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**

We’ve noticed some slop overall in the armatures and are working to create a stiffening mechanism to keep this in check. The basic assembly is assembled and ready for testing. So far there’s also been some issues with microstepping the motors and the total torque they produce. This can be resolved by reducing the microstepping but this also reduces the resolution. An acceptable range for us is +- 1mm of tolerance on the end effector and we will keep within this specification.

Going forward we will add in the pneumatic sub system and add mounting structures so that it can be included in the design. We will also be adding a large casing system so that the entire apparatus is enclosed and will not be a hazard.

**Electrical**

An exciting new development for the electrical branch of this project has been completed! Our stepper motors are now capable of completing a homing sequence, allowing us to know the position of the motors after a power cycle. This is an important stepping stone towards improved reliability and consistent results over time.

Furthermore, I’ve been working with Jorian to develop new PCBs for the stepper motor drivers. We are switching stepper motor drivers to a model with improved robustness and reliability. Additionally, we’ve been developing a new PCB to hold the main ‘brains’ of the project (namely, Arduino Nanos and a Raspberry Pi). These PCBS include much better voltage converters, which should improve system stability and efficiency.

Lastly, we implemented a new power supply that has noticeably better load regulation than the last one we had. This means that the system will not change its behavior under heavy load. Again, this was done in order to increase system robustness and reliability.

**Computer Science**

Over the last few weeks most of the time spent on this portion of the project has been centered around the design of the user interface as well as getting the coding portion of the control systems. Our goal is to have the basic movements of the bot working in the next week or two. Once we have the basic functionality of the bot is working and we have a test environment built that has stable lighting and camera position we can start fine tuning the computer vision and implement the encoder feedback.

In the coming weeks we will continue our initial designs for the system and all of the updates we have provided in this email, as well as any future updates can also be viewed on our GoogleSite. We will all be available by email during the holiday break to answer any questions you might have.

Thank you,

Zach Bendt

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