Sensor Selection and Integration into a Wearable Sensor Array for Human Health Monitoring

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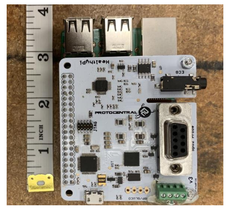
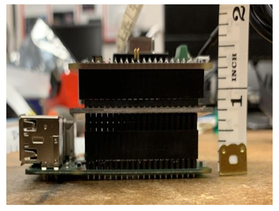
Introduction

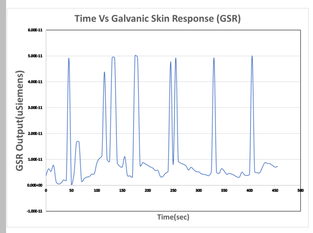
Project Description:

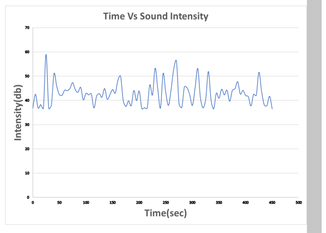
To expand the existing Building Management System (BMS) into an intelligent automated building control system to incorporate energy efficiency, power management and human factor using the wearable sensor array.

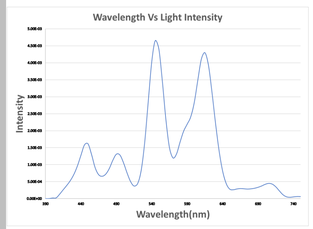


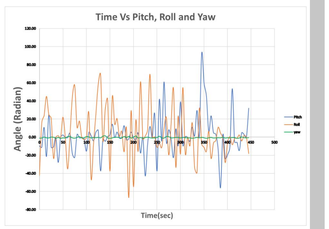


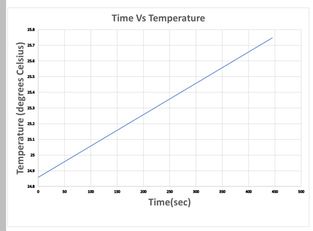
Proposed approximate size of the wearable sensor array

