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Project Update to Team

The Micro-Segway project has come far since last semester. The project has begun to take shape. A lot of the background work of the project has been completed. This work includes the choice of using the Dragonboard 410c as the main micro-controller and the cumbersome work of setting it up and getting the python libraries running correctly. The Dragonboard has extremely useful aspects that the electric imp did not. The dragon board has on board GPS and several more GPIO pins than the imp. It also has communication pins that will allow communication between sensors and the IMU. The IMU will be discussed later in this briefing.

The control systems aspect of the project will be crucial to the success. The Segway must be able to move with good balance and without too much shaking or else it will render the video capturing useless. Therefore, the control systems of the Segway will need to be careful thought of and executed correctly. First off, the Segway will use a negative feedback loop. The sensors will feed back into the system to correct its balance. I have found and plan on using what is called an Inertial Measure Unit (IMU). The IMU is a single unit in the electronics module, which collects angular velocity, and linear acceleration data, which is sent to the main processor. This chip has three different sensors on it. It contains a three-axis accelerometer, three-axis gyroscope and a three-axis magnetometer. The accelerometer is used to measure linear acceleration while the gyroscope measures

the angular velocity changes. This movement is converted into very low-current electrical signals that can be amplified and read by a host microcontroller. This IMU should be able to handle all of the necessary measurements required to keep the Segway in a stable position while moving throughout its environment.

The next segment of the project that needs to be discussed is the navigation of the Segway. Now, as said before, GPS will be an important part of the project. It will use the onboard GPS of the Dragonboard to be able to navigate a building. However, there have been problems on trying to get actually readings for the GPS to work. I was able to turn it on but not see any type of data. I will need to figure out some sort of interpreter within the Linux operating system. This would be a useful explanation to have Dr. Spalletta to explain during lecture. Also, part of the navigation involves the Segway to move autonomously. Using several different proximity sensors along with the GPS to navigate through a building will accomplish this task. Now, the actual expectation is to get the Segway to move through a hallway in the science center while avoiding walls and people. The sensors used for object avoidance still need to be decided.

The final task that stills need to be discussed is the video communications of the Segway. Originally, the Segway was supposed to communicate using a facetime feature of a mobile device. To accomplish this, I was going to use the electric-imp, which was going to communicate with the mobile device. However, communication with the imp and Dragonboard would be extremely difficult. I propose a new idea of just using a camera that is compatible with the Dragonboard. This allows all processes to be controlled by that same micro-controller. A second Dragonboard

may be needed to complete this. These are all the parts of the project that will need to be completed for this micro-segway to be a successful project.