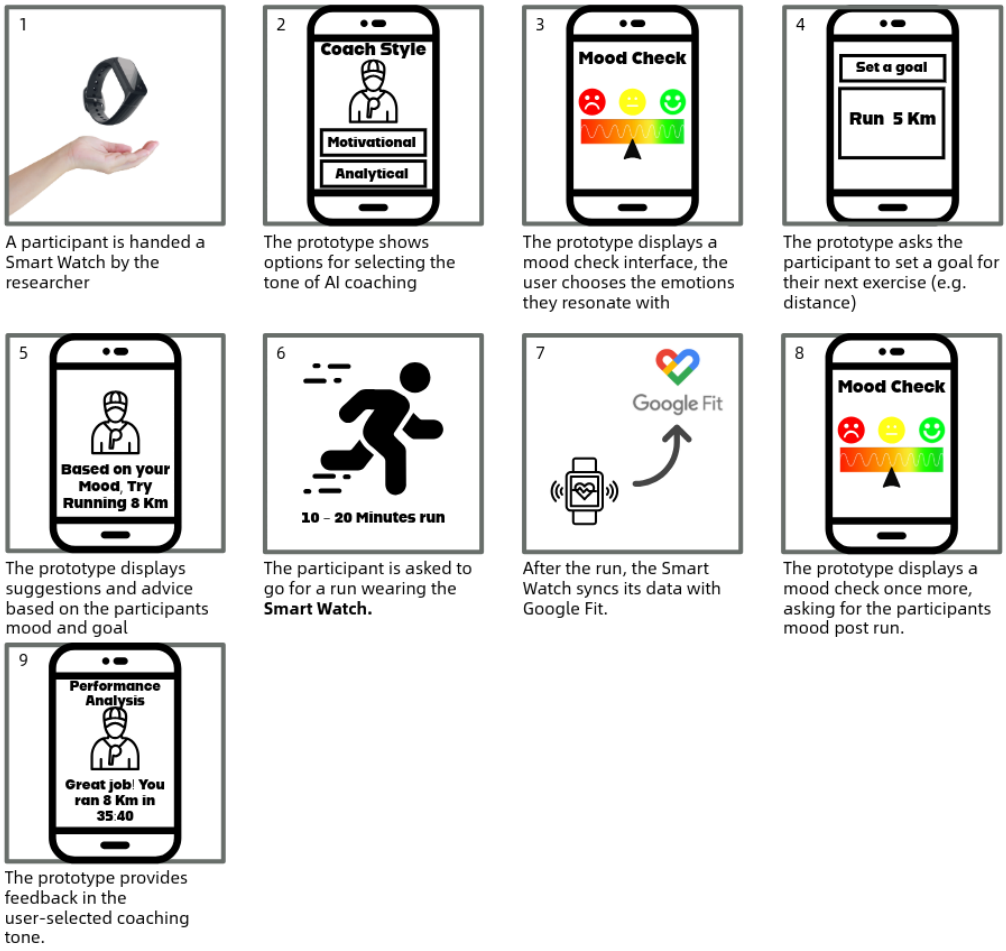

Figure 5.1: Storyboard of Procedure

5.2 Functional and Non-functional requirements

The success of the prototype relies on meeting its functional and non-functional requirements. These requirements help define the essential operations of the tool, which are important to ensure the user will have a seamless experience. Now that a clear procedure and storyboard have been sketched, functional and non-functional requirements can be identified. As mentioned in Section 3.1.1, these requirements can be categorised with the MoSCoW method, categorising on their level of necessity or priority [62]. The following subsections will present two tables, each categorising functional and non-functional requirements.

5.2.1 Functional Requirements

As mentioned in Section 3.1.1, functional requirements are requirements that define the basic system behaviours, describing what functions the system should have in order to perform as intended. Functional requirements often describe the "What" of a product, describing the action it must perform in a specific scenario. Table 5.1 shows a categorisation of the functional requirements of the prototype.

Table 5.1: Functional Requirements and MoSCoW Categorization

MoSCoW Category	Functional Requirement
Must Have	1. **Feedback**: The system must be able to provide feedback to the user.
	2. **Integration with Google Fit**: The tool must allow users to interact with and view their performance data (e.g., step count, previous exercises).
	3. **Mood logging system**: Users must be able to complete a mood check before each workout through an intuitive interface, such as a slider, emoji interface, or something similar as in Figure 4.3.
	4. **Coaching personalities**: The prototype must have the option to select in what tone the user would prefer their feedback is provided.
	5. **Goal Tracking**: The prototype should allow the user to set a goal (e.g., distance) before performing physical exercise.
	6. **Mood-adaptive AI**: The prototype should be able to provide useful insights by combining psychological inputs and the user's Google Fit data, making the AI context-aware of the user's mood and goal.
	7. **Exercise Refresh Button**: The prototype should allow users to refresh their past exercise data without needing to restart the prototype.
Should Have	8. **Short Feedback**: The prototype should have a function that provides the user with shorter text feedback.
	9. **Manual Exercise Tracking**: The prototype should have a function that allows the user to manually input their most recent exercise, in case Google Fit is not syncing with the Google Cloud.
Could Have	10. **Performance Metric Visualisation**: Post-workout feedback could include radar graphs or other visualisations to present user performance metrics.
	11. **Training Regime Generation**: The Coach could provide a training regime based on the user's goals and mood.
	12. **Gamification**: The tool could include gamified elements, such as challenges and badges.
Won't Have	13. **Real-time Feedback**: The tool will only provide feedback before or after exercise.

5.2.2 Non-functional Requirements

As explained in Section 3.1.1, non-functional requirements describe "How" the product should perform, focusing on quality attributes such as usability, reliability and performance. Ensuring the prototype meets the user's expectations. Non-functional requirements often lack the "Won't Have" category from the MoSCoW method.

Table 5.2: Non-functional Requirements and MoSCoW Categorization

MoSCoW Category	**Non-functional Requirement**
Must Have	1. **Usability**: The prototype must have an intuitive interface for easy navigation of the main features. Visual elements must be clear to help users understand their performance.
	2. **Tool Performance**: The prototype must be able to process mood and fitness data directly after an exercise has been logged in Google Fit, immediately providing feedback.
	3. **Past Workout Access**: The user must be able to access previously recorded exercises from the Google Fit application.
Should Have	4. **Compatibility**: The prototype should work on Android and IOS to ensure accessibility.

Chapter 6

Realisation

This chapter will describe how the final concept will be transformed into a working prototype. In this phase, the final idea of the ideation phase is built into a Hi-Fi prototype. This chapter will describe the process of making the prototype and explain the design choices.

6.1 Used Software & Tools

To bring the final concept to life, various software and tools were utilised. This section will discuss the software and tools necessary for a functional prototype.

6.1.1 Health Tracking Applications

To be able to display sports metrics, there should first be a method to obtain and record sports metrics. The two fitness applications used for the realisation of this thesis are discussed in the following.

Samsung Health

As mentioned in Section 2.3.3, Samsung Health is the fitness application utilised by Samsung devices [32], including the Smart Watch used by the researcher. When tracking an exercise on the watch, the workout would first be sent to the Samsung Health app. Thus, the reasoning for the inclusion of Samsung Health in the context of the realisation of this thesis.

Google Fit

The reason why Google Fit has been used for this thesis project's realisation is due to its compatibility with Google Cloud, which allows Google Fit data to be sent to Google Cloud through the Fitness API. In addition, Google Fit has a feature called "Health Connect", which can be enabled by downloading the Health Connect Application. The Android Health Connect application is a central hub for storing, syncing, and sharing health and medical data across multiple apps and devices. This allows, for example, the step count from a Smart Watch synced via Health Connect to be shared with your Google Fit account and data [71].

6.1.2 Google Cloud

The Google Cloud Platform is Google's collection of cloud-related services. Services include web hosting, data storage, AI tools, and various other APIs [72]. For the realisation of this project, the Google Cloud platform aids in providing essential external services, such as providing the Google Fit data and allowing for external Gemini usage.

6.1.3 Cursor

Cursor is an AI-powered code editor that integrates various AI models to assist with programming. Cursor allows the user to chat with AI about their code and generate code from natural language. Unlike traditional code editors, Cursor is context aware, which means that the AI is aware and understands the whole project structure and related code [73].

6.2 Realising of Final Concept

6.2.1 Front End

The prototype provides the user with two tabs which the user can switch between. Before the first screen, the user is asked to choose an AI coaching style, which can be seen in Figure 6.1. The user can always switch between coaching styles using the drop-down bar in the top right of the UI, which can be seen in Figure 6.3, which is shown in a later section.

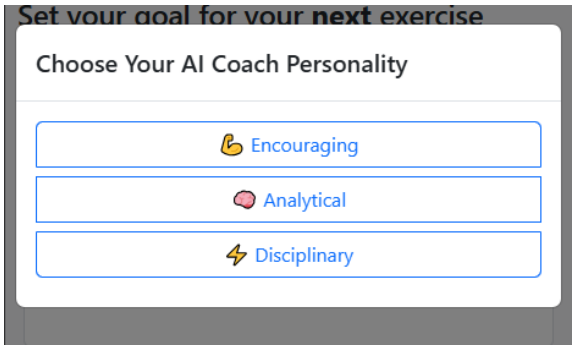

Figure 6.1: Initial Pop-up when opening prototype

After closing the AI coaching personality pop-up, the first screen is the "Overview" screen, which prompts the user to perform a mood check and set a goal for their **next** exercise. The mood check menu can be seen in Figure 6.2. The mood check was inspired by a paper discussing a pictorial tool for mood measurement (Vastenburg et al., 2012)[74], [75]. Pick-A-Mood is a visual mood scale that uses cartoon characters to help people express their emotions quickly and accurately. In the prototype, when the user hovers or presses one of the emotions, a coloured rectangle reveals itself, showing that this emotion has been selected.

