The purpose of the Raspberry Pi in this system is to facilitate the communication between the user and the two rovers. While the user will not be controlling the rover directly, they will be shown a display of the maze as well as the rovers’ movement through it in real time. What this means is that as the minotaur and Theseus move throughout the maze they will send messages up to the Pi stating their progress as well as what they see around them such as the other rover. During all of this, the Pi will organize the messages and respond to the opposite rover appropriately. A simple user interface will allow the user to start, stop or reset the game as well as place the “gold” which the Theseus rover will search for. It should be noted that while the Pi will listen to and respond to the devices, it will not handle any of the actual data processing needed for the game to function correctly.

On top of communication between the two rovers, the Pi will also handle communication between the two PIC32s on each. This means that the board handling the sensors will have the communicate through the Pi to the board coordinating device movement. All of this of course will be dependent on the specific rover and its intended functionality. All of this communication will be carried out using a format similar to the one described in class where messages will be comprised of key-value pairs. The purpose of this is to allow for custom message values without having to predefine message fields that may or may not apply in all usage cases.

The final piece of this project, the maze, will be a fairly simple setup using a square piece of cardboard (white or black) with predetermined walls drawing a variety of passage ways and dead ends. On top of this, tape of color opposite to that of the board will be laid on the ground next to the wall in order to help guide the rovers throughout board. While the walls will not be able to be redesigned the user can choose the placement of the “gold” allowing for a different outcome every time. Using the history of movement from the Pi, Theseus will attempt to locate the gold, avoid the minotaur and escape back through the entrance.

Obviously there are still a lot of design choices to be made this early in the process, but the general functionality should match the specifications listed above. Altogether the project should have two boards per rover controlling their movement and sensors with one rover looking for gold. The other PIC32 of course will be looking to stop its opponent by roaming through the maze and communicating with the Pi about what it’s seeing. Finally, the Pi will provide the user with a way to monitor progress (UI), and a way for the rovers to know what is going on around them.

**References**

Brian Douglas. "PID Control – A brief introduction" *YouTube*.  
YouTube, 13 Dec 2012. Web. 06 Sept. 2016.

Burgin, Colin, Alex Makar, Jean-Phillipe Ouellet, and Conor Patrick. "ECE 4534 - Embedded - Team 13." *YouTube*. YouTube, 10 Dec. 2015. Web. 05 Sept. 2016.

Lao, Anna, Pooja Malhotra, Will Cowen, and John Kalin. "ECE 4534: Team 3 - Spring 2016." *YouTube*. YouTube, 05 May 2016. Web. 05 Sept. 2016.

Littley, Michael, Thomas Sickert, Daulet Talapkaliyev, and Renee Spangler. "ECE4534 - Spring 2016 Team 17." *YouTube*. YouTube, 01 May 2016. Web. 05 Sept. 2016.