Memo

To: Professor Pisano

From: Occusense ECE Senior Design Team

Team: Occusense: Team 11

Date: 3/2/2017

Subject: Functional Testing Test Plan

1.0 Goal & Description

The goal of this test is to demonstrate the full functionality of the Occusense sensor system. The major components that will be tested that are different from the second testing go as follows: ability to differentiate the direction of someone entering/exiting a doorway and the ability to collect historical and real-time data over the course of a 24-hour time period. In order to validate that the system can differentiate between a person entering or exiting the room we will perform multiple cases of people using the doorway. In order to validate that we are able to collect real-time and historical data we will leave the Occusense system running for about 24 hours collecting occupancy data of PHO 113 (Senior Design Lab). The resulting data will be time-stamped entries in our Firebase web server of people entering/exiting the PHO 113 over the past 24 hours. This information will also be presented in an organized fashion on the Occusense web application. Below is a figure of the system configuration that we will use for the functional testing (Figure 1).

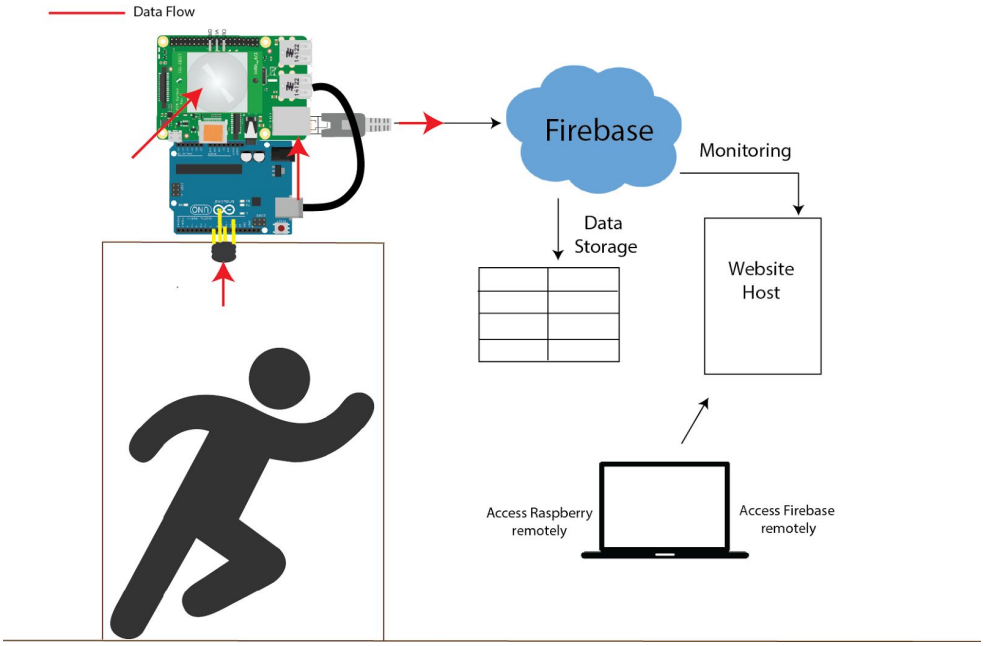

Figure 1: System diagram of functional testing setup

2.0 Procedure

2.1 Directionality Detection

In preparation for testing the Occusense sensor system's ability to differentiate between a person exiting or entering a doorway we will have the system mounted above the door to PHO 113. The Occusense sensor system is made up of the MLX90621 thermal sensor, Parallax passive Infrared sensor (Rev B), Arduino Mega 2560, and Raspberry Pi. The C++ script used to collect and process the raw thermal data picked up by the MLX90621 sensor will then be run. At the same time, we will run the Python-based client server program (which will host the main algorithm) that will take in the 16X4 thermopile array, process it, and convert it into a +1 or -1 based if the person walked in or out of the room. The cases that we will test include: one person walking in and out, multiple people walking in and out, and two people walking under the sensor in close proximity to each other. The data will be accurately recorded in the Firebase web server in the form of a timestamped +1 or -1 and will be updated on the real-time count of the occupancy of the room on the Occusense web application.

2.2 24-Hour Historical/Real-time Data Collection

In preparation for testing the the ability of the Occusense sensor system to collect data for a prolonged amount of time we will have the system running and collecting data the night prior to the functional testing. During the testing time there will be time-stamped data entries recorded from the previous hours leading up to testing stored in the database. This historical data will also be displayed on the Occusense web application in the form of a Time vs. Occupancy graph of PHO 113. The current occupancy of the room being displayed on the web application should also be roughly equal to the number of people in the lab during the time of testing to prove that the data we collected was, in fact, in real-time and accurate.

3.0 Verifiable Goals

By the end of this test we will have verified that the Occusense sensor system is able to differentiate the direction of a person walking under the system with the updated version of the people counting algorithm. At the conclusion of this test we should be able to sense somebody walking under as well as if they are exiting or entering the room with the MLX90621 thermal sensor. We hope to be able to detect direction of a single person walking in and out and thus be able to send a +1 followed by a -1. The other verifiable goal is to show that the Occusense sensor system can run on its own for a prolonged amount of time and accurately collect the data and display it on the web application. These two goals demonstrate the ability of the Occusense sensor system to be fully functional and reach the requirements given to us by our clients.