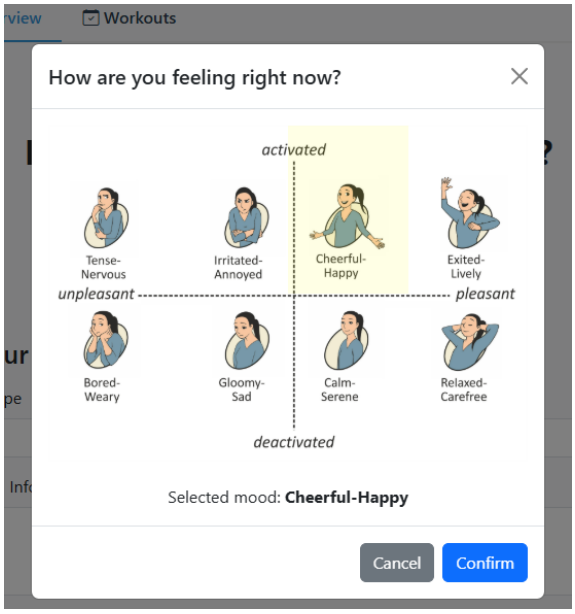

Figure 6.2: The Mood Check window, visual from (Vastenburg et al., 2012) [74], [75]

After performing a mood check and setting a goal, the user can press the “Set Goal and Receive Advice" button, making the set AI model generate advice for the user’s goal. The AI takes the user’s set mood into account for the advice. At the bottom of the advice, the user is prompted to change their goal for more advice, or asked whether they are ready to perform their exercise, which can be seen in Figure 6.7. The AI coach will make comments based on the user’s change in goal. The user may change their goal if the AI-generated advice convinces them to. Below the “Set Goal and Receive Advice” button, a note is visible, mentioning that the AI coach can make mistakes in its advice. Making users aware of the potential risk of AI.

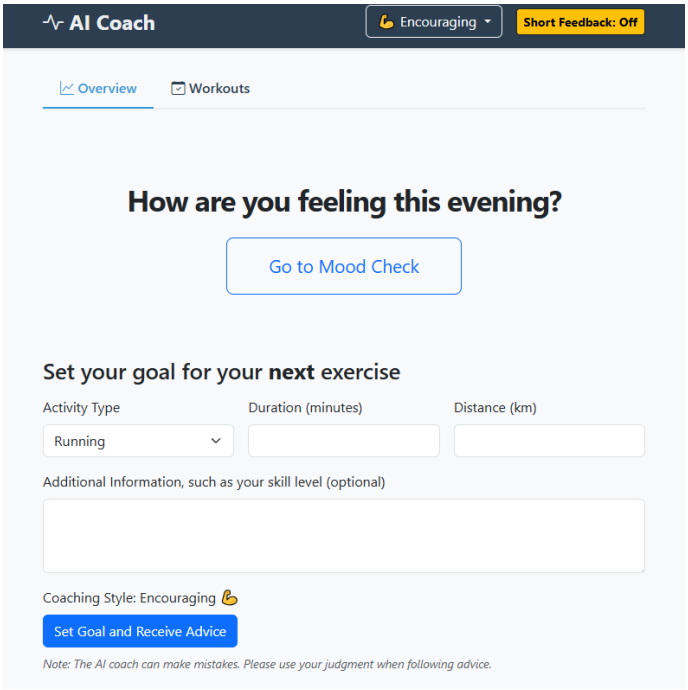

Figure 6.3: Overview tab UI without mood & goal set

When returning from their workout and Google Fit has processed the data, the user then interacts with the "Workouts" tab, which is displayed in Figure 6.4 and shows the last 10 workouts from the last 7 days of their Google Fit account. The user is then prompted to re-perform the mood check if their mood has changed post-exercise. This change in mood will be taken into account for the workout feedback. If your most recently logged exercise is not yet displayed, you can press the "Refresh Workouts" button. In case Google Fit does not sync correctly with the prototype, the option to manually add their workout is available. Allowing for AI feedback on the user's workout, even if the user's most recent workout is not being synced with Google Fit. The user can then press their recent workout, pressing the "Generate AI feedback" button. This button then generates feedback based on the users' change in mood, sports performance, and whether they have met, missed or exceeded their previously set goal. Lastly, in the top right of the UI, a "Short Feedback" button is shown. If pressed on, the AI coach will constrain itself to provide feedback in 6 to 12 sentences. If this function is turned off, the AI has no constraint and will provide feedback in a length it finds satisfactory.

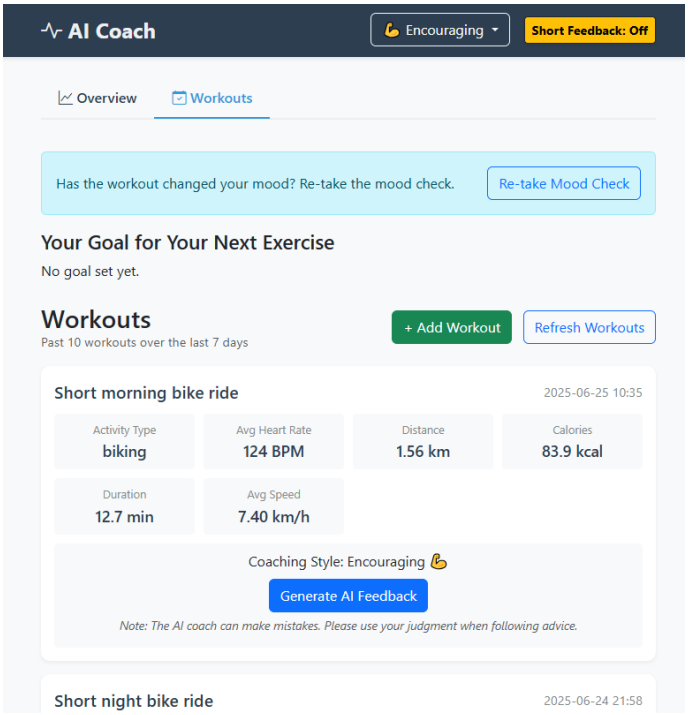

Figure 6.4: The Workouts tab, metrics of most recent workouts

In order to summarise and provide the reader with a clearer view of the user flow, a flow chart has been created, which can be seen in Figure 6.5. Going over the flow of the user experience and the choices the user can make. The most important note in the realisation is that the user first receives AI-generated **advice** for their goal, post-exercise the user receives AI-generated **feedback** for their workout.

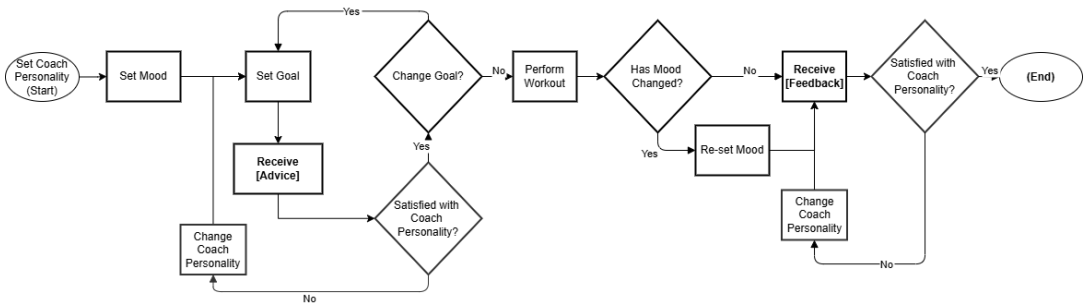

Figure 6.5: Flow of user experience in a flowchart

6.3 Back end

6.3.1 AI choice

Due to the prototype using the Generative Language API from the Google cloud, only AI models created by Google were able to be utilised [72]. Gemini 2.5 Flash was chosen for this prototype because it provides fast response times, which is necessary when users need fast feedback before or after workouts. The "Flash" version is specifically designed for speed while maintaining good quality, making it ideal for quick coaching responses. As Google's latest model, Gemini 2.5 includes the most recent improvements and better

performance compared to older versions, such as Gemini 1.5 [38], [72]. A clearer view of the context and Google ecosystem of the prototype can be seen in Figure 6.9.

