

# A Proposal for the Integration of Several Techniques to Create a New Type of Heron Deterrent

Bachelor thesis Industrial Design Engineering

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This bachelor assignment was commissioned by Velda B.V, which is a company based in Enschede that focusses on the production and sales of pond related products. The company strives for their products to be of a high quality which is simultaneously affordable. Moreover, they desire to be the frontrunner of the market they compete in, especially with relation to innovation. One of the sections of the market they indulge in involves the production of heron deterrent. Heron deterrents are requested by pond owners as herons are often found to be foraging on the expensive fish they hold in their ponds. Velda has created different types of heron deterrents before, yet these products do not always suffice. This is due to the products using several techniques that have scientifically been proven to be ineffective, yet also since herons are smart and stubborn animals that implement problem-solving to gather resources and are thus not easily repelled. To adhere to the demand of customers, Velda is looking into developing a new type of heron deterrent. Their previous developed heron deterrent products are static and passive and therefore Velda wished to explore active heron deterrent products that utilised physical movements to repel herons.

The ideation process was engaged in before any research had been performed as to obtain a wide variety of unbiased ideas that could later be explored. Research, analyses, and interviews provided insights into the behaviour and physiology of the grey heron, previously explored or implemented heron deterrents and their effectivity as well as their (dis)advantages, ponds, pond owners, Velda and its competitors as well as the overall market of heron deterrents.

Based on the idea generation, three concept directions were formed in which the different ideas were categorised. These ideas were iterated upon to give more body to the different concept directions. The concept directions were held next to the list of requirements which was established during the analysis phase. Then, the hypothesised performance of the three concept directions on each requirement was evaluated. This performance comparison resulted in concept direction three, creating distance between heron and fish, being chosen as the direction from which a concept would be chosen and developed further.

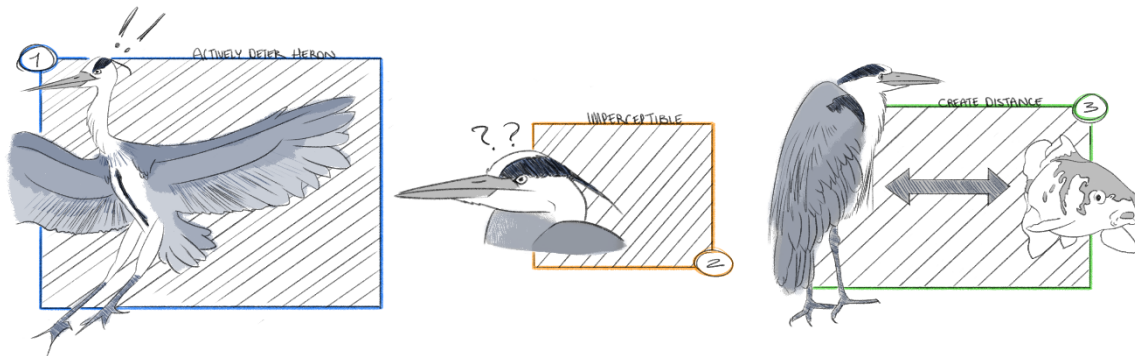


Figure 1: The three different concept directions as created, used and explored during the bachelor assignment.

Several concept ideas were compared and evaluated, yet it was chosen to explore creating a distance between heron and fish by means of acoustic fish repellent. Research was performed on the hearing abilities and sensitivity of fish, and stress and its consequences in fish. To test the effectivity of an acoustic fish repellent, an experimental study was set up and performed at Intratuin Duiven and Groenrijk Zevenaar. Several different fish species were exposed to a variety of frequencies and complex sounds at 80 dB(A) and 100 dB(A). Their behaviour with respect to the acoustic repellent was investigated and evaluated. It was concluded that an acoustic fish repellent would not be effective enough independently to create enough distance between heron and fish and thus that it should not be developed into a product solely using this technique. Instead, several other techniques were reintroduced from the concept direction of either decreasing the visibility of pond fish or impairing the sight of heron. Research was performed in the vision fields of heron and the two techniques. Suggestions were made on how the concepts could be physically achieved and once more the concepts were evaluated.

The objective of the assignment was to create an active heron deterrent that uses physical movements. The basic goal of this product would be to ensure that pond owners do not lose any more valuable fish to grey herons. This thesis suggests that the exclusion of herons may be more easily achievable by using other techniques than an active heron deterrent and it proposes several ideas, concepts, and recommendations on how to achieve this exclusion. Furthermore, several suggestions on how to improve current heron deterrence are provided.