Group 36: **The Occupancy Project**

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Group Members:

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Project Abstract

Project Background:

Recently, homes and offices around the country have been rapidly connecting to the web via the Internet of Things, providing people with previously unknown information that can offer widespread beneficial effects. We want to provide these benefits to Iowa State University as well by making its lecture halls, classrooms, and offices "smart." Our project makes use of IoT data to reveal classroom availability information to both Iowa State students and staff.

Rooms around the university will report their current occupancy status via an occupancy sensor to a user-friendly web application. With this new room occupancy information, students can make informed choices about where to study and meet, and the university can make informed decisions using our application's analytics about classroom usage (room popularity, energy consumption, etc.). Because of Iowa State's continued growth in enrollment, managing classroom usage effectively is more important than ever. The Occupancy Project will help Iowa State get the most out of their current buildings and be at the forefront of smart and sustainable technologies.

MVP (Minimum Viable Product) Goal:

Make our own device for analyzing room occupancy. It will be able to detect when a room has someone in it and also whether the lights are on or off. We will use WiFi to save activity status online and display the information in a meaningful way via a web application interface. Our goal is to have this MVP completed by the end of Fall semester 2015.

Stretch Goals:

Once we have completed our MVP in the Fall, we will spend the Spring semester working on implementing some of our stretch goals.
- Integrate room occupancy information into the MyState app
- Be able to toggle classroom lights on and off with device
- Count the number of individuals in the room/gym/court
- Live-stream the room
- Book a room
- Scale to classrooms around Iowa State University

Business Ideas / Goals:

Upon successful completion of this product, we see potential in selling these web-connected devices to universities and offices. We could also sell analytics data they produce, integrate into power systems to automatically turn off and on lights as you enter/exit a room, or keep an activity log of a room, office, or home. We hope to pitch this solution to GSB for funding it across the university.

Implementation Ideas and Design Constraints:

- Use ESP8266 microcontroller that has a built in wifi module to send data from PIR motion detector to web server.
- Assume wifi connection will be present since it's in a building always
- Use Ionic framework to make native phone apps and web app simultaneously
- Device when produced in bulk should cost no more than $30 each.

Timeline:

9/18/15
- Attend HackISU to build initial prototype
- Basic web interface establishing connection between hardware & software

10/1/15
- Have budget created and plans to get funding in place (GSB, business pitch comp)
- Begin more in-depth web design with Ionic

11/1/15
- Functioning device correctly pinging basic website

● Compile database of all classrooms and their amenities (find resource online?)

12/1/15
● Final design for device with enclosure
● Website should display statuses of all devices (all the rooms)

12/14/15
● Demo functionality to other groups
● Pitch for additional funding

Budget:

Product Name	Description	Cost	Link
Microcontroller	Adafruit HUZZAH ESP8266 Breakout	$9.95 x 2	here
Solar Panel	Solar Panel 60mm(2-3/8") Square	$3.95 x 3	here
Photoresistor	To detect light changes	Free	(basic part)
Motion Sensor	PIR sensor to detect movement	$9.95 x 2	here
Casing	Plastic enclosure for all components	Unknown	
Command Strips	To attach enclosed components to wall	$12 (per 12)	here
Serial->USB Cable	To connect microcontroller to computer	$17.95 x 1	here
Super Capacitor	10 F / 2.5 V Super Capacitor	$5 x 4	here
	TOTAL PRICE	**$101.60**	