Overview

The idea of the project is to create a mesh network of sensors to demonstrate the Internet of Things (IoT) to a level most people can understand. The main objective of this project is to demonstrate the vast amount of use cases the platform can be utilized for. In order to relay information collected by a mesh network of sensors mounted to Raspberry Pi’s we will be using this platform. The Raspberry Pi’s with on board sensors will sense people entering and exiting rooms and relay the information to ThingWorx server where we will gather the data to display heat maps based off of the density of people in rooms.

Objectives

For this project, we need to create a mesh network of devices - Raspberry Pi’s in our case - and develop the wireless functionality. We will use this network to communicate sensor data among each other and the Thingworx server. For this purpose, we need to connect our C-SDKs on the network to the Thingworx platform and establish secure communication. Following this, we will start creating the front end application for the user to interact with and start incorporating real sensor data.

Approach

1. **Develop Wireless Functionality**
   Develop the ability for the Raspberry Pi’s to communicate to each other over Wi-fi in a mesh network fashion

2. **Establish Sensor Connection Using ThingWorx Platform**
   Use ThingWorx platform to allow the Raspberry Pi’s to sense and communicate sensor data
   Calibrate and verify the output of the connected sensors
   Verify that the Raspberry Pi’s are communicating the correct sensor data

3. **Develop User Interface for Mesh Network Data**
   Create a visual display capable of informing users of the capacity of the rooms included in the system.
   Design heat map displays based on demonstration location
   Integrate functionality of updating in real-time to demonstrate mesh network communication

4. **Demonstrate Mesh Network System in Open Environment**
   Mount sensors and Raspberry Pi’s at chosen public location
   Generate the capacity of the rooms in the system and update user interface visuals in real-time

Outcomes

- Created Mesh Network of Raspberry Pi’s
- Developed algorithms to count the number of people in a room and average temperature
- Utilized the ThingWorx platform to create a front end display
- Gave ThingWorx a working prototype to show how easy it is to solve a complex problem with their software
- Created a cheap implementation of a person counter.