

ECE 480 Design Team 3 Progress Report 2

Software

- Initial version of control software has been written using a state machine
 - Waits until location has been found and scheduled time
 - Gathers 10 samples of orientation data, averages them, calculates required angles to rotate through
 - Outputs to azimuthal motor, then polar motor
 - Waits for sensor data to settle, then averages 10 samples again
 - Repeats this process until within a certain bound of target orientation
- Corrects for errors near 90° (previously orientation data would skip from 88.5° to 91.5°)
- Only allows the camera to turn up to 190° in either direction from its starting orientation to prevent tangling of wires
- Will schedule future targets to look at by reading a text file
 - Scheduling can be reloaded after text file's contents are modified
- Links to desktop java application.
 - Requires Android Debug Bridge in a specific location on desktop OS to function properly.
 - Uses TCP socket protocol to transmit data

Phone-Microcontroller Circuit

- The phone being used has been found to be able to output a noisy DC signal from its audio jack, unlike most other phones tested before, where any DC signal would exponentially decay. This allows us to use DC with a simple low pass RC filter instead of an AC signal with an AC-DC rectifier circuit
- The microcontroller circuit correctly interprets the phone's output with little delay. Previously, the capacitor in the rectifier circuit took too long to charge, so that the microcontroller sampled the wrong voltage for a large amount of time (~1 second). Now, the voltage changes fast enough so that only two samples are converted incorrectly (sampled at 600 Hz, so about 3 ms). The code for the microcontroller has been modified to account for this, and it throws out the first two values read above 200 mV.
- The phone and microcontroller code have been calibrated so that each instruction (motor and direction combination) can be interpreted correctly and the proper outputs are made to be used by the motor controller board

Motor Controller Board

- A motor controller board was constructed with larger, more robust components, as the commercial boards kept overheating
- It can be powered by the power supply we are using, and outputs a regulated 5V to be used by the logic onboard and our microcontroller circuit
- At the moment, the protoboard it is built on has a problem, in that one of the XOR gates does not operate correctly. Consequently, the board cannot reverse the direction of the motor. Once we rebuild it on another board this should be corrected.
- The board is capable of controlling a motor without overheating
- Still need to obtain a DC-DC converter to be used to power the motors, and the parts to build another board for the second motor
 - These parts have been ordered and we are awaiting shipment

Camera Mount

- There was a minor setback with the destruction of the gear responsible for rotating the mount on the horizontal axis. This part will need to be replaced by a 3d printed gear, due to unavailability of the part
- The construction of the mount, with the exception of the gear is complete and operational

To-Do

- Testing of all components together
- Building of the new motor driver circuits
- Power regulation for the motors
- Take context imagery and store it to SD card