We came up with four project ideas, based on issues we encountered in real life and more importantly, our own personal hobbies and interests.

**Electric Scooter**

The rise of electric vehicles , due in no small part to Tesla Motors, has spurred an interest in personal electric vehicles like bicycles and low powered scooters. This project aims to use a brushless DC motor controlled by a micro controller via potentiometer. In addition, we may develop an app to monitor battery capacity, charging, and speed as well for diagnostic purposes.

**Gaussian Rifle**

The second project is based on an interest in to experimental firearms. The military has experimented with rail guns on naval ships. While getting the energy levels required to fire a projectile as fast as a conventional smokeless powder is unfeasible at the hand held level, small firing coil guns would be an unique engineering challenge, though also the most costly.

**LED Equalizer**

The LED audio visual equalizer is one for the music lovers here. Using a strip of individual LEDS, it will amplify based on frequencies received. More for visual use, this will require good understanding of frequencies and also some software programming to convert those frequencies to light the appropriate LED.

**Washer/ Dryer Completion Alarm App**

The final project explored would be solving the perennial problem of forgetting to change your clothes in the washer to the dryer. Potentially using Bluetooth or other longer range signals, a smartphone app would be alerted when the wash cycle is complete and also update on time remaining. One major issue is the fact that it would only work on certain washing machines and explaining to my mother I need to dismantle the control panel for a school project.

**Decision Matrix**

For deciding on what project would be the most viable and most impressive, our group is weighing 4 categories; the complexity of the circuitry, which is the most important to us, as our group has more experience programming rather than building hardware. For this reason, the simplicity of circuitry will be rated much higher than the simplicity of programming. The overall impressiveness of the finished product is important to us. The finished product should be interesting and entertaining, preferably something anyone can use easily.

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| --- | --- | --- | --- | --- | --- |
| Criteria ->  Ideas: | Simple Circuitry (4) | Programming Ease (1) | Impressiveness (3) | Cost (2) | Overall  Score |
| BLDC Electric Scooter | 3 | 2 | 3 | 2 | 27 |
| Ferrite Launching Coilgun | 1 | 4 | 4 | 1 | 21 |
| LED Audio Equalizer | 3 | 3 | 2 | 3 | 27 |
| Washing Machine Bluetooth Notification | 3 | 1 | 2 | 3 | 25 |

Results: The LED Audio equalizer and Electric scooter come out tied for our requirements, however we already have a lot of the parts required for the Electric Scooter. I have an assortment of high powered Hexfet Mosfets in my toolbox as well as a sensored high torque, high power BLDC brushless RC motor, so while the overall production cost of an electric scooter would likely be much higher than led strips and audio equipment, our group has most of the electrical components aside from the battery, and the scooter portion can be bought for cheap. Plus you can’t ride an audio equalizer around the halls of PSU. The other projects were scrapped for a variety of reasons. The coil gun arguably would have been the most impressive, and most dangerous. It would require a lot more mechanical engineering and industrial design and would prove to be the most expensive to design and manufacture. The washing machine notification is a novel idea but the feasibility of dismantling the control panel of an existing washer would not have gone over well with the parents.