AI feedback prompts

The AI coaching feedback system uses a structured prompt that combines workout data like heart rate and distance, with the user's mood and set goal to create a personalised response that feels relevant to the user. The prompt used for the work-out feedback can be seen in Figure 6.6, which works by first telling the set AI model (Gemini 2.5 Flash) what kind of coaching personality it should use. Gemini is then shown all the workout data like heart rate and distance, comparing how the user did compared to their original goal, and checking whether their mood has changed from before the workout. The structured prompt ends with an open prompt, giving the AI additional instructions, such as taking the user's mood into account.

```
PROMPT_TEMPLATE_EXERCISE_FEEDBACK = '''
Adopt an [{personality}] coaching style.
Analyze this workout:
- Activity: {activity}
- Duration: {duration} minutes
- Distance: {distance} km
- Avg Heart Rate: {avg_heart_rate} bpm
- Calories: {calories} kcal
- Avg Speed: {avg_speed} km/h
- User mood: {mood}

Compare with user's goal:
- Goal Activity: {goal_activity}
- Goal Duration: {goal_duration} minutes
- Goal Distance: {goal_distance} km

Provide personalized feedback and recommendations,
including how this workout compares to the user's goal.
```

Figure 6.6: The structured work-out feedback prompt with a shortened instruction

Types of AI coaching styles

In Table 5.1, functional requirement number 4 under the Must Have category specifies that the prototype must include coaching styles. As shown in Figure 6.1, the system supports three coaching styles: Encouraging, Analytical, and Disciplinary.

The **Encouraging** style is designed to be supportive and motivating, celebrating the smallest achievements of the user. The **Analytical** style was designed for users who prefer a data-driven approach, focusing on bullet points of the user's data and how they can optimise or improve. The **Disciplinary** style is intended for users who prefer direct and honest feedback, offering "harsh truths" rather than the supportive tone of the Encouraging style. In Figure 6.7, three goal-setting feedback outputs of the three styles are shown. The mood was set to Gloomy - Sad, and the goal was set for running 2 kilometres in 15 minutes with the "Short Feedback" on.

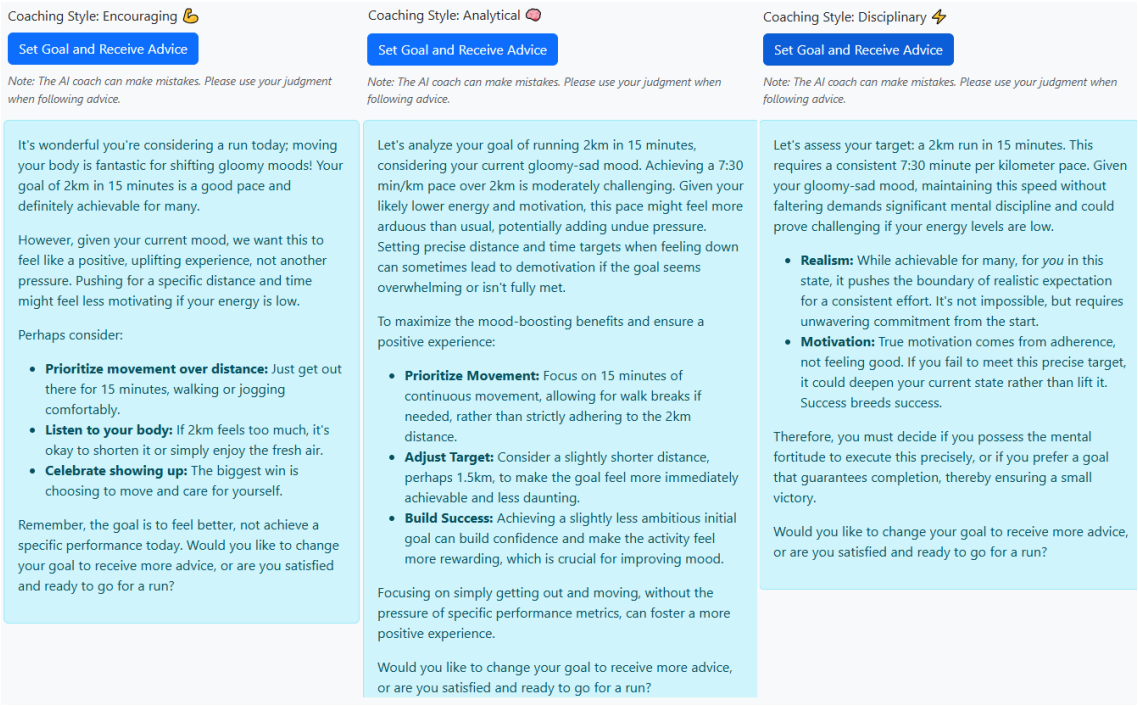

Figure 6.7: The distinct differences between the coaching styles and their provided Advice

6.3.2 Architecture of System

The finalised prototype uses an architecture that divides the system into three distinct layers: Client layer, Server layer, and the Google Cloud layer, which takes care of the external API's.

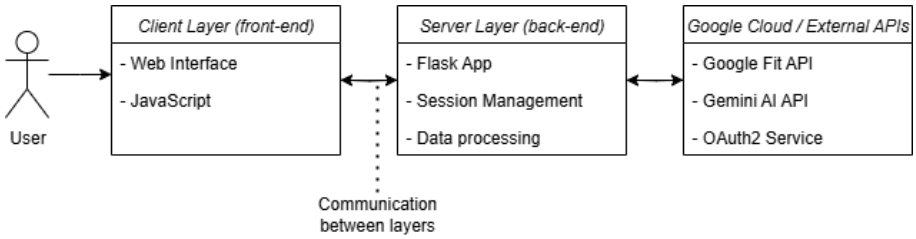

Figure 6.8: The Architecture of the system and communication between layers

Client Layer (front-end)

The Client Layer represents the user interface and all client-side functionality that the user directly interacts with through their web browser. This layer is responsible for presenting data to users, capturing user input and interactions, and making API requests to the server layer. Components include:

- Web Interface: HTML-based user interface
- JavaScript: JavaScript code, Client-side logic, handling user interactions

Server Layer (back-end)

The server layer handles all server-side processing and takes care of the communication between the user interface and the External API's. Components include:

- Flask App: A Python web framework handling HTTP requests
- Session Management code: User state management and temporary data storage
- Data processing code: Logic for transforming, analysing, and formatting the fitness data

Google Cloud or External APIs Layer

The External API layer contains all third-party services and external data sources that the application integrates with to provide the user with Google Fit data. Components include:

- Google Fit API: Allows for fitness data retrieval, providing the user with workout data and health metrics.
- Gemini AI API: Generative AI service, allowing for external use of Gemini
- OAuth2 Service: Google Authentication service managing secure user login and Fitness API access permissions.

6.3.3 Data flow of System

The data flow in the system begins with the smartwatch, which collects health metrics during the user's workouts. These metrics include heart rate, distance, speed, and duration of activities. The smartwatch then syncs this collected data with Samsung Health, which then sends the data to Google Fit through the Health Connect application, ensuring all fitness data is in the Google Fit platform.

When a user accesses the web application through their mobile browser, the Python Flask application running on the host computer initiates an OAuth 2.0 authentication check with the Google Cloud. After successful authentication, the prototype gains secure access to the user's Google Fit data through the Fitness API.

As users interact with the web interface, they can set workout goals and provide additional context about their current mood and fitness goals. When users request feedback, the application processes the workout data along with their personal goals and mood information. This data is then sent to Google's Gemini API, which analyses the information and generates personalised coaching feedback based on the structured prompts mentioned in Section 6.3.1. Based on this prompt, the Gemini API considers various factors such as the user's performance compared to their goals and their reported mood to provide relevant and motivating feedback.

The generated feedback is returned to the Python Flask application, which formats and presents it through the web interface on the user's web interface. Figure 6.9 visualises the data flow of the system.

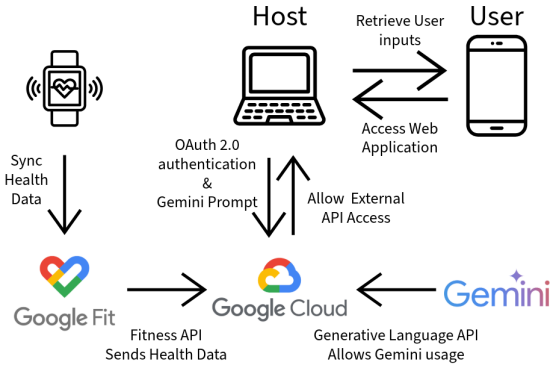

Figure 6.9: Data flow of the Prototype

6.4 Conclusion and Requirement Analysis

The realisation phase successfully implements most of the functional and non-functional requirements mentioned in Chapter 5. The prototype displays its ability to provide feedback, integrate with Google Fit, and adapt to the user's mood. Succeeding in implementing the core "Must Have" functional requirements. However, some "Could" and "Should" have requirements, like visualisations, which were not added due to time constraints and feasibility. The requirements tables from Chapter 5 include an additional "Implemented" column, which indicates whether the requirement has been implemented in the prototype. These tables are displayed in the following section.

