**Abstract**

Our handheld device will track the position of a beacon and point the user towards it. The beacon will transmit a GPS signal using Radio Frequency which can be received and processed by the handheld tracker. This signal will be used to point a pointer towards the beacon.

**A project description and statement of work**

*Electronics/Code*

The system has two main parts - the compass and the beacon. The compass is held by a user and constantly points in the direction of the beacon. The beacon is held by another moving user. The beacon transmits data back to the compass, changing the direction the arrow is pointing to keep it always pointing towards the beacon. This is accomplished by transmitting GPS coordinates through an Atmega 328 and sending them over RF to an Arduino. By taking these coordinates and the coordinates of the Arduino (established via a GPS module on the compass) a direction vector can be found, which when combined with the magnetometer input can be used to decide the angle from the north that the compass should point . Timing will be accomplished by transmitting a time signal from the beacon to the compass at the beginning of gameplay, and using the Arduino and Atmega’s internal clocks thereafter.

*Mechanical*

We want our compass to remain flat for a normal range of motion. This involves putting the servo and the arrow inside a two-axis gimbal. This gimble and the display for time will be mounted atop the Arduino with the whole thing encased. The entire device will be hand-held.

The beacon design will be fairly simple. It will consist of a case with the game time displayed. The case will be designed such that when the timer is facing up, the GPS module is in the correct orientation. Ideally, the case will fit, timer up, in a pocket for hands-free game play. If this proves infeasible, the beacon will also be hand-held.

The goal is to end up with a polished looking device. As such, the external components of our final devices will be of nice looking materials held together in legitimate ways. The internal mechanical components on the compass will likely still be made of cheap, sturdy materials. We are going to discuss material selection and mechanical design with Gui.

*Game Design*

The compass and the beacon can be used to play a hunting game where the person holding the compass is attempting to track the person with the beacon in a limited time. Due to the limited range of the Radio frequency of the transmitter, the game is to be played within a closed area with a specific radius so that the players will not be out of range from the signal and the compass will be continuously pointing in the direction of the beacon. Since the person with the compass knows where the beacon is, the gaming area is expected to not be a leveled area where the players can easily spot each other. This is a broad overview and we are going to decide on more details of the game later during the project.

**Team member responsibilities**

The first person listed after a task is the lead on that peice. The second person is the backup.

**Code to Write:**

* GPS input - useful coordinates - Tenzin - Emily
* Magnetometer input- useful vector - Tom - Tenzin
* GPS + magnetometer to servo angle - Tom - Tenzin
* RF transmission protocol - Emily - Tom
* RF reception protocol - Emily - Tom
* Timer + LCD output - Tenzin - Emily

**Other Pieces**

* electrical diagrams - Tenzin - Emily
* Circuit construction - Emily - Elizabeth
* compass mechanical - Elizabeth - all
* beacon mechanical - Elizabeth - all

**Budget**

See attached

**Schedule**

See attached

**Plan of Disposal**

This project could make a cool hallway display. To do this, we would need to talk to Kelly McDaniel from the library and Ellise LaMotte from Academic Services.