Shell Eco-Marathon 2015
Wiring

Overview
The Shell Eco-Marathon is an annual student competition that challenges students to design and build ultra energy-efficient vehicles. The Penn State Shell 2015 Team inherited two partially complete battery-electric vehicles. The Wiring Team’s project was to understand the competition rules and meet all wiring needs for both vehicles before the competition (April 9-12, 2015).

Objectives

<table>
<thead>
<tr>
<th>Wire, Mount and Test - Urban Concept Vehicle</th>
<th>Prototype Vehicle</th>
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<tbody>
<tr>
<td>Headlights, taillights, brake lights</td>
<td>Horn</td>
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<tr>
<td>Front and rear turn signals</td>
<td>Throttle</td>
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<tr>
<td>Windshield wiper, horn, throttle</td>
<td>Internal and external kill switches</td>
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<tr>
<td>Dashboard for accessory switches</td>
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<tr>
<td>Internal and external kill switches</td>
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Approach
- The team first read the competition rules to fully understand the wiring requirements.
- After examining the initial state of both vehicles, the team decided to remove all existing wiring.
- Next, the team created a wiring diagram to illustrate how the electrical components would be wired.
- A list of parts needed to meet competition requirements was generated.
- The team researched various automotive-grade accessories and purchased the required parts.
- The team designed a dashboard for the inside of the Urban Concept Vehicle to house the accessory switches.
- Upon arrival, all accessories were tested using a multimeter and a spare 12V battery.
- Properly functioning accessories were then installed on the vehicles.
- All lose wiring was protected and secured according to competition regulations.
- Once the accessories were wired and installed, the team completed a final test using the DC/DC converter and the propulsion battery (36V).

Outcomes
- The accessories and switches were functional and reliable.
- At competition, both vehicles passed rigorous inspection which included testing the wiring and circuitry.
- The Wiring Team used $353.24 from the Penn State Shell Team’s budget of $3,000.
- Future recommendations have been made to redesign the back brake lights, taillights, and turn signals into one fixture.