Matthew Collier
EE 454
Dr. Spalletta
May 10, 2017

Project Closeout

I. Project

Mobility is a key factor in industry. The autonomous micro Segway would allow a person to travel without needing to leave their office or even their house. The goal of the project is to be able to have an autonomous Segway travel through a building. The Segway will have a mobile device attached to it to allow a person to FaceTime with the device and therefore able to communicate with the outside world. The most difficult problem will be figuring out the control systems and be able to balance the Segway. The Segway will use several proximity sensors and an accelerometer for movement and to control balance. The project will use two different microcontrollers. One will be used for ease of connection to internet while the other will be used for sensor and motor control.

The initial and final deliverables of this project were automatic balance, dynamic movement, camera implementation, and GPS navigation. Even though there are only a few deliverables for this project they are complex parts to this system. The automatic balance involves several different components to work. First, there must be a gyroscope implemented to get different readings of the tilt of the Segway. Second, the readings must be used to control the motors so that the Segway does not fall over. This will create a feedback system that will allow the Segway to autocorrect itself. This is essential to the dynamic movement deliverable described above. The dynamic movement combines the automatic balance and the sensors implemented with the Segway. The Segway is designed to be autonomous and avoid objects

that it interacts with. The GPS interface is supplied from the support of the dragonboard 410c, the microcontroller used for this project. The dragonboard is an advanced microcontroller that has several inputs and outputs and onboard GPS. This is ideal for the micro Segway and is essential for its success.

The actual or expected deliverables for the project were to get the autonomous aspect of the Segway correct since that is the most challenging part of the project. The deliverable I could accomplish is the sensor data. I originally had trouble getting the sensor working with the dragonboard. There was limited information for getting the sensor working correctly. I had difficulties getting the i2c communication part of the program to work.

The timeline started off on time. However, I encountered many problems with using the dragonboard. As soon as I got to the part of the timeline where I needed to get sensor readings, my timeline got of course. I thought it would be easier to program the IMU. The problem is I got stuck on this part and could not skip it. It was essential to get readings from the IMU to the dragonboard. I could complete the task by eventually using an Arduino. However, by the time I accomplished this, the project was too far behind and the semester was over.

II. What was accomplished

Throughout the semester, we were given several assignments about our projects and topics covered in the course. I have complete several discussions and papers on the project progress, which could be found on the website portfolio. I also wrote a paper and presented on my professional practice topic of patents and how their effects on the economy. The notebook that has notes on the project will be collected at the end of semester.

I do not think work should continue for the project. Though the project is an interesting one, it also has lots of different mechanics to it. It seemed when I first picked the project It would be doable. As soon as I started working on it with the dragonboard, I realized it would be more challenging than I thought. The only part that is done on the project is getting sensor data. There is still a lot of the project to complete and in a real-world scenario the project would be dropped due to the timeline being so off course. The next person would need to use an Arduino or find another microcontroller to use that will work with the IMU. Then figure out how to use the readings from the sensor and incorporate that with motor control to get it to correctly balance and move. Then they would need to add object avoidance using sensors, GPS movement, and a video interface. Therefore, I believe with all that still needs to be complete, the project should not be continued.

As far as what can be demonstrated, I can show what data is being collected from the sensor. With a few days, I could easily incorporate simple motor functions for balance when the Segway is not in equilibrium. That would complete the balancing aspect portion of the project.