6.4.1 Functional Requirements

Table 6.1: Functional Requirements and their Implementation Status

MoSCoW Category	Functional Requirement	Implemented?
Must Have	1. **Feedback**: The system must be able to provide feedback to the user.	Yes
	2. **Integration with Google Fit**: The tool must allow users to interact with and view their performance data (e.g., step count, previous exercises).	Yes
	3. **Mood logging system**: Users must be able to complete a mood check before each workout through an intuitive interface, such as a slider, emoji interface, or something similar as in Figure 4.3.	Yes
	4. **Coaching personalities**: The prototype must have the option to select in what tone the user would prefer their feedback is provided.	Yes
	5. **Goal Tracking**: The prototype should allow the user to set a goal (e.g., distance) before performing physical exercise.	Yes
	6. **Mood-adaptive AI**: The prototype should be able to provide useful insights by combining psychological inputs and the user's Google Fit data, making the AI context-aware of the user's mood and goal.	Yes
	7. **Exercise Refresh Button**: The prototype should allow users to refresh their past exercise data without needing to restart the prototype.	Yes
Should Have	8. **Short Feedback**: The prototype should have a function that provides the user with shorter text feedback.	Yes
	9. **Manual Exercise Tracking**: The prototype should have a function that allows the user to manually input their most recent exercise, in case Google Fit is not syncing with the Google Cloud.	Yes
Could Have	10. **Performance Metric Visualisation**: Post-workout feedback could include radar graphs or other visualisations to present user performance metrics.	No
	11. **Training Regime Generation**: The Coach could provide a training regime based on the user's goals and mood.	No
	12. **Gamification**: The tool could include gamified elements, such as challenges and badges.	No
Won't Have	13. **Real-time Feedback**: The tool will only provide feedback before or after exercise.	No

6.4.2 Non-Functional requirements

Table 6.2: Non-Functional Requirements and their Implementation Status

MoSCoW Category	Non-Functional Requirement	Implemented?
Must Have	1. **Usability**: The prototype must have an intuitive interface for easy navigation of the main features. Visual elements must be clear to help users understand their performance.	Yes
	2. **Tool Performance**: The prototype must be able to process mood and fitness data directly after an exercise has been logged in Google Fit, immediately providing feedback.	Yes
	3. **Past Workout Access**: The user must be able to access previously recorded exercises from the Google Fit application.	Yes
Should Have	4. **Compatibility**: The prototype should work on Android and iOS to ensure accessibility.	Yes

Chapter 7

Evaluation

The prototype that was created during the realisation phase will be user tested and evaluated in this chapter. The purpose of the evaluation chapter is to help uncover whether the user experience is satisfactory. Uncovering possible gaps in the design and functional requirements of the prototype.

7.1 Participants

The participants in this study are **casual runners**. Casual runners, as mentioned in Chapter 2, are runners who typically train 1 to 3 times per week with informal and less structured exercises. Emphasising enjoyment and the health benefits of running rather than performance. For this study, the casual runners are required to be older than 18 years old.

7.2 User Test Set-up and Procedure

The user testing was done in 3 parts. The briefing, prototype testing and an interview. During the briefing, the participants were informed about the purpose of this study, the function of the prototype and the procedure of the user test.

7.2.1 The Briefing

The participants were briefed through the use of a printed information sheet. This information sheet can be found in Appendix C. After having read the information sheet, the participants were asked to fill out a consent form. This consent form outlines the purpose of the data collection and terms of the voluntary participation, informing the user that they are allowed to withdraw from the study. This consent form can be found in Appendix D. After the consent form has been signed, the participant will be provided with a Smart Watch.

7.2.2 The Prototype Interaction

The participants were then introduced to the prototype. Participants interacted with the prototype without any tutorial or instructional guidance, which allowed for observations related to the intuitiveness of the system. The prototype starts with a pop-up window asking the participant what type of personality they want the AI coach to have. The participants are then required to set a mood in the mood check pop-up window and set a

goal, such as time and distance. This is necessary to provide the AI with more context, so it can generate personalised advice. When done successfully, the participant then presses the "Generate feedback and receive advice" button, which provides the user with advice based on their goal and mood. The AI-generated advice concludes with the sentence: "Would you like to change your goal to receive more advice, or are you satisfied and ready to go for a run?" signalling to the participant, if they are satisfied, that they are ready to go perform physical exercise.

The participants will then perform a workout. The workout has been performed on the Utrack on the campus of the University of Twente. The researcher joined the participants in their run if preferred by the participant.

When returning from their workout, participants were then asked to interact with the prototype once more. When opening the "Workouts" tab, the participants were asked by the prototype whether their mood had changed due to the workout, prompting the user to perform the mood check once more. When done successfully, participants needed to press the "Refresh Workouts" button for Google Fit to sync its data with the prototype. When synced correctly, the participant pressed their latest workout, analysing their performance(distance, duration, average heart rate). To receive feedback based on their latest workout, the participant was required to press the "Generate AI Feedback" button. After receiving feedback, the participants were then informed about the "Short Feedback" button and, if unaware, the ability to change the coaching personality. Allowing the participants to experiment with the types of personalities.

7.2.3 The Interview

After the participant was done experimenting with the prototype, the participants were then asked to perform a semi-structured interview, answering questions related to their experiences with the prototype. Interview questions were read aloud by the researcher from a computer, and responses were written down manually. The questions asked during the interview can be found in Appendix E. After the interview, the participants were asked whether they had any more questions related to the prototype.

7.3 Evaluation Results

A total of eight people were evaluated for user testing of this prototype. All participants can be categorised as casual runners because they run 1 to 3 times per week. The questions used for the interview have a qualitative focus, aiming for useful insights and improvements related to the prototype. The results of the interview can be found in Appendix F. These results can be divided into subsections. Below are all the observations and findings that have been uncovered during the user testing.

7.3.1 Look & Feel of User Interface

The results from the evaluation of the User Interface showed an appreciation for how minimalistic the prototype was. The minimalism helped make the experience intuitive and straightforward to use, preventing participants from getting lost. Participant 7 stated that the prototype's navigation mapping could be improved, and they thought some actions required a higher cognitive load than they would have liked. Participant 8 noted that the colour palette could have been more intrusive, making it pop out more.

7.3.2 Mood check

The participants' opinions on the mood check graph, shown in Figure 6.2, were rather diverse. 3 out of the 8 participants thought the grid was clear and sufficient in its emotions. Other participants thought it was quite bare bones. Participants 2, 4 and 5 suggested a broader range of moods, participant 8 suggested using a wheel rather than a grid, participants 5 and 7 suggesting having the option of a "Other" mood and, finally, participant 4 stated that they would have liked the option to select a specific point in the grid rather than a specific mood.

7.3.3 Feedback & Advice Initial Impressions

The initial impressions of the AI-generated feedback and advice were shaped by the perceived uniqueness of the coaching personalities. While all participants were unaware of the ability to change coaching style, when told, they appreciated the possibility to change their AI coach's style. Participants 1 and 5 noted the encouraging tone to be very pleasant, while the disciplinary tone was perceived as harsh or even demotivating. Similarly, participant 4 thought the encouraging tone felt supportive, while the disciplinary tone felt "*a little intense*." Participant 2 noted that they thought the analytical style felt "*most complete*" due to its direct analysis.

Participants 1, 2, 5 and 6 mentioned their appreciation for the personalisation of the prototype, noting the AI coach's ability to combine the user's mood and goals into the feedback. Participant 6 reacted positively to the AI's ability to acknowledge the participants' changes in mood.

Regarding the presentation of the feedback, participants had mixed feelings. Although participant 1 appreciated the use of bullet points to structure the text, participants 3 and 4 thought that the length of the text was too long, even when the "Short Feedback" function was set to on. Participant 4 suggested that key information should be written in bold for easier readability. Lastly, participant 7 expressed that they thought the feedback felt too "AI-generated" due to its use of bullet points.

7.3.4 Trust in Feedback & Advice

In terms of trust, all 8 participants had a kind of "blind" trust in the feedback provided by the AI coach. 7 out of 8 participants mentioned that they trusted the feedback of the AI coach, due to the feedback that mentioned the data they had put into the prototype(goals, mood, and results of the workout). However, participant 2 likes to go in-depth into the feedback, but doubts the validity of the feedback as the AI coach felt too tailored and trained for coaching and optimising their workout. Participant 4 mentioned that the feedback made sense and was correct, but often talked about information they already knew.

Participants 1, 6 and 8 mentioned that they trusted the feedback based on the terminology used in the feedback as it applies to the workout. To them, the feedback provided felt like it was based on research and information related to running and thus felt more inclined to be trustworthy. Participant 8 even mentioned that the AI coach mentioned they walked a "brisk" pace, showing to the participant that the AI coach was aware of what types of paces there are.

7.3.5 Adaptation of AI Coach to User Mood

Initially, most participants were not aware that the AI feedback was adaptive based on the participant's mood. An observation made was that when participants' 8 mood was set as Irritated-Annoyed, the AI coach would adjust its feedback to be less intense. Participant 7 noted that they felt the AI coach's feedback was adjusted to their cheerful mood, as the feedback felt energetic.

7.3.6 Influence on Participant Motivation

The prototype showed a varied capacity to influence participant motivation. The coaching styles had a significant impact on motivational responses. Participants 1,3, and 4 noted that the encouraging tone positively influenced their motivation, while the disciplinary tone was disliked. They could envision a scenario where they would like to hear "*harsh truths*". Participant 4 mentioned that they felt motivated because the feedback encouraged them by stating, "You can do this!".

While encouraging advice may directly influence motivation, participants 5 and 6 mentioned they felt motivated by the prototype because the advice reminded them how healthy it is to go for a run. This feeling was further supported by the fact that they felt better after the workout. Participant 2's motivation stemmed from an internal drive to prove their capabilities to the AI coach by achieving their set goals.

