**BEVO Beacon: An Affordable and Useful Building EnVironment and Occupancy Monitor**

Fritz, Hagen1, Bastami, Sepehr1, Kinney, Kerry1, Schnyer, David3, and Nagy, Zoltan1

1Civil, Architectural, and Environmental Engineering, University of Texas, USA

3Psychology, University of Texas, USA

Over the past decade, there has been a rapid influx of affordable, commercial sensing technologies. The wide array of available sensors grants users the ability to adapt multiple devices towards answering their research questions without straining their budget. In addition to understanding more about a particular environment, researchers can scale up their original experiments to gain an even greater understanding of how a certain variable varies across space. High-grade instruments are still more accurate, but not all research questions require the precision that these devices provide and can often be unnecessary, costly, and restricting – depriving others of a sought-after device.

One particular field of study, air quality, has begun to incorporate these affordable sensors in a variety of indoor applications. To help further explore the indoor environmental exposures, we have developed our own monitoring device called the Building EnVironment and Occupancy (BEVO) Beacon. The BEVO Beacon consists of 5 pollutant-detecting sensors, 2 environmental sensors, a small fan, and a real-time clock all tethered to a Raspberry Pi 3B (RPi) microcomputer. All of these sensors all the BEVO Beacon to measure carbon monoxide/dioxide, particulate matter of multiple sizes, nitrogen dioxide, total volatile organic compounds, temperature, relative humidity, and light levels. The RPi is also capable of detecting WiFi and Bluetooth signatures of nearby devices when enabled to. The BEVO Beacon takes 10 second-averaged measurements every minute for each variable and stores the data locally or pushes it to an online server if connected to WiFi. The BEVO Beacons have been tested, calibrated, and deployed on multiple occasions with great success in terms of the amount and value of the data collected. In the future, we hope to further improve the hardware, software, and reliability of these devices.

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