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| **MEETING MINUTES – Sponsor, Advisors & Team Meeting** |
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Present: Dr. Simon Foo, Dr. Shonda Bernadin, Dr. Michael Frank, Dr. Bruce Harvey, Dr. Rajendra Arora, Matt Cammuse, Joshua Cushion, Patrick Delallana, Malcolm Harmon, Julia Kim, Jasmine Vanderhorst

Time: 4:30 – 5:30 p.m.

Pete’s expectations for the project: Propose a project that involved fundamental transmit/receive concepts that were applicable to communications, radar, anything wireless. Deal with how to get hardware together to get it to work, turn the power on slowly, how not to make things blow up, etc. His perspective was to pick a project with fundamental concepts and have a breadboard type scenario to get something working in a lab.

Dr. Frank: For senior design, students should show that the project makes sense within realistic constraints. Not all projects have to be turned into commercial products. Students should go through a design exercise, and it’s good that Pete is helping us with the design in order to get things done in time, especially since we don’t have a background in radar systems. He wants students to solve problems in pieces.

Pete: Students have made suggested and come forward with ideas. The only thing missing is more of a physical understanding of how a radar works, so we talked about the physical aspects of the system without equations. It’s basically a glorified metal detector, like a little pencil beam trying to map metal and doing it synthetically, without moving parts. So we just walked through the phase centers, collecting amplitude and phase for 16 points, how that enables us to synthetize where the metal is, etc. Trying to keep it simple by using two line arrays, so making it one dimensional. If it looks like it’s too challenging, then there are back up plans. For example, for the FPGA, it can be done on oscilloscopes, which are like A/D converters, and they sample the signals and Excel or MATLAB can be used to generate the image. So if we can’t generate pulses with the FPGA, we can get a pulse generator.

Originally, it was to be done with test equipment, but other ideas were added to test them out. The FPGA can create pulses, and if we connect some A/D converters, sample the signals, we need 16 amplitudes and phases, and put those in memory. And maybe we can engage that to the display since we will be creating one dimensional columns of pixels that correspond where the metal is in space. If we can’t do that, then we can do that in Excel. We can get the data from the oscilloscope and plot it in Excel.

Dr. Frank: Students should present what option will be pursued, which will be reviewed by the advisors and reviewers.

Dr. Harvey: Students should also present how the team will be divided to do different tasks and work in a parallel manner. The implementations may be options, like the FPGA vs Excel/MATLAB analysis may be a trade-off that students may have to decide later on, maybe for the next design review.

Pete: Jasmine and he put together a schedule and added a bunch of subtasks and people assignments with task succession and due dates. Students have shown incremental progress as the project goes on. There will be goals, such as getting the transmit path functioning to a certain characteristic specification, take a VCO that’s referenced to the FPGA and create a 10GHz signal that’s at a certain level, take the noise power and control the noise level input to the A/D, verify the demodulator works, etc. There will be backup plans if something doesn’t work out.

Dr. Frank: What about lab space?

 Jasmine: It would be preferable to do it in a metal room, so the IEs are going to have to talk to Dr. Okoli again.

Pete: Absorbers will be needed to control reflections at other ranges. We need to control at what range reflections come from.

Dr. Harvey: The portables can be used for testing as well, although he doesn’t know exactly in what conditions they’re all in, as they can have equipment set up, wires hanging from the ceiling, etc.

Dr. Arora: What is the objective of the project?

Pete: What we’re trying to do is light up a line of pixels on a display that corresponds to where metal is at a certain angle in a scene. It’s a synthetic aperture, and it’s equivalent to moving a big dish around to map out the metal, but we’re trying to do without moving parts synthetically. We’re working at the 10GHz because above that, the parts start getting more expensive and below that, the aperture gets too big. We have a scene (2ft x 2ft) 20ft away and we want to identify where the scatter is in that scene.