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# Progress Report – March 22, 2010

Solumspect is currently well on track for demonstrating a working model of our ground penetrating radar landmine detection system in mid-April 2010. With almost all of the modules built and tested, we are quickly approaching the final integration and verification of the finished product.

## Completed Tasks

The ground penetrating radar system can be divided into four main components: radio frequency (RF) electronics, low frequency (LF) electronics, mechanical base and frame, and processing software. For the device to function properly, each of these components must work together. As such, we set a key goal to have the majority of the components built and tested by mid-March. This would allow for a three to four week thorough system integration and testing period before the final demo. As outlined in the following sections, each of these components is either finished or nearing completion.

### RF Electronics

The RF electronics module has been assembled and tested in the lab. Testing was performed by arranging the antennas such that the receiving antenna was directly measuring a low-power transmitted signal. The signals were investigated using the fast Fourier transform function of the oscilloscope as well as our digital capture circuit. As expected, we were able to observe a frequency component that was proportional to the distance travelled by the signal between the two antennas. The final step in completing the RF module will be to construct a box for the components and mount it on the mechanical frame.

### LF Electronics

The sawtooth and data collection enable analog circuits have been completed. After implementing additional optimizations during testing, the circuits are now ready for the final integration. Although there were initial concerns about the selection of an analog to digital converter (ADC), we have successfully sourced a part that meets our needs. The microcontroller has been programmed to collect data using the ADC and optimization is ongoing.

### Mechanical Base and Frame

We have purchased the majority of the parts to build the mechanical base and frame and will begin construction this week. Once ready, we will be able to commence the integration of all of our components onto the structure and begin the testing process.

## Processing Software

The user interface elements of our processing software as well as the data listener application have been created. Currently, the radar readings can be collected on the computer and frequency signals viewed in MATLAB. Image processing functionality is almost complete and will be integrated with the UI shortly.

## Schedule

An updated Gantt chart is shown below in Figure 1, where the bordered bars show the original proposed schedule and the filled bars show the updated schedule. While the design specifications and data acquisition circuitry took longer than expected, we finished well ahead of schedule on our processing software.
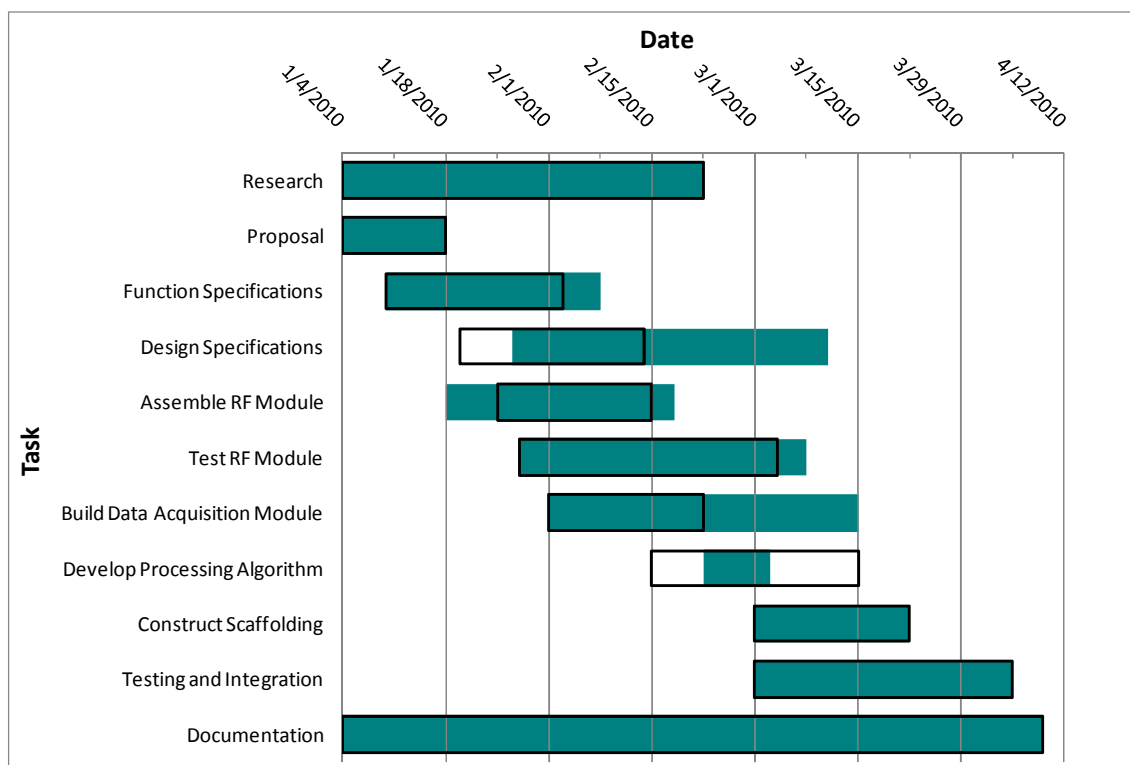


**Figure 1: Updated project schedule showing the proposed schedule
in bordered bars and the updated schedule in filled bars.**

## Budget

Most of our components for the model device have been purchased. International shipping costs have been higher than anticipated and there have been some unexpected purchases that were necessary to complete our project. However, we were also able to borrow several costly high frequency electronics components from Engineering Science professor Dr. Shawn Stapleton. Currently, we are under budget for the project, having spent a total of $945.90. All of our ESSEF funding has been exhausted and we are currently in the process of seeking support from the Wighton fund to cover the remaining costs.

## Human Resources

Team dynamics have been smooth and problem-free over the course of the project. Each member of our team has been working hard over the past two months to complete the individual modules. As we move towards integration, the team will be collaborating even more closely to ensure that bugs can be quickly resolved.

## Action Items

As outlined above, Solumspect is making excellent progress towards the final model demo on April 16, 2010. Currently, our main target is to complete the mechanical structure and integrate all of the modules onto it as soon as possible. The remaining time will be used for thorough testing and optimization of the product.