SouthEastCon 2015 Proposal: Are We There Yet?

For our project, we are planning to go with the SouthEastCon 2015 Challenge, dubbed “Road Trip”. This challenge is broken down into five distinct challenges that must be done autonomously. The challenges are: line following, playing Simon Says for 15 seconds, drawing “IEEE” on an Etch-A-Sketch, and rotating one row of a Rubik’s cube 180 degrees and carrying a playing card across the finish line. All of this must be done in less than five minutes. We will highlight the approaches we will be exploring in order to meet these tasks as well as what we feel will be challenges for us and what we feel will be our strengths.

For the line following portion, we will be investigating photo resistors in conjunction with some form of proportional-integral-derivative controller (PID controller). Our reasoning behind this is that we’ve had experience with photoresistors before, and PID will help to smooth out the movement of the robot.

For the Simon Says portion, we plan on exploring color/light recognition as well as sound recognition. Our concerns for these areas are noise pollution for sound and light pollution for color/light.

For the Etch-A-Sketch and Rubik’s cube, we plan on investigating a claw system or something of similar nature in order to be able to manipulate the cube and knobs on the etch-a-sktech. We have concerns of how well the robot might be able to articulate and mimic the movement of a human wrist. These are problems we will address as we do more research.

In order to carry a card across the finish line, we are proposing either something as rudimentary as glue on a stick or something a little bit more refined as a vacuum system to pick up the card.

With the thoughts of all these interdependent systems in the back of our minds, we are exploring micro controllers that might have a little bit more processing power than an Arduino Mega. Two examples are the Beaglebone Black and the Cortex M4 series of microcontrollers. These controllers have more system resources available than an arduino and seem like viable options.

Based on our initial research and exploration as well as our proposed solutions above, we are estimating the following: roughly $40 for some sort of claw/arm system, $40-$70 for a micro controller (depending upon selection), $60 for a movement system, $50 for a chassis, and about $10 a motor (not sure on the final tally of motors at this time).

As we have been looking more into the project, our concerns are primarily in the realm of color and light recognition as we have never done any projects relating to those fields before. The autonomous and spacial recognition of the robot is something we have concerns about as well, since, once again, we have not done any work in these areas. We feel that we will have success with line following, however the PID implementation may prove slightly tricky.

For the fall semester, our goal is to tackle two of the harder challenges: Simon Says and Etch-A-Sketch.