VIPS: Vector-Generating Indoor Positioning System

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1 Project Description

We propose a system for detecting and keeping track of a large number of objects in three-dimensions. This system consists of the following components:

- A large number of small, inexpensive modules that can be attached to the objects
- A central hub that keeps track of the 3D coordinates of the modules with respect to itself
- A software interface that allows a user to acquire the 3D coordinates of the modules

The modules are to be designed so that they are easy to mass produce to ensure that the system is scalable. The user attaches the module to an object of interest. The module is software programmable so that the user can "label" the given object. The mapping of these "labels" to the 3D coordinates of the object is calculated and stored by the central hub. The user can then access the 3D coordinates of any of the given modules via the central hub's software interface.

2 Implementation Plan

Below is a proposed plan for the project's implementation.

2.1 Stage 0

Early Deadline: End of this next week
Expected Deadline: End of the quarter
Late Deadline: First weekend of summer break

- Develop an algorithm to determine the position of the modules. This should include robust error handling
- Determine the physical mechanism that ascertains the modules' distances from the central hub (i.e. communication protocol and hardware used)
- Determine the specification of the central hub and module hardware

2.2 Stage 1

Early Deadline: Week 0 of Fall 2018 quarter
Expected Deadline: Before fall design review
Late Deadline: End of winter break

- Write the program that determines a module's position using the algorithm determined in Stage 0. The input to the program at this stage is simply generated test data
- Design the central hub and module hardware
- Write a software interface so that the position of a module can be acquired from the central hub, assuming it has already been correctly calculated

2.3 Stage 2

Early Deadline: Before fall design review
Expected Deadline: End of winter break
Late Deadline: Before winter design review

- Manufacture the central hub with an acceptable number of modules
- Integrate the software written in stage 1 with the assembled hardware
- Test the system with the modules