MEMORANDUM

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Group: Hippotronics (Team 1)

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RE: Term Project Deliverable 1

This memo briefly summarizes the content of our project update, "Term Project Deliverable #1", which includes an export of our electronics CAD from fusion, a detailed BOM of all of our selected components, a STEP file containing our robot design progress, and a wiring diagram showing how our board will interface with our project's peripherals. We have attached our board schematic and our wiring diagram to this memo for your convenience.

Board Design

Our electronics CAD contains a completed first draft of the PCB we intend to order. This board design also includes a smaller board that will be broken off at a perforation to mount our Hall effect sensor. Our board has power management circuitry for a 12V 7A supply battery (3S LiPo), 5V 3A from a switching regulator, and 3.3V 1A from our linear regulator. Our peripherals are generally connected via JST connectors, with the exception of the programming header, RxTx header, and SPI header (all header pins). We are driving our four large motors with three Texas Instruments motor drivers (our collection system will run two motors off of one driver with the polarity reversed), and we have two servo motors running off of our 5V rail (drawing .4A at stall). We are concerned about our 12V trace width, as drawing a polygon on one layer does not appear to allow for a sufficient trace width (online calculators suggest around 500mil for this unregulated supply).

BOM Overview

Our BOM includes all our current planned SMD components from our PCB design, as well as all of our peripherals. The current BOM does not include our 3D printer filament, acrylic mounting panels, nor our fasteners, as our robot design is still in the works. We have ordered all of our peripheral components with the exception of the IR line sensors (as these could be replaced by the Pixy2 line following functionality) and the limit switches (as we want to make sure that their geometry works well with our mechanical design). We have also ordered six FlySky receivers (which come in packs of 2 at a reasonable $20 package price) in collaboration with other project

groups. We are postponing ordering the RF transmitters until we have a better headcount of how many groups are interested in joining our collective RF plans. We are also holding off on ordering our PCB components until we receive feedback on our board design. We plan to order all other listed components by the end of week 6.

Mechanical Design

Our mechanical design has progressed from a hand sketch to a crude 3D model in Fusion 360. Our current iteration is basically a 3D cartoon of our intended design, as the robot modeling has taken a backseat to our electrical designs. Our robot is broken into seven subassemblies, each of which accomplishes a different task, ranging from the robot's drive system to the mounting setup for our Pixy2. Each system will be updated with off the shelf parts (except for the acrylic mounting plates and 3D printed parts as needed) until the design is converted from placeholder geometry to purchasable parts. We will purchase these as we deem appropriate based on our confidence in their selection and the part lead time, and will begin manufacturing the custom components as soon as the design is fully specified.

Wiring Design Overview

Our wiring diagram shows the connections between our board and our peripherals, all of which are JST connectors with the exception of the SPI header (header pins) and our battery connection (XT-30). Our sensor array includes one hall effect sensor, three line sensors, one color sensor, an IMU, and a Pixy2 camera. We believe our sensor selection is more than sufficient to accomplish the competition task. Our peripherals also include a FlySky 3-channel RF module which will allow remote control of the drive system and an emergency stop feature. We have two drive motors and two intake motors connected to our motor drivers as described above.