Regarding the contents of the advice, participants 2,7, and 8 initially felt that the content itself did not directly motivate them. However, the AI's ability to incorporate their data as context was what motivated them. Participants 2 and 7 mentioned that the AI taking their data as context motivated them to exercise, as it made them curious what the AI coach would generate. Participant 7 noted that the advice on their goal informed them more about how to approach their run, but it did not necessarily motivate them to exceed or change their goals. Participant 8 found the goal-related advice to be less useful but experienced an increase in motivation and satisfaction with their run from the post-workout feedback, making them feel better about their run.

7.3.7 Opinions on Coaching Styles

In terms of coaching styles, participants provided unique perspectives regarding the provided personalities. Participant 3 observed that the analytical coaching style was more direct and straight to the point in its feedback than the other personalities. Participants 4 and 6 pointed out that the encouraging personality was supportive, while the disciplinary personality was mean or discouraging, often criticising the user for not achieving their goal. In general, most users felt like the coaching personalities corresponded to the AI being either, supportive, neutral or discouraging/strict.

7.3.8 Issues with User Experience and Flow

The functions themselves, such as the mood check and goal setting, were quite clear to the participants. The flow of the user experience, however, was confusing to some. Participant 6 mentioned that they were initially unaware that the AI coach was context aware of their mood, goals and performance.

An observation made was that 5 out of 8 participants instantly went for the goal setting

rather than the mood check. The participants mentioned this was their first instinct after reading the briefing sheet from Appendix C. Participants 2 and 7 mentioned that it took quite some time for the AI to generate feedback. A common critique of most participants was related to how they did not know where to go, missing that they could re-take the mood check, that they could edit the coach after initially selecting personality, and missing the short feedback button in the top right corner. These participants suggested the addition of a tutorial or help button. Participants 3 and 7 suggested for the AI-generated feedback to be already generated in the back-end, pressing the generate feedback button would then reveal the feedback rather than making the AI generate it. Decreasing the time the user has to wait for their AI-generated advice or feedback. As for the Short Feedback button, User 7 suggests that the AI-generated feedback should start with the Short Feedback mode and show an expand button at the end of the feedback for if the user would like an extended or more in-depth feedback.

Participant 2 mentioned that they were missing other options for setting goals. They suggested the addition of a heart rate zone goal, rather than distance and duration. Users 5 and 6 would have liked to see more visuals rather than text, such as having confetti explode over the UI display after completing a workout. User 6 mentioned the idea of having a streak function. Lastly, user 8 mentioned they would like to see the colour scheme of the UI display to be a bit more engaging, as they felt the colour scheme was not intrusive enough.

7.3.9 General Improvement Suggestions

In terms of general improvements, most improvements have already been mentioned earlier in this Section. However, other suggestions include a more distinct difference between the UI and the feedback provided. This can be done through more contrasting colours, pop-ups and visuals. Furthermore, although the minimalism of the UI was appreciated, participant 2 felt the prototype was too much like a Python script converted to a web page. Lastly participant 6 suggested having the drop-down menu to change AI coaching personality next to the generate feedback button rather than in the top-right.

7.3.10 Additional Comments

In general, the participants were satisfied with the system being a prototype. Participant 2 mentioned that the AI coach should be less strict, as their feedback scolded them for walking 300 meters more than what was planned. This participant suggested that the AI should provide advice based on percentage improvements(e.g. Try improving your distance by 10% more). Participant 3 suggested that the system should provide the user with pop-up notifications that remind the user to go on a run.

7.4 Conclusion

The evaluation chapter revealed that the prototype provides a generally satisfactory user experience, its minimalistic design and personalised feedback being appreciated by most of the test participants. Participants valued the AI coach's ability to adapt its feedback based on mood and personal goals. Opinions on coaching styles varied, with the encouraging tone being the most motivating. The disciplinary tone was often seen as too harsh and mean.

User motivation was influenced by various factors, like the personalisation of the feedback. Some participants felt motivated by the reminder of the health benefits of running, while others were driven by their desire to meet their goals or to prove themselves to the AI coach.

Participants' suggestions include enhancing the user flow with tutorials or help buttons, reducing the feedback generation delay, and adding features like expanded mood options and the addition of visuals. While the prototype shows potential to motivate casual runners, improving the prototype in these areas will enhance its performance and usability.

Lastly, the conducted interview contains a Likert scale related to the prototype. However, either the quantitative results from this Likert scale were not significant enough, or the results from the interview itself made the answers from the Likert scale obsolete. Thus, the choice was made not to discuss the Likert scale results.

Chapter 8

Discussion

The discussion chapter reflects on the findings of the study, addressing research and research questions, discussing the implications of the results, mentioning related limitations, and suggesting directions for future work.

8.1 Research Questions

This study aimed to answer the following research question: *What are the psychological and physical factors that influence casual runners in their motivation to train?*.

Additionally, this study aimed to answer the following design question: *How to make use of current generative AI models in combination with running data.*

The research began by exploring the traits and motivations of casual runners, defining them as individuals or runners who prioritise enjoyment and health benefits over the competitive side of running. An observation that was made was that there was a gap in the white literature, as most studies do not necessarily dive into "What" a casual or recreational runner is. Limiting the results of the background research of this study. A method to bypass this limitation was to analyse grey literature. The grey literature analysed dives into the *general* physical and psychological factors, such as why runners quit or why running is "fun". Key findings from Chapter 2 show that casual runners are primarily driven by intrinsic motivations such as health, enjoyment and personal achievements. They value the flexibility and accessibility of running.

The results of this study highlight that incorporating psychological factors, such as a user's mood, into a feedback system is feasible and can enhance the personalisation and motivational impact of the users running feedback. The prototype successfully combines mood-based input with the user's set goal and performance data to generate personalised feedback.

8.2 Implications

The findings of this study have several implications for the design and development of AI-driven feedback systems.

- **Potential for other domains:**

While the prototype has been designed for casual runners, the functionalities of the mood-based personalisation and AI coaching feedback could be applied to other sports-related domains, such as fitness tracking.

- **Bridging the State-of-the-Art Gap:**

  By focusing on feedback systems and applications, this study contributes to the development of improved AI generative feedback. The addition of mood checks and AI coaching personalities are functionalities that can be easily integrated into current feedback applications.

- **Non-intrusive Psychological Integration:**

  While not the focus of this study, the prototype highlights the potential for a non-intrusive way of implementing psychological factors, such as a user's mood, into (sports) feedback systems.

8.3 Limitations

Several limitations were encountered during the development of this thesis. One of the key technical challenges encountered was the limitation of the Fitness API from the Google Cloud Platform. In the work-out tab of the prototype, live data of the user's previous workouts are shown as seen in Figure 6.4. However, the data from the user's Google Fit would often not synchronise fast enough, sometimes taking up to 6 hours to sync. During user testing, luckily, out of the 8 tests, 6 tests instantly synchronised with the prototype. This inconsistency may have affected the seamlessness of the user experience. The validity of the AI's output can also be acknowledged as a limitation, as there was a possibility of unpredictable or incorrect advice.

Another limitation is the explorative nature of the thesis. The primary objective of the thesis was to determine whether a functional prototype that uses sports data and performance data to provide AI-generated feedback could be realised. Thus, the thesis was more focused on the feasibility than on the refinement of the prototype.

The final two limitations dive more into the argumentation of some design choices, namely the coaching personalities and the prompt engineering for the AI. The selection of the personality styles for the AI was made spontaneously during the Ideation and Realisation phase, rather than based on literature and interviews. As for the prompt engineering, during the realisation phase, a structured prompt was designed, which can be seen in Figure 6.6. While this prompt was iteratively worked on until it met the required functionality, its design was not based on existing prompt engineering literature.

8.4 Future Work

The prototype has highlighted the possibility of integrating psychological factors into AI-generated feedback systems for casual runners. However, there are several opportunities for innovation to build on the current prototype, integrating and enhancing its functionality, user experience and marketability. Functionalities include:

8.4.1 Implementing User Feedback

User evaluations provided valuable information on areas for improvement in the prototype. One area mentioned is the User Interface (UI). Although participants appreciated the minimalistic design, some noted that navigation could be more intuitive. Future iterations of the prototype should focus on refining the UI to ensure an intuitive experience.

8.4.2 Implementation of Preliminary Concepts

In Chapter 4, additional ideas were thought of for this study, however, these ideas did not necessarily align with the study's goals. However, these concepts would be important additions to the current prototype. The integration of visuals and gamified elements would enhance user engagement. As mentioned in Chapter 4, the implementation of radar graphs would be a nice addition, providing a clear and motivating visual representation of the user's potential improvement. In addition, gamification features such as badges and streaks could be introduced to make the feedback system more interactive and rewarding.

8.4.3 Marketability and Development of a Complete Application

Lastly, to maximise the impact of the system, future work should focus on transforming the prototype into a fully fledged application. This development would involve addressing technical constraints, such as ensuring compatibility with a wide range of wearables. Additionally, the application must be enhanced with features such as user accounts, which require secure data privacy methods. Lastly, a market-ready application would also require branding to ensure success.

Chapter 9

Conclusion

This study explored the potential of AI-generated feedback to motivate casual runners by integrating psychological data, such as a user's mood, with sports performance metrics. Using the Creative Technology design method, we developed a prototype that combines features from the preliminary concepts mentioned in Chapter 4, concluding in a final concept that offers personalised feedback based on the user's mood, goals, and performance.

