Power Saving Smart Switch

ECEN 404 - Team 20

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Ryan Sessions
Goal
To safely and instantaneously switch between renewable and utility sources, to save energy and to monitor the power usage throughout a system.

Deliverables
- Bicycle w/ Alternator
- Load (Light bulbs)
- Relays
- Phase Synchronization
- Stellaris LaunchPad (Microcontroller)
- Mobile Application
- Smart Meter

Key
Blue: Measurements
Green: Relays
Purple: Sources
Red: Communications
<table>
<thead>
<tr>
<th>Subsystem</th>
<th>Team Member</th>
<th>Task</th>
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</thead>
<tbody>
<tr>
<td>Sources</td>
<td>Ryan Sessions</td>
<td>• Converts the mechanical energy generated from the bike and converts the AC power into DC through an alternator which feeds to a battery.</td>
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| Wireless Receiver/ Broadcaster         | Nathan Douthit            | • Configure the Stellaris LaunchPad and the Bluetooth module to communicate with each other  
• Transmit/receive information to/from the smart phone |
| Mobile Application                     | Nathan Douthit            | • Transmit/receive information to/from the Bluetooth module  
• Display information received information from the EKG Push module |
| Metering                               | Seth Quiñones             | • Setup the SmartMeter to monitor the output of the relay system to the load.  
• Hope to connect the SmartMeter data readings to mobile application. |
| Power I/O Conversion & Synchronization | Seth Quiñones Ryan Sessions | • Convert voltage and current from the battery and utility sources to relay requirements.  
• Synchronize utility and battery sources |
| Stellaris Relay Control                | Carolyn Kuchenbecker      | • Use a comparator op-amp to check that battery voltage is above 70% and send voltage to the Stellaris when true.  
• Program Stellaris to send a trigger the switch relay coil when received voltage from op-amp. |
| Relay Switching System                 | Carolyn Kuchenbecker      | • Amplify current and voltage from the Stellaris  
• Protect the switch from voltage spikes using MOVs |