Last Mile Solution for Singapore

Overview

The goal of this project is to design a product that takes users a short distance, primarily preceding or following the exchange with public transportation. The overabundance of bikes and the lack of space present in Singapore presents a problem for daily commuters. Given the high cost of owning a car, the people in Singapore are searching for an alternative transportation solution that is compact and affordable. Penn State is collaborating with students from the National University of Singapore (NUS) and Brigham Young University (BYU) to create a solution to this problem.

Objectives

This semester, the PSU eMobility team designed and manufactured an electric bike to meet the needs of commuters in Singapore. The team designed the product in SolidWorks, complete with engineering drawings, and manufactured a working final prototype to model the final product.

Approach

- The team collectively identified the problem and established customer needs based on surveys distributed to the target commuter population in Singapore.
- Concepts were first independently generated by the teams and each team presented their ideas at one of the weekly teleconferences early in the semester. These ideas were built upon and formed new ideas that were generated collaboratively.
- When generating concepts, a full benchmarking process was performed to analyze the current consumer market. The team also identified patents for products and process also on the consumer market.
- The teams used Dropbox to manage all data and designed the tricycle in SolidWorks.
- An initial prototype was built prior to manufacturing the final working prototype (shown right), which was presented to the teams at the end of the semester with a full analysis and recommendation report.
- The PSU team tested the tricycle by attempting to ride the device with a 180lb load operating on the system.
- The results were based on present mechanical failures and were the core of the design improvement recommendation section which was presented to the team.

Outcomes

- While the product was not manufactured to full scale this semester, the final prototype that was presented cost the team $914.23. If the bill of materials for the full model is around this amount, the sponsor will be around 25% of the compared product, the Yike Bike.
- The design meets the needs of the customer and will be elaborated on in the second semester.