Through user testing with eight participants, it was found that the prototype successfully provided personalised and context-aware feedback. The encouraging AI coaching style being the most motivating. Participants appreciated the minimalistic design and the AI's ability to adapt advice and feedback based on mood and performance. However, participants suggested areas of improvement, such as enhancing the user interface by providing the user with a tutorial, reducing the delay of the AI-generated advice & feedback, and implementing more visual elements.

In general, this study displays the feasibility of integrating psychological factors into AI-driven feedback systems, highlighting the opportunity for further improvement and application in sports and fitness tools.

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Appendix A

Use of AI Tools

During the preparation of this work, the author used ChatGPT, Grammarly, Jasper, Gemini, and Cursor in order to refine sentences and grammar. Cursor was used for aiding during the programming of the study, helping with coding and debugging. Following the use of these tools, the author took full responsibility for the content, evaluating and editing if necessary.

Appendix B

Ideation Requirements Questionnaire & Results

Sports-AI Feedback requirements questionnaire

2 antwoorden

Analyse publiceren

General Questions:

How often (and how long) do you run per week?

2 antwoorden

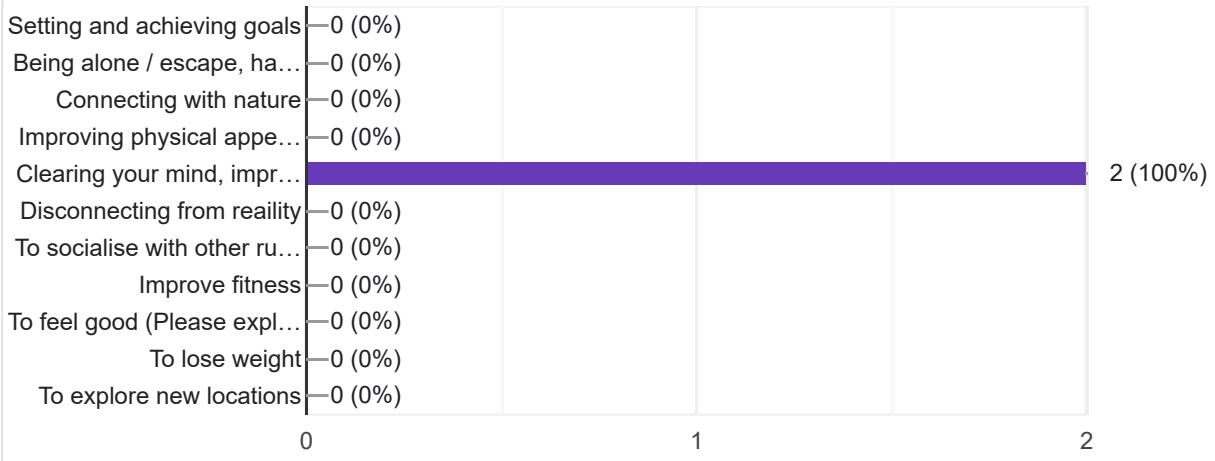
2 hrs per week

3 days, around 1 hour each

What motivates you to run?

Kopiëren

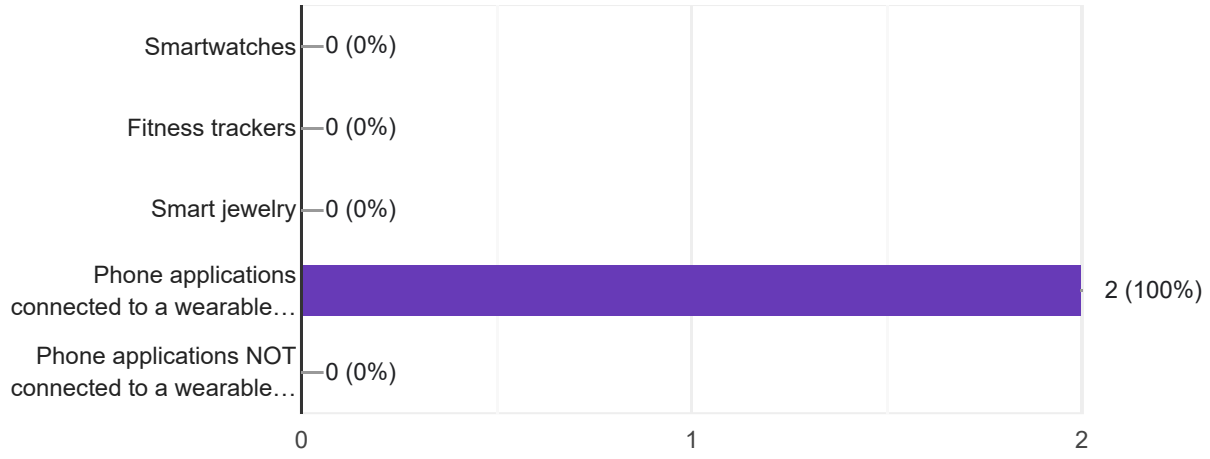
2 antwoorden



How do you currently track your exercise progress or performance?

Kopiëren

2 antwoorden



What do you find lacking or frustrating about existing tools or apps for sports feedback? (e.g. lacking certain metrics, lacking visuals, not engaging enough)

2 antwoorden

Using metrics already recorded by the apps to find trends in training and optimization of goals

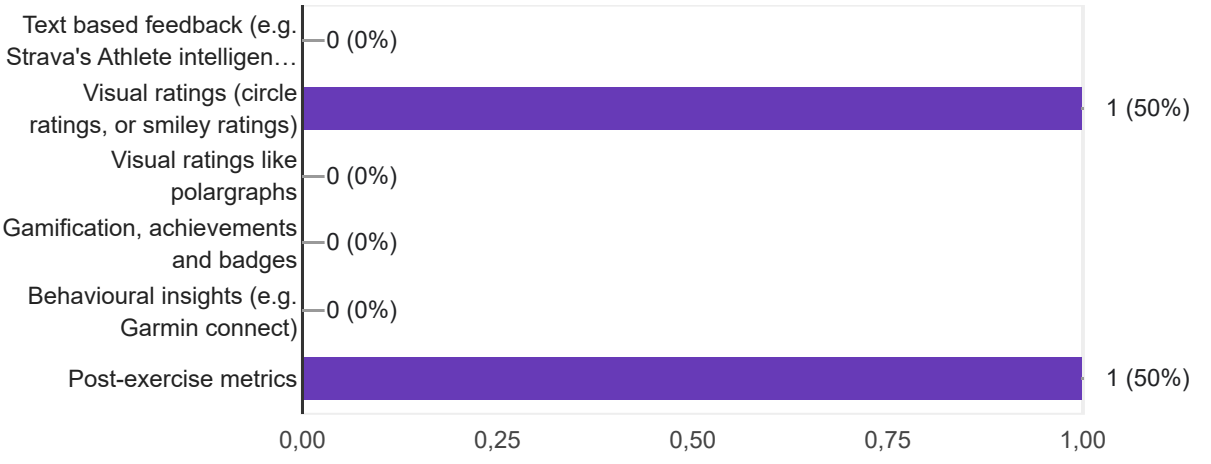
The data when it is given in charts, is hard to interpret if you are not used to seeing charts like those

Feedback Preference questions

What type of feedback do you find most helpful?

Kopiëren

2 antwoorden



Do you prefer simple or in-depth analytics and why? (Simple metrics such as running distance, or an in-depth analysis)

2 antwoorden

I prefer an in depth analysis, because it lets me extract data from my activities and create a mental map of my progress

In depth but with simple appearance, I get to understand my body better.

What kind of visual elements would you find engaging or motivating in an app or tool like this project? (e.g. graphs/charts, animations, badges, color-coded progress bars)

2 antwoorden

A single score that takes into account all metrics to categorize the activity.

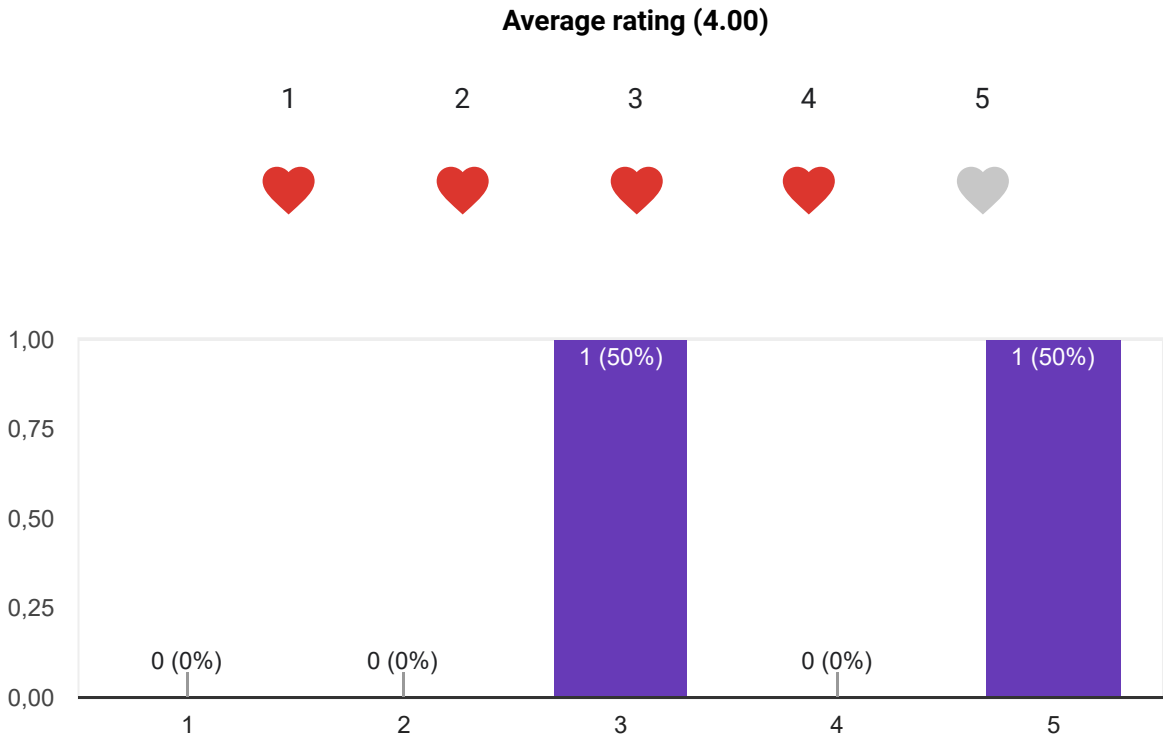
Color-coded progress bars would be nice, describing what each activity or what each value means

