

# Public summary

The objective of this project is to design a locking product/system for the Plus rain cover of Urban Arrow's Family electric cargo bikes. Urban Arrow is a Dutch company headquartered in Amsterdam that specializes in the manufacture of electric cargo bikes and related accessories. As the popularity of these bicycles has increased, the theft of accessories also increases, particularly the rain covers. The objective of this project is to develop a product or system that will prevent the theft of the Plus rain cover for Urban Arrow's Family electric cargo bikes. The primary research question that informs this project is as follows:

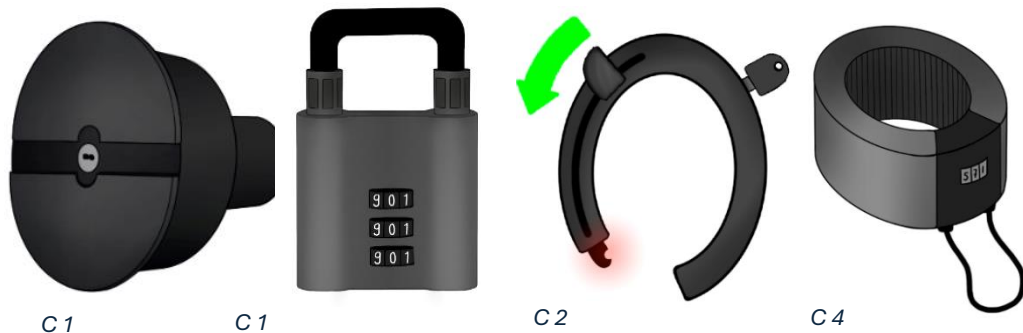


To what extent can a product/system be designed for the rain cover of the Urban Arrow's Family electric cargo bike, to secure

In order to address this question, two sets of sub-questions were formulated. The first set focused on products and safety, while the second set focused on consumer needs. In order to address these sub-questions, both empirical and theoretical research methods were employed. Empirical research involved interviews and observations, which highlighted the necessity for a rain cover that protects children from wind and rain while identifying several issues with the current design. These included difficulty in switching between rain and sun covers, Velcro catching on hair, wind affecting stability, theft problems, and insufficient window space for older children. Theoretical research included an analysis of cargo bikes, Urban Arrow's products, stakeholders, and the market, all of which indicated that theft of rain covers was a significant problem.

The findings of this research led to the formulation of requirements and the beginning of the ideation process, resulting in the following four concepts.

1. Cover lock
2. Cable lock
3. Steering wheel ring lock
4. Steering wheel cable lock



The final design was selected using the weighted criteria method, which involved weighting the main requirements and rating the concepts on a 5-point Likert scale from very poor to excellent. The final choice was concept 2, the cable lock box. The design comprises the attachment of a cable lock box to the back of the rain cover, enabling the cable to be secured to the steering wheel of the cargo bike. This configuration effectively locks the rain cover to the bike, thereby deterring potential theft. Additionally, a serial number is added to the rain cover. By making each rain cover uniquely identifiable, stolen items can be more easily traced, making them less attractive to potential thieves.

The final design was subjected to a prototype testing phase, during which users evaluated the prototype and provided feedback. The feedback was employed to refine the design and develop recommendations for future improvements.



From the feedback of the test and the results, the research objective was investigated. The final design successfully incorporates security features that prevent theft

unless the product is intentionally damaged. However, user feedback during prototype testing indicated areas for further usability improvements, such as reducing cable length, offering different locking options, and exploring digital or RFID locking technologies.

In conclusion, the project successfully developed a product that integrates effective anti-theft measures while maintaining the original functionality of the rain cover. Nevertheless, there are potential enhancements that could be made to further improve the user experience and the overall effectiveness of the product.