**Capstone Design Project Proposal**

**Title of Project: Real-time Indoor Wheel-based Asset Localization System**

**Date:** August 18, 2022

**Proposer**:

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**Project Title:** Monitoring Dynamics of Emergency Vehicles

**Unmet Need – Engineering Problem to be Addressed:**

Real-time in-door localizing and continuous tracking of mobile assets is very essential in main domains including healthcare, which enable teams to focus more on operational excellence and less on searching for missing assets. Continuous, room-level, facility-wide tracking delivers enhanced insights that empower the implementation of greater workflow efficiencies. With seamless access to needed equipment in healthcare, for example, will enable clinical staff to focus on patient care, increase utilization of existing medical equipment, reduce the time and cost of tracking & locating assets, and turn reactive work into proactive workflow. Such localization systems need to be highly-accurate, ultra-lightweight with minimal hardware, and zero disruptions to clinical operations at installation. Moreover, the systems need to be able to respond to physical changes in the environment enabling ongoing accuracy.

**Proposed Deliverables:**

The objective is to develop a sensing system to track wheel-based assets. More specifically, our system will utilize multiple 9-degree inertial sensors (accelerometer, gyro, magnetometer) that will be installed on the wheels of the assets. Data sampled from the inertial sensors will be collected, stored, and analyzed to extract fine-grained information on the asset mobility. We will start with the mobility information including distance traveled and turns. We intend to test the system on wheel-based assets such as wheelchairs and carts for multiple indoor-environments including VCU ERB. In addition, we plan to evaluate our system against GPS localization in outdoor environments. It is expected that our systems will be able to accurately localize and track the mobile assets in both indoor and outdoor environments.

**Anticipated Resources Required:**

We will purchase a set of the inertial sensors, a couple of Raspberry Pi, and the corresponding development environment.

**Anticipated Skills required**:

* Hardware/software hands-on
* Statistics and data collection
* CoE and CS.