Second Generation Bike

Project Preposal

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Overview

- Customer Needs and Project Goal
- Objectives
- Constraints
- Concept Generation
- New Design Section – Generator Mounting System
- Engineering Analysis
- Bill of Materials
- Cost of Fabrication and Testing

Customer Needs and Project Goal

Customer Need

- The 1st Generation Charging Bicycle Station does not possess an adequate interactive display or an efficient energy storage system.

Project Goal

- Goal: Complete and improve the 2013-2014 2nd Generation Bicycle Charging Station.

Objectives

- The bike should be able to power small electronics
- The touch screen should be able to sustain heavy use
- The bike should be durable and reliable
- The bike should have an efficient energy storage system
- The control system should be inexpensive
- The system should look aesthetically pleasing

Objectives

Objective	Measurement	Units
Powers Small Electronics	Test with a Load Bank	Watts (W)
Durable Touch Screen	Surface Roughness/Scratches	Number of Scratches
Durable and Reliable Design	Maintenance Costs	Dollars ($)
Efficient Storage System	Test System Load Capacity	Watts (W)
Inexpensive	Cost of Additional Components	Dollars ($)
Aesthetically Pleasing	Compare Survey Results	Survey

Constraints

- Capable of charging common electronic devices in only a few hours
- Charging station must be capable of being converted from stationary to mobile in only a few minutes

Testing Environment

- A Laboratory Experiment
  - Will be used to analyze the power output of the charging station (via computer program)

- A Field Test
  - Will be used to test durability and functionality of the charging station and display screen.

Concept Generation

- Bicycle design divided into four separate categories
  - Electric Control System
  - Interactive Display Screen
  - Enclosure
  - Generator Mounting System

Concept Generation – Electric Control System

- Converts mechanical energy from the rider into usable electricity
- Stores unused electricity for later use and to power the display
- Some designs will convert DC electricity to AC electricity for AC required appliances such as laptops

Concept Generation – Interactive Display Screen

- Must be able to display power being generated, calories lost, and distance traveled
- Should display information in an educational and easy to understand manner
- Should display graphs of power outputs over time that will help the user understand the data provided

Concept Generation - Enclosure

- Must house and protect the electric control system
- Should hide any unpleasing wires for aesthetic purposes
- Should be lightweight
- Should be waterproof so that the electronics will not get damp or wet

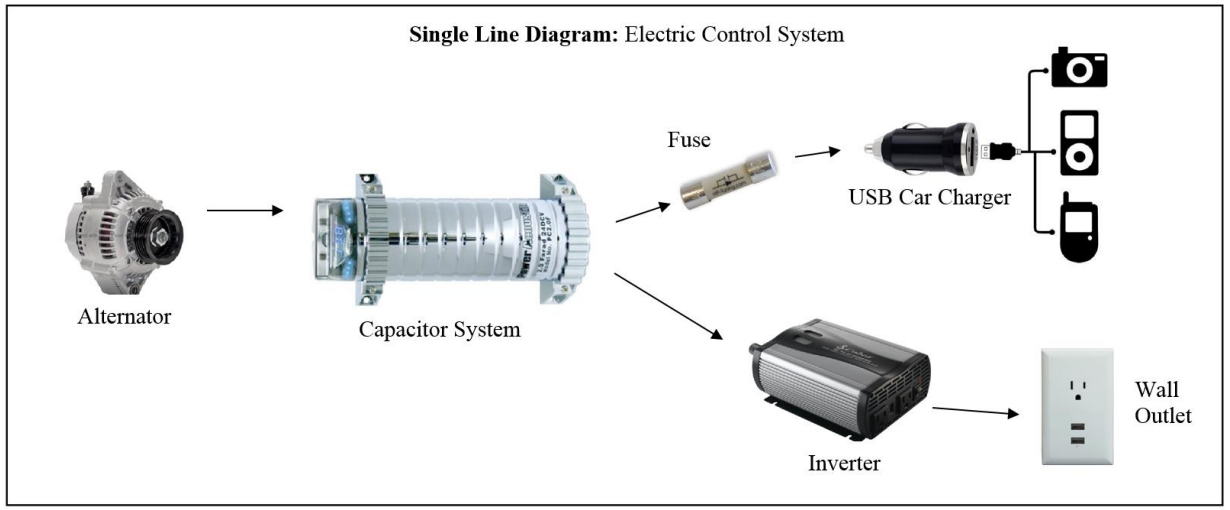
(NEW) Concept Generation – Generator Mounting System

- Must firmly support the alternator during operation and down time
- Must be reliable with little to no chance or breaking down
- Must provide a high enough RPM speed for the alternator to function properly
- Should be aesthetically pleasing and avoid any interference with the riders

Generator Mounting System (GMS) – Decision Matrix

Engineering Analysis – Electric Control System

- Car Alternator – Built in Fail Safe that prevents high power output
- Capacitor – More efficient than batteries and can stabilize power without additional parts
- Inverter – Relatively high efficiency when power output is low
- Car Phone Chargers - Keep costs low and the design simple



Engineering Analysis – Interactive Display Screen

- LabVIEW for Android – Software for chart and graph making
- Arduino – Microcontroller for sensors
- Sensors – Bluetooth module and current sensor
- Android Tablet – Contains a touch screen and Bluetooth module

Engineering Analysis – (IDS) Alternative Design Idea

- Watt meter thing

Engineering Analysis – Enclosure

- Ventilation Fan – To prevent electrical components from overheating
- Material – Pressure-treated plywood
- Dimensions – Small enough to fit between the frames and large enough to hold all the electrical components

Engineering Analysis – Generator Mounting System

Bill of Materials

Description of Material	Cost
New Car Alternator	
2 Farad Audio Capacitor	
400 Watt Inverter	
Terminal Block	
Treated Plywood Material and Clear Coating	
Wire and Terminal Clips	
Google Nexus 7	
Ventilation Fan and Filtration Material	
External Mounting System Material	

Cost of Fabrication and Testing

- All fabrication will be done by project members in the machine shop.
- No costs will be required for the fabrication of all components of the project design
- Testing of the components individually and as a whole will be done with university owned instruments
- No costs will be required for the testing of the project design

Conclusion

- The designs proposed will solve all the problems stated in the project objectives and goals.
- The new external mounting system design will solve the problem with the current design not working as well as finding a solution to securing the alternator to the bike during charging operations.
- The current design will only cost a total amount of [insert total] including cost of material, fabrication and testing.

Questions

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