Midnight Racer

EET 273 – Electronics Senior Project

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Introduction

This project aims to convert a wired RC car into a wireless RC car using a Raspberry Pi-compatible controller for programming. To ensure efficient and timely completion of the project, we assigned different tasks to each member. We decided on a project that would challenge both the hardware and software aspects of the conversion. At the beginning of the project, we had little knowledge of Python, which is the programming language used on a Raspberry Pi. We replaced all the car's original parts, including the motors and tires.

We would like to emphasize the skills we have acquired and how we can apply them to this project. We utilized existing knowledge about RC cars to enhance our understanding of how the car will operate. Our first step was to choose the necessary components to switch from a wired system to a wireless system. We chose a toggle switch, two 3.7 Volt LiPo batteries, motor drivers, a wireless controller, jumper wires, infrared obstacle avoidance sensors, light intensity sensors, and a Raspberry Pi to achieve this transition.

According to the plan, we were supposed to receive the project materials on February 12th. After that, we planned to assemble the components on February 20th. On February 27th, we were planning to program the light sensor. Starting from March 5th, our plan was to program the steering and driving of the RC car using the Raspberry Pi and other components. On March 12th, we were planning to program the obstacle avoidance sensors that we installed in the front and back of the car. And finally, on March 19th, we were planning to assemble the final product and prepare for the presentation.

We successfully converted a wired RC car into a wireless one by following the process we had laid out, thus achieving the project's main goal. This project provided us with innovative ideas and insights for enhancing the car and improving some of its aspects. Throughout the project, we had to learn new skills such as Python programming and soldering, which were new to us. By doing so, we were able to expand our skill set and bring the project to a spot where we could present it with pride. We all worked hard on this project and wanted to showcase our efforts.

Demonstration

The reader will be able to use the project just like any other RC car. But they will be able to see all the different components that we used and how he could improve the RC to make it better. To start the RC car, just flip the switch on the bottom, and wait until the headlights begin flashing. Then you can power the controller and it will connect and be ready to drive. The controls are very simple:

- Forward = RT
- Reverse = LT
- Steering = Left Analog Stick

Since the cars sensors for obstacle detection are infrared based, they are sensitive to sunlight. Therefore, they must be overridden outdoors.

- Override the obstacle sensor = Hold A
  - Necessary for driving in the sunlight.

You should press these buttons simultaneously to shut down the Raspberry Pi, before flipping the switch to the off position. The lights will flash to indicate that it is shutting down, and the controller will power off once the Raspberry Pi is fully shut down.

- Shutdown = LB + RB + A
 - Wait until controller powers off before turning off the car.

You can also override the light sensor if you want to turn the lights on/off on your own. To do this, you should enable the override with D-Pad Left, then you can toggle the headlights with D-Pad Right.

- Toggle override for the light sensor = D-Pad Left
  - Toggle headlights = D-Pad Right

Description

The code can be viewed at:

https://github.com/alexhester/RC-Cars/blob/main/57Chevy.py

Layer 1

Layer 2

Layer 3

Top
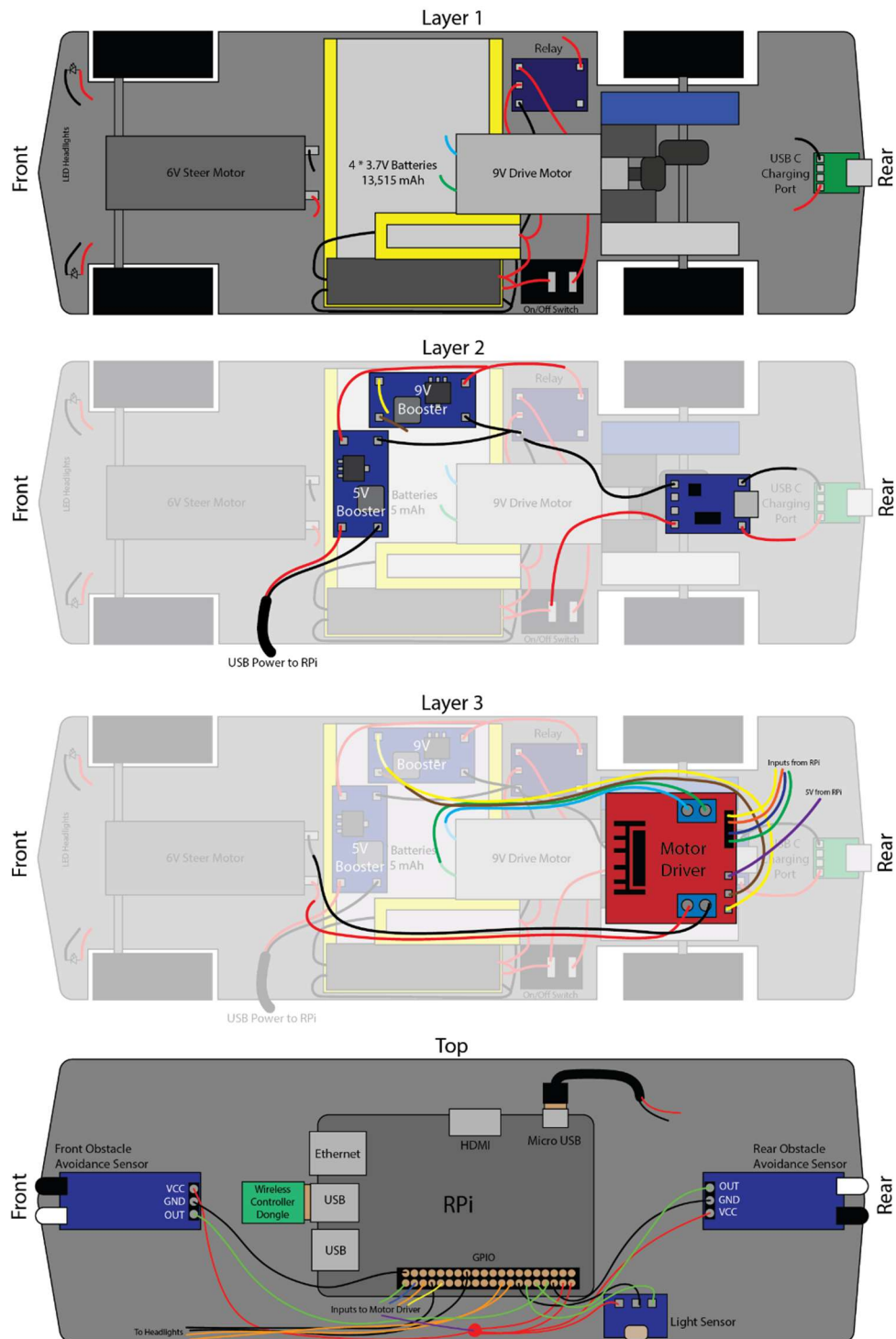
Conclusion

One of the highlights is that even though we had some problems like the RC car not going as fast as we wanted it to or the photo light sensor not working very well that we were able to solve the different problems that came up and had the project ready for the demonstration. Some improvements that could be made would be to get some better parts like better obstacle avoidance sensor so they would have greater detection range to avoid hitting anything in its path. Another thing is to get motors that have more power so we can increase the torque to make the wheels spin better and easier. We could have also made our own body for the RC car so that everything could easily fit and not be so tightly packed in a small space. This would help us if we needed to add more components, we would have more than enough room to spare without causing any interference with the other components. Also, instead of having four small batteries we could have gotten one that could supply all the current that we needed. Making sure that we research and order all the parts that we will need and not having to order parts close to the deadline of the project. So that we can save more time to focus on improving the project. Something that we have learned is coding with python which we have not had any real experience with until this project.