Staff Meeting

January 25, 2018

Executive Summary: The NRL Arch team presented the findings for motor specifications, deflection analysis, accelerometer candidates, and the construction manual.

Meeting Minutes

5:58 -- Mitchell explains power concerns regarding the motor selection, mentioning that Jeff preferring the use of C for programming the motor driver. Dr. Trevas explains that Arduino code is a combination of C and C++ from a consumer point of view, which will simplify future coding.

6:00 pm -- Jacob presents the findings from the deflection analysis for the beams used in the NRL Arch's arms, and Dr. Trevas recommends use of finite element analysis to double-check results, and the possibility of using some bracing to prevent deflection of the part used in the arm. When asked if the beam is considered weightless, Jacob explains that the force of deflection is taken into account, but for all intents and purposes, the analysis was performed under the assumption of a weightless beam. Analysis also assumes position of the arm is at 90 degrees, and the analysis will also need to be conducted at 85 degrees. Requirement of a 0.5-degree tolerance is restated for clarification.

6:10 pm -- Zachary explains the list of the possible accelerometer candidates for purchase. The $440 Wilcoxon accelerometer fits the 500 mV/g sensitivity and 0.1-2500 Hz Frequency range exactly. The 9100L and 9200L Rockwell series and the Emerson A0120LF all fulfill the sensitivity requirements laid out by the NRL Arch team, but the frequency range for +/- 5% was stated to 0.5-2000 Hz. Depending on how much these accelerometers cost, they may be more desirable than the Wilcoxon 799LF, but the NRL Arch team would need to contact the manufacturers directly to obtain a quote to confirm this. Dr. Trevas suggested possibly searching for another tool, one which measures angular accuracy, since the accelerometers do not list angular measurements in their specification sheets. The team has resolved to meet with Dr. Sagnik Mazumdar for advice on this matter.

6:14 pm -- Daniel Matthews presents the skeleton for the NRL Arch construction manual, which currently consists of a cover sheet, a page for parts listings, a page for a step-by-step guide to the NRL Arch features, and a page for a checklist for proper construction. Daniel intends to continue work on the construction manual.

Team Action Items

- On Saturday, the NRL Arch team will meet in the engineering building to discuss and go over the calculations for beam deflection as a group, in order to check Jacob's math and make any suggestions for future tasks
- At some point in the following week (date currently unspecified as of this writing), the team will meet with the following NAU faculty members:
    - Dr. Heidi Feigenbaum, for advisement regarding finite element analysis for the beam's deflection, which will be used to check the calculations.
    - Dr. Sagnik Mazumdar, for advisement regarding the purchasing of accelerometers, as well as possible alternatives for measurement devices.

Individual Action Items, As of This Writing

- Daniel Matthews retains responsibility for the NRL Arch construction manual/FEA.
- In the event that the team decides that contacting manufacturers for measurement devices will be necessary, Zachary will be responsible for contacting them and obtaining price quotes.
- Jacob has retained responsibility for continued beam deflection calculations, albeit with upcoming group assistance.
- Mitchell will research specs on the NEMA 24 stepper motor (wiring diagrams, torque, etc.).