Questions about Psychological data

How comfortable are you with sharing your current mental-state with the tool/applications; questionnaire sharing how you are feeling in the moment? (1 being lowest)

Kopiëren

2 antwoorden



And if you are not comfortable with sharing your mental-state, to what extent would you be?

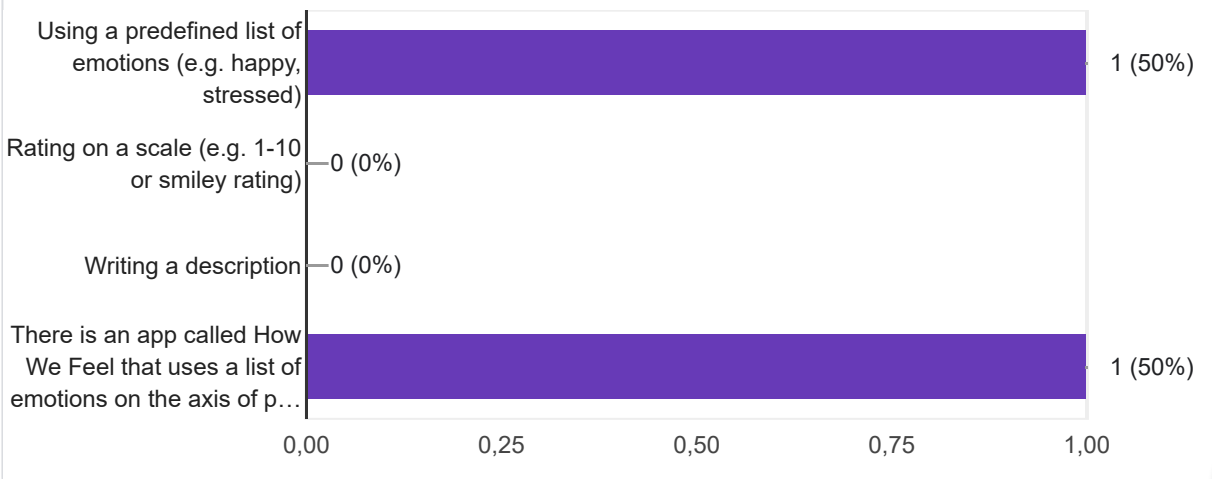
0 antwoorden

Nog geen antwoorden op deze vraag.

How would you prefer to describe your mood or emotional state?

Kopiëren

2 antwoorden



What kind of feedback would you find most encouraging when you're feeling low or unmotivated before a run?

2 antwoorden

Positive reinforcement that my goals are within my reach, but that I have to work for them

That I should remember why I am doing it and reminder of how I will feel after (getting runners high).

Do you think there is psychological data or context we've missed that could be useful for improving feedback and personalisation?

1 antwoord

Some wearables measure stress and maybe it can be misleading, driving you to feel the way the watch is saying and not reality.

Other questions

Are there any specific features you've always wanted to see in analytics/insights of a sports exercise?

2 antwoorden

Run intensity score and trends in heart function over time

The interface to be clearer.

Do you find gamification of for example, sports apps important?

2 antwoorden

No, I find that good data is more rewarding than gamified rewards

Yes 100%, completing challenges or for example Strava that tells you if you're a "local legend" is fun

If you could design your ideal exercise feedback tool, what type of feedback would you let it provide?

2 antwoorden

Optimization tools for where things could improve in my activity and trends to see improvement over time

Minimalist but insightful, clear and to the point

Is there anything else you would like to share about your preferences or expectations for this project?

1 antwoord

I would be willing to test, I am excited to see what you can come up with

Thank you!

Appendix C

Evaluation Information Sheet

Briefing Sheet for the study: “AI-generated motivational feedback for casual runners”

Authors: Arthur Vafi (based on template by BMS EC)
Last edited: 04-06-2025

Purpose:
The goal of this research aims to develop a tool that utilises running performance data of casual runners and psychological data such as someone's mood in combination with Artificial Intelligence to provide the user with meaningful and motivating feedback. As of now similar systems such as Strava’s Athlete Intelligence are limited and often provide generic feedback. This observational study’s purpose is to improve the prototype until the target user is satisfied with the results(feedback). In order to achieve a final result, thorough testing and interviews should be performed with the prototype. Obtaining formative feedback for the prototype.

Procedure:
The participants are first briefed on the context of this research. In order to obtain the necessary running performance data, participants are asked to wear a smart watch that tracks metrics such as, steps, heart rate, etc. The study begin with the participant interacting with the prototype, setting a running goal and performing a mood check. This start sequence will likely take 5 minutes. Following this, the user has to perform a run of at least 20 minutes. Post exercise, the user interacts with the prototype again, retaking the mood check. The tool will provide the user with feedback based on their performance and mood. After the observational study, the participant is asked to perform in an interview, responding to questions related to the functionality of the prototype.

Withdrawing from the study:
The participants participation is entirely voluntary, withdrawing without providing any reason is completely acceptable and will have no negative consequence.

- If the participant wishes to withdraw during the procedure, the participant should inform the researcher and the participants participation will end immediately.
- If the participant wishes to withdraw after the session, the participant should contact the researcher through email within 14 days of participation.

Personal information:
Personal information may only include participant name during observational study and their sports performance & psychological metrics such as the user’s mood.

Data utilisation:
The users data only contains sports performance and psychological metrics, this data will be stored in a recorded activity in Google Fit.

Contact Details:
If the participant has any questions about the study, wish to withdraw your participation, or has any other questions please contact the researcher:

- Arthur Vafi: A.J.Vafi@student.utwente.nl

Contact information for questions about your rights as a research participant:
If you have questions about your rights as a research participant, or wish to obtain information, ask questions, or discuss any concerns about this study with someone other than the researcher(s), please contact the Secretary of the Ethics Committee/domain Humanities & Social Sciences of the Faculty of Behavioural, Management and Social Sciences at the University of Twente by ethicscommittee-cis@utwente.nl

Appendix D

Evaluation Consent Form

Consent Form for the study: “AI-generated motivational feedback for casual runners”

YOU WILL BE GIVEN A COPY OF THIS INFORMED CONSENT FORM

Please tick the appropriate boxes

Taking part in the study:	**Yes**	**No**
I have read and understood the study information dated [04/06/2025], or it has been read to me. I have been able to ask questions about the study and my questions have been answered to my satisfaction.	○	○
I consent voluntarily to be a participant in this study and understand that I can refuse to answer questions and I can withdraw from the study at any time, without having to give a reason.	○	○
I understand that taking part in the study involves using the prototype of the study for at least 20 minutes or more, including interacting with the prototype and going for a run.	○	○
Use of the information in the study:		
I understand that the information i provide will be used for research purposes. The information will be used to evaluate the prototype and in this way assist in improving the prototype.	○	○
I understand that personal information collected about me that can identify me, such as [e.g. my name or where I live], will not be shared beyond the study team.	○	○
I agree that my information can be quoted in research outputs	○	○
Future use and reuse of the information by others		
I give permission for the interview and user data that I provide to be archived in the University Of Twente data base so it can be used for future research and learning. All personal identifiers will be removed, ensuring data privacy. Access to this data will be restricted to qualified researchers and educators	○	○

Signatures:

_____	_____	_____
Name of participant	Signature	Date

I have accurately read out the information sheet to the potential participant and, to the best of my ability, ensured that the participant understands to what they are freely consenting.

_____	_____	_____
Researcher name	Signature	Date

Study contact details for further information:
Arthur Vafi: A.J.Vafi@student.utwente.nl

Contact information for questions about your rights as a research participant:
If you have questions about your rights as a research participant, or wish to obtain information, ask questions, or discuss any concerns about this study with someone other than the researcher(s), please contact the Secretary of the Ethics Committee/domain Humanities & Social Sciences of the Faculty of Behavioural, Management and Social Sciences at the University of Twente by ethicscommittee-cis@utwente.nl

Appendix E

Evaluation Interview Questions

AI-generative runner feedback evaluation

Thank you for participating in this study. Please reflect on your experience with the AI-based running feedback system. Your answers will help us improve the prototype.

