

Second Generation Charging Station

Progress Report Presentation

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January 21, 2015

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Project Summary

This year's team was assigned the project of completing and improving last year's design of the 2nd Generation Charging Station. The station must

- Be mobile and therefore lightweight
- Charge the majority of small electronic devices
- Display the data of the power output in an interactive manner

Overview

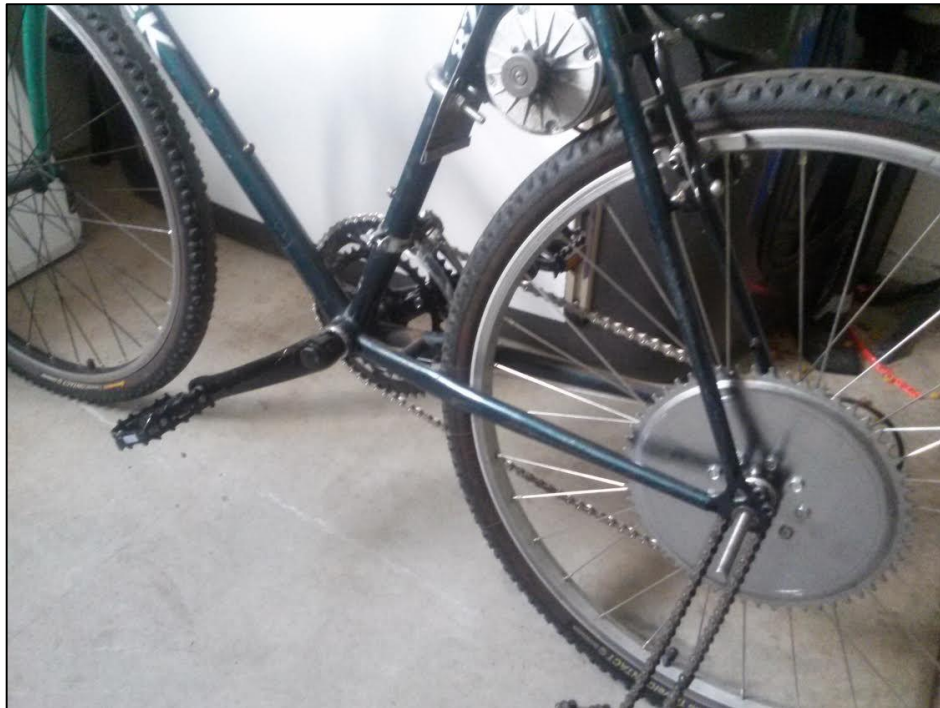
- **Already Completed**
 - Bike status
 - Ordered parts
- **In Progress**
 - Hardware testing
 - Programming
 - Bike stand and alternator mount
- **To be Completed**
 - Enclosure
 - Display screen mount
 - Aesthetics
- **Timeline**

Completed So Far

- The previous year's bike has been disassembled of the gearing system and bike stand
- Parts for the new design have been selected and ordered
- Future parts for the build have been researched and selected

Bike Disassembly

- Most of the undesired components have been detached from the bicycle
- The DC motor and mount will also be removed



Parts Ordered

- **Alternator** – One Wire, Self Exciting, New, Aftermarket Product - \$64.93
- **Capacitor** – Power Acoustik 2.0 Farad Digital Power Capacitor - \$45.13
- **Bike Stand** - RAD Portable Magnetic Work Put Bicycle Trainer - \$69.88
- **Terminal Block** – Isolated, Electric Barrier Terminal Block (Qty:4) - \$6.81

Tasks In Progress

- Alternator and capacitor are going to be set up for experimentation and testing
- An Interactive Display Screen will be designed/programmed using an Arduino microcontroller
- A mount on the bike stand for the alternator will be designed and built
- Electric Control System will be mapped out to properly fit the enclosure size

Alternator and Capacitor Testing

- The alternator will be analyzed to find its average power output, minimum required speed for start up and regular use
- The capacitor will be tested for how well it conditions the oscillating voltage from the alternator
- It will also be tested for how much power is stored inside after the alternator has been disconnected
- Both devices will be tested for fail safe procedures in the event of overcurrent output.

