Subject: Automated Microbial Analysis Update

Hello Scott,

We have made some good progress towards the overall design of the project. We have partitioned the workload into Mechanical, Electrical and Computer Science sub groups to help with organization.

**Mechanical**

The mechanical design has been updated to reflect some issues that were discovered during the first iteration. We have expanded the T-slot extrusion frame to be much larger so the delta arm can have a much larger work area. We have used around 2x the amount of T-slot, but this is still within the financial parameters. This new design also uses more custom 3D printed mounting blocks which will save on costs for aluminium mounting brackets.

The delta arms have also been updated to use less material by using the generative design function of Autodesk Inventor. Loads were simulated on the original arms and then an optimized design was generated based on those conditions. This new design uses 40% less material overall and will allow for more torque on the end effector (meaning faster movement).

**Electrical**

Since the last update, the Electrical portion of this project has made steady progress. Despite the delay due to the Coronavirus outbreak in China, we are still on track to complete this project in a timely manner. The custom PCBs Mack and Jorian designed have been completed, fabricated, and shipped to us in the last few days. These PCBs will allow different components in our system to communicate with each other efficiently and effectively. Furthermore, these PCBs will enable a greater degree of motor accuracy, as the newly established encoder signals will only further enhance our error detecting capabilities. Although we still need to assemble and extensively test these PCBs, this still marks a great moment of progress towards our final goal.

**Computer Science**

Over the last few weeks most of the time spent on this portion of the project has been focused on having the user interface send control signals to the controls processors. We will now begin working on using the feedback from the encoders to allow for the primary processor to have the ability to track and check position of the end effector. This will also include the integration of the kinematics processing that is required because of the delta configuration of the robot. Next week we will also be making an update to the GoogleSite and documentation repository.

In the coming weeks we will continue to integrate our designs into the system. All of the updates we have provided in this email, as well as any future updates can also be viewed on our GoogleSite. As always, we will all be available by email to answer any questions you might have.

Thank you,

Zach Bendt

Jorian Bruslind

Macklin Hall