* Required

User specific questions

1. What do think think is your skill level in running?

- ◯ Beginner, Casual, Recreational
- ◯ Intermediate
- ◯ Advanced
- ◯ Other

2. How often do you run?(atleast 20 minutes per run)

- ◯ Less than 3 times per week
- ◯ 3 - 5 times per week
- ◯ More than 5 times per week
- ◯ Other

General Impressions

3. What was your first impression of the prototype? *

4. What did you think of the mood tracking system? *

5. What was your first impression of the feedback you received? Did you feel like your choice in AI coaching style actually affected the feedback? *

6. Based on your first impression, did anything about the feedback stand out to you (positive or negative)? *

7. In general what do you think could be improved? *

Credibility and Context Awareness of the Prototype

8. Did you trust the validity of the feedback the AI coach provided you? Why or why not? *

9. Did it seem the AI felt knowledgeable about your performance and mood? If so, how did you notice?

10. Was the feedback emotionally appropriate, did the prototype adjust to your (run) performance, mood, or goals?? *

Encouragement of the Feedback

11. Did the feedback motivate you to start running or exceed your goal? Why, why not? *

12. Did it feel like your AI coaching style choice made an impact on the feedback provided? If so, how did you notice? *

13. Did the feedback feel supportive, neutral, or discouraging? Why? *

14. Would you feel encouraged to use this tool again in your training routine? *

- ◯ Yes
- ◯ No

Interaction with prototype

15. Which problems did you encounter when interacting with the prototype? *

16. How easy was it to understand what to do while using the prototype? Did anything feel confusing or was it intuitive? *

17. What would you like to change about the interaction of the prototype?

Likert scale questions

18. Rate on a scale from 1 = Strongly Disagree to 5 = Strongly Agree *

	1	2	3	4	5
I trust the AI's feedback	◯	◯	◯	◯	◯
The feedback made sense to me	◯	◯	◯	◯	◯
The AI-generated feedback seemed to care about how I felt	◯	◯	◯	◯	◯
I felt motivated after receiving the feedback	◯	◯	◯	◯	◯
The coaching tone felt like it affected the feedback	◯	◯	◯	◯	◯
The protoype was appealing to look at	◯	◯	◯	◯	◯
I would use this tool again	◯	◯	◯	◯	◯

19. What would you like to change about the prototype(e.g. interaction, design, etc..)? (optional)

Appendix F

Evaluation Results of Interview Questions

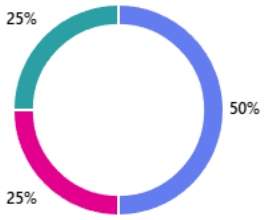
Responses Overview

Active

Responses	Average Time	Duration
8	45:10	16 Days

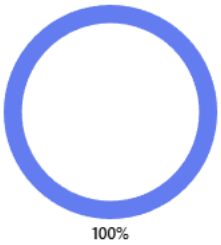
1. What do think think is your skill level in running?

Beginner, Casual, Recreational	4
Intermediate	2
Advanced	2
Other	0



2. How often do you run?(atleast 20 minutes per run)

Less than 3 times per week	8
3 - 5 times per week	0
More than 5 times per week	0
Other	0



3. What was your first impression of the prototype?

8
Responses

Latest Responses
"It was nice, intuitive, feel like the colour scheme could pop out more."
"The colour palette makes it attractive to click on things, it makes it engaging. It is ..."
"Clean, minimalistic, It showed everything I needed"
...

4. What did you think of the mood tracking system?

7
Responses

Latest Responses
"It was nice, there should be more moods added. It was limited in its choices, it sh... "
"It's clear, I know what I have to do. It could be nice if there is an other option, like... "
"Clear, I liked the use of colors, it was easily accesible."
...

5. What was your first impression of the feedback you received? Did you feel like your choice in AI coaching style actually affected the feedback?

8
Responses

Latest Responses

"It felt like it affected by the style, i chose disciplined but it didnt necessarily feel di..."
"Yes the choice of coaching affected the feedback. The feedback itself some feedb... "
"I think the feedback was the same, but the style nicely affected how they worded it."

• • •

6. Based on your first impression, did anything about the feedback stand out to you (positive or negative)?

8
Responses

Latest Responses

"I liked that it was really specific and tailored made towards me, it identified the m... "
"It feels very AI generated, it's like bulletpoints with dots. Short version of text mig... "
"It was nice that they said, just adding 3 minutes would help achieving your goals."

• • •

7. In general what do you think could be improved?

8
Responses

Latest Responses

"Making the colour scheme pop out more, it should be more intrusive and call me... "
"The feedback should go more in-depth. Maybe add a tutorial how to navigate th... "
"Some more buttons where, allowing the user to change style next to the feedbac... "

• • •

8. Did you trust the validity of the feedback the AI coach provided you? Why or why not?

8
Responses

Latest Responses

"Yeah, the analytic style it seemed like it was accurate and knew what it was talkin... "
"Yeah, I think the feedback makes sense based on what I put in."
"I believed what the AI said because it was using terminology that apply to this wo..."

• • •

9. Did it seem the AI felt knowledgeable about your performance and mood? If so, how did you notice?

8
Responses

Latest Responses

"Yes, it recommended me it was a good pace because i was not in a good mood."
"The first thing we talk about in the workout feedback talks about how the mood ... "
"Yeah it was aware about my mood, it mentioned my mood changed due to the re..."

• • •

10. Was the feedback emotionally appropriate, did the prototype adjust to your (run) performance, mood, or goals??

8
Responses

Latest Responses

"My mood was annoyed and my coach was disciplined, but the Feedback did not f... "
"In my case i has a happy mood so I felt the feedback matched my energy level"
"I was feeling sleepy and the AI coach motivated me to go for 3 more minutes to ... "

• • •

11. Did the feedback motivate you to start running or exceed your goal? Why, why not?

8
Responses

Latest Responses
"I felt like, once i got the feedback back, I felt better about the run (workout feedb… "
"Yeah I think so, after the feedback I felt I knew a bit more information as to how t… "
"Without the feedback I probably wouldn;t have started to run. It reminded me of … "

12. Did it feel like your AI coaching style choice made an impact on the feedback provided? If so, how did you notice?

8
Responses

Latest Responses
"Yes, it did have an effect on the style. I changed mainly how it perceived the data … "
"In general the feedback stays the same, the difference is the voicing and tone of t… "
"Was already answered, the encouraging was motivating and the disciplinary was … "

13. Did the feedback feel supportive, neutral, or discouraging? Why?

8
Responses

Latest Responses
"supportive, it encouraged me to keep running because it said I did a good job"
"It felt supportive, the feedback other than the metrics helps make me feel encour… "
"It felt supportive eventhough I had the tone set to analytical, it fit my situation."

14. Would you feel encouraged to use this tool again in your training routine?

15. Which problems did you encounter when interacting with the prototype?

8
Responses

Latest Responses
"No, but the coach type was not immediately noticed"
"The text for the mood and the set goal were the same size ish, so based on my k… "
"I closed the text sometimes (pressing the workout text collapses the box)"

16. How easy was it to understand what to do while using the prototype? Did anything feel confusing or was it intuitive?

8
Responses

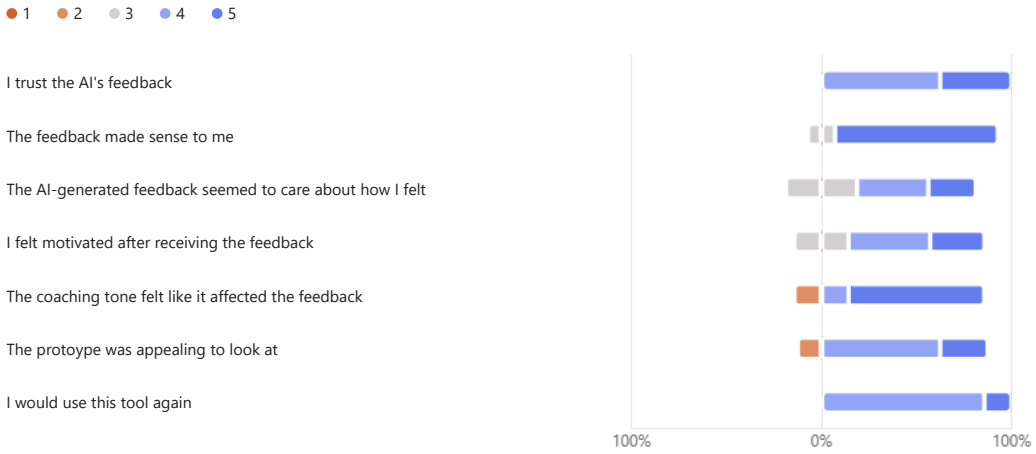
Latest Responses
"It was fairly easy."
"It was easy enough to get the hang of it. It could be clearer, I knew i needed to pr… "
"It was quite easy to understand, except the part where changing my goal would a… "

17. What would you like to change about the interaction of the prototype?

7
Responses

Latest Responses
"Perhaps the colour scheme to make it more engaging"
"Maybe start with a graph that displays my past runs (visual) Streak function."
• • •

18. Rate on a scale from 1 = Strongly Disagree to 5 = Strongly Agree



19. What would you like to change about the prototype(e.g. interaction, design, etc..)? (optional)

6
Responses

Latest Responses
"design"
"I would like a tutorial."
"more buttons, easier to navigate"
• • •