Interactive Display Screen

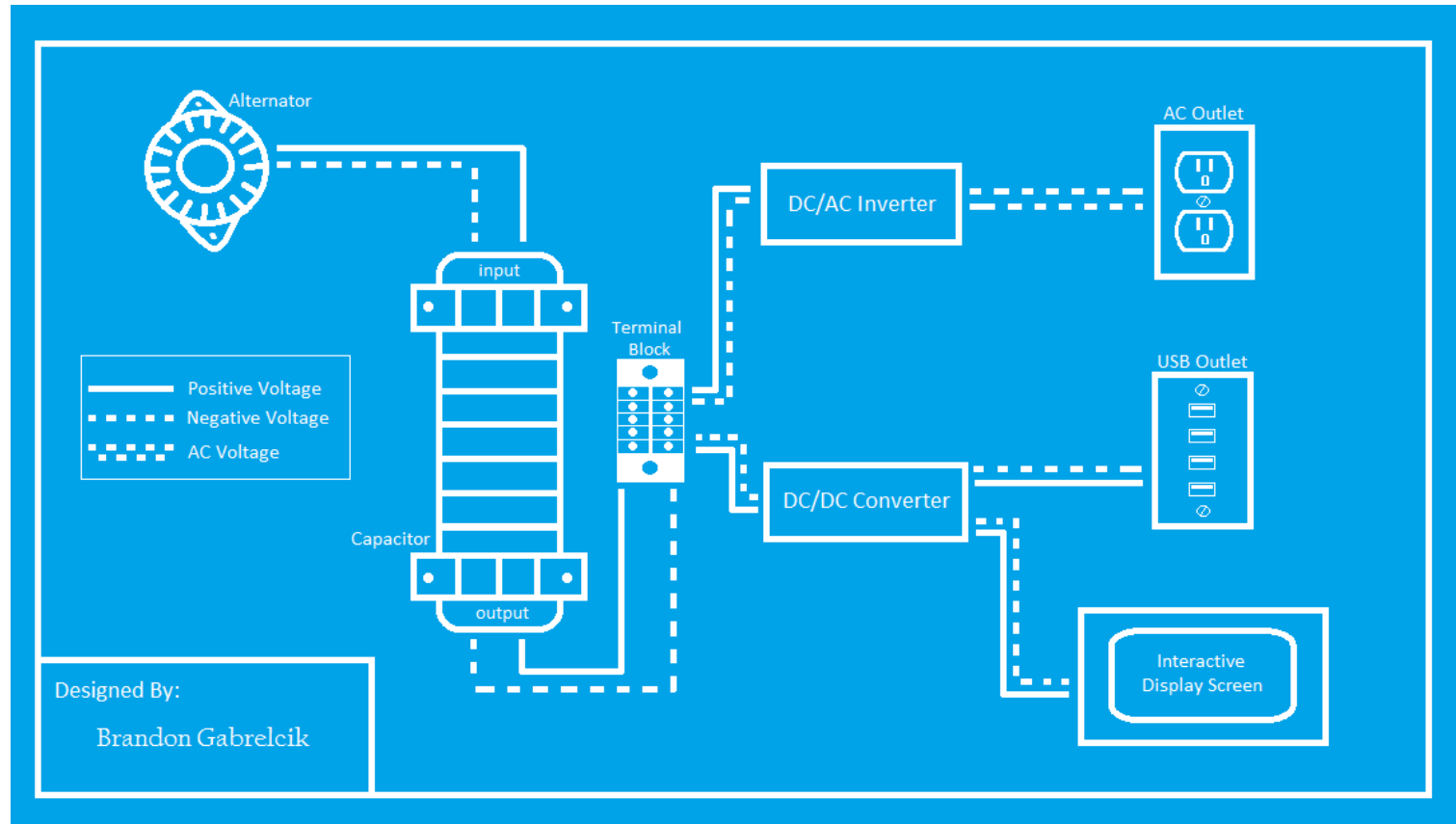
- The previous idea of using the Android LabVIEW software has been proven to be impossible to do without its own server
- The new design will use an Arduino microcontroller with voltage and current sensors attached
- We aim to make a simple design with buttons used to interact with the screen
- We will display a type of dashboard view on the initial start up and will have live graphs and charts on additional pages.