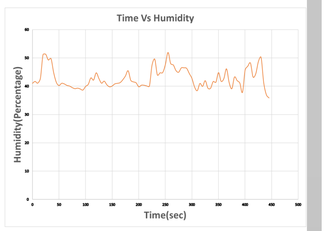




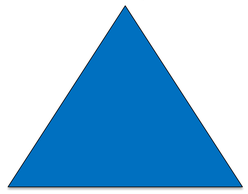








Energy Use
-efficacy

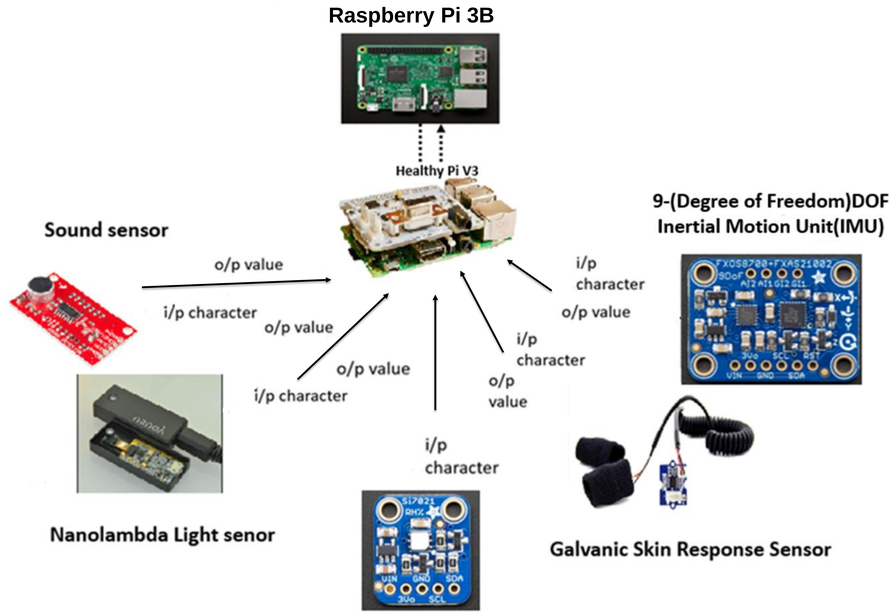


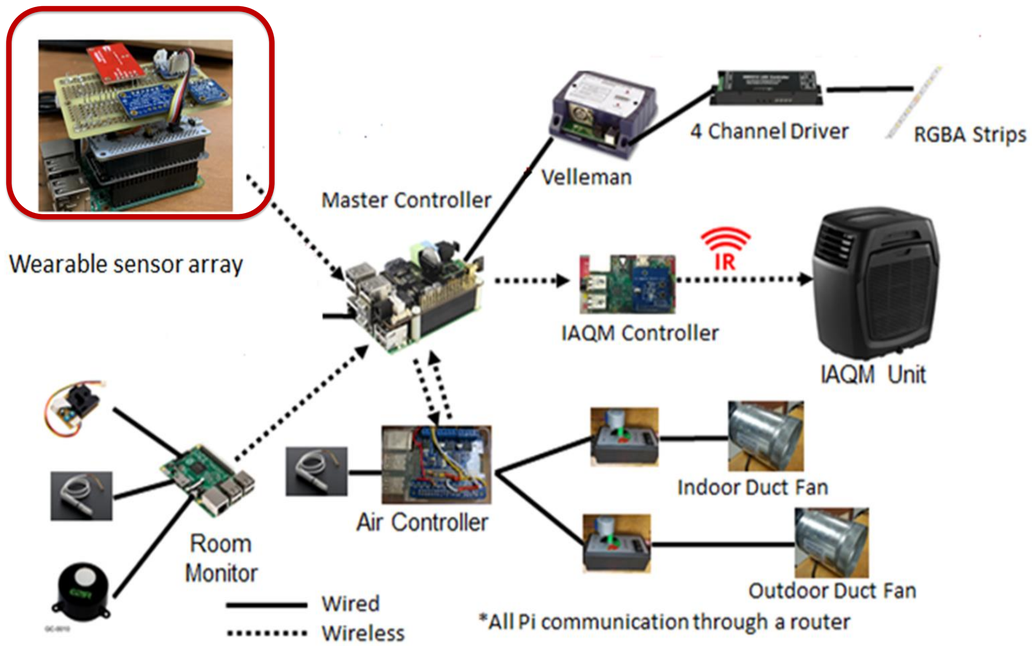
Psychological Impact
-warm/cool
-low/high CCT

Psychological Effects
-SPD (CRD, Energy)
-Flicker
-Glare

Method

- The individual sensors are evaluated initially with the Raspberry Pi to determine power consumption and communication protocols, and to select the specific sensors which will complement the existing BMS.
- Based on the individual sensor evaluation, battery life management will be optimized for data logging and communication intervals using the Witty Pi mini which adds RTC (real time clock) and power management capabilities.





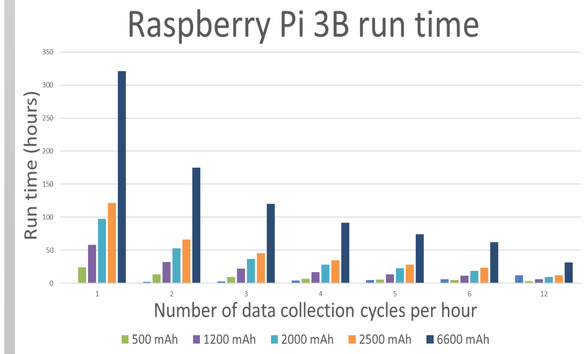
Practical Application

Sensors can measure several physiological signals/parameters as well as activity and movement of an individual

- ❖ Heart Rate
- ❖ Oxygen saturation
- ❖ Respiratory rate
- ❖ Ambient sound level
- ❖ Spectroradiometer
- ❖ Atmospheric Temperature & Humidity
- ❖ Galvanic skin response

Conclusions

- From the wearable sensor array the data can be transferred physically during an office visit or, with proper cybersecurity measures, uploaded via a wireless link for medical personnel monitoring and review.
- To improve system endurance, a battery management system is incorporated which allows the system to “sleep” between data logging and transmissions.



- Future improvement include a single PCB board to reduce overall size

Acknowledgments

•Kevin Martin, Associate professor at Northern Illinois University, Department of Technology Dekalb, IL.

•William Mills, Assistant professor at Northern Illinois University, Department of Technology, Dekalb, IL.