Bike Stand and Alternator Mount

- The mount will be permanently attached to the bike stand for durability and simplicity
- The mount will first be built out of wood as a prototype and later from aluminum or another light weight metal.
- The mount will also have a feature (swivel, locking mechanism, etc.) that will allow the alternator to be engaged and disengaged

Electric Control System

- The Electric Control System has been designed with simplicity and safety as top priorities.



To Be Completed In the Future

- Build and assemble the enclosure for the Electric Control System
- Design and build the mounting system for the display screen
- Carry out tasks that will make the charging station much more aesthetically pleasing
- Test the design and fix any bugs or problems that may arise

Build and Install both Enclosures

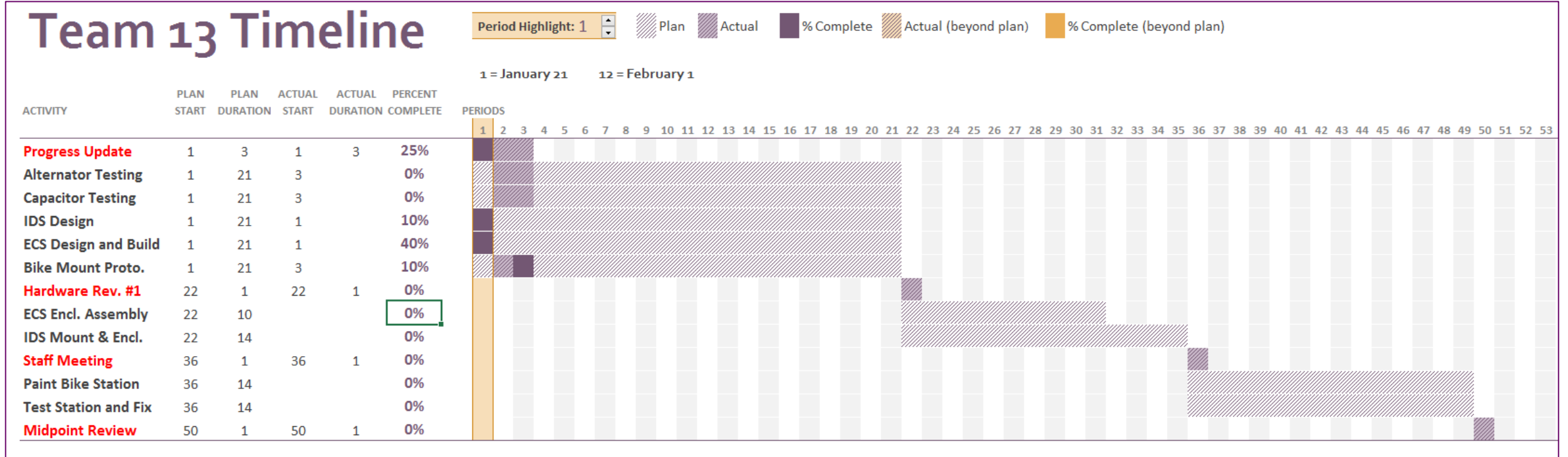
- The ECS (Electric Control System) enclosure has already been designed and only needs to the dimensions finalized in order to be built
- The Display Screen mount and enclosure still need to be designed before it can be built
- Both components will be built of the same material and with similar protective coatings to make them weather resistant

Make Project Aesthetically Pleasing

- The bike and enclosures need to be painted to improve looks as well as weather resistance
- The handle bars on the bike need to be re-wrapped and with tape that will hold up to the elements and continuous wear and tear
- Both tire treads need to be replaced to increase reliability of the bike
- The bike stand needs to be painted to match the color scheme of the rest of the bike



Project Build Timeline



Conclusion

- **Currently**

- Bike is disassembled
- Parts are ordered (alternator, bike stand, capacitor, etc.)

- **Moving Forward**

- Work on alternator mount design
- Design enclosure after all parts have been ordered
- Order Arduino microcontroller
- Research C++ programming language for the Arduino
- Work on the bike's aesthetics

Questions or Comments