

### **Problem Statement**

My IoT home hack product aims to bridge communication between roommates in a dorm setting. As someone who lives in an on-campus dorm with a roommate, I found that finding private time in a shared space can be difficult. Sometimes it is a hindrance to message my roommate asking whether she was in the room or not and then waiting for her reply (she's slow at responding, too). Always having to manually notify my roommate would be annoying too. I know a lot of my floormates in my dorm face the same issue of oftentimes being disturbed by their roommates. In order to solve this problem I created this Home Hack that would ultimately communicate when roommates are in or out of the room, preventing any miscommunications or unnecessary messaging. In order to prevent any disturbances, my Home Hack can effectively bridge student roommates together. As a student who lives in a dorm setting, I personally think it is useful and helpful to know when a roommate is in or out of the room since a dorm is a shared space.

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input: switch

output: LED light

sensor: pirSensor (motion)

## Goal

I want it to help facilitate communication of the shared space. My Home hack project aims to expedite automatic and quick communication between roommates for the occupation of the dorm room. Rather than having to reach out to each other or having to go out of one's way to let each other know, my product acknowledge the presence of a roommate in the room. This way, I can let my roommate enjoy her free time in the dorm without worrying about any intrusions. I wouldn't want to enter in the dorm room when my roommate is chilling with her friends nor does my roommate want to bother me while I am napping.

#### **Process - Challenges**

#### Button to switch

Initially I was going to use a button for my input and then use a microphone as a sensor to collect sound data. As I began working through the project, I changed to a switch for my input and then a PIR sensor to collect any movement. I thought these changes would be appropriate because a switch would keep the PIR sensor on and will then shut off depending on when the user flips the switch.

#### Getting the code to work

Because of my lack of experience and skill with coding, writing up the code was definitely a challenge. I tried my best to base my code off something simple learned on the tutorials and make the necessary changes to make my prototype work.

#### Accessing data on the internet

Towards the end I realized my Home Hack was not yet an IoT product if I did not have a way to access the collected data and information from my product. I tried multiple ways to figure out how to access the information, such as using the Pushbutton app or sending email notifications, and figured that using Particle. Publish would probably be the best to keep track of live updated information. Although the internet logging is quite messy, it gets the job done.

## Outcome - photon board



int pirPin = D2; int switchPin = D0; int ledPin = D1; int pirState = LOW; int buttonState = LOW;

### Outcome - code

	switchLED.ino	
	<pre>int pirPin = D2;</pre>	
	<pre>int switchPin = D0;</pre>	
	<pre>int ledPin = D1;</pre>	
	<pre>int pirState = LOW;</pre>	
6	<pre>int buttonState = LOW;</pre>	
8	void setup()	
9	ł	
11		
11 17	ninMede/ evitebDin	
12 12	pinmode( switchPin , iNPUT_POLLOP); // sets pin as input	
14	ninMode( nirPin INPUT ).	
15		
16	pinMode ( ledPin, OUTPUT):	
17		
18	Particle.variable ("buttonState", buttonState);	
19	Particle.variable("pirState", pirState);	
20		
21		
22	}	
23		
24	void loop()	
25	{	
26		
27		
28	<pre>buttonState = digitalRead( switchPin );</pre>	
29	// Using a pulldown resistor we get a LOW	
30		
31	pirState - digitalRead( pirRin );	
32	pristate - dryttathead( privin /,	
34	if ( buttonState == HTGH)	
35		
36		
37	<pre>if ( pirState == HIGH ) // when sensor is on, light turns on</pre>	
38	4	
39	digitalWrite( ledPin, HIGH);	
40	}else{	
	<pre>digitalWrite( ledPin, LOW); // when sensor is off, light turns off</pre>	
42	}	
43		
44		
45	Death and a sublicity (UD assessed a Tall - Charles (build a Charles ()))	
46	Particle.publish ("Koommate in", String(buttonState));	
4/	Derticle sublich ("Deermate activity", String(pirState)))	
40	delay (500):	
49 50	ue (a) (300),	
51		
50		

# Outcome - room set up



#### **Outcome - data collection**



Secure https://console.	particle.10/10gs					
Logs 🕛 🖻						
To see the same stream, re	un this from a terminal:					
curl https://api.parti	icle.io/vl/devices/ev	ents?access_token	=bd51ff9b84885823fc	c4c3165434b867a27fac	1995	
			Roommate In	Roommate activity	device went offline	device came online
20 - 15 - 10 - 5 -	nadb	JIL IN J	hin., immi	line in		
0	04:56:56 PM	05:01:00 PM	05:05:04 PM	05:12:04 PM	07:49:08 PM	07:50:08
EVENT NAME	DATA			PUBLISHED AT		DEVICE
Roommate activity	0			February 1st at 5.	15:55 pm	yoonyouk
Roommate In	1			February 1st at 5.	15:55 pm	yoonyouk
Roommate activity	0			February 1st at 5.	15:54 pm	yoonyouk
Roommate In	1			February 1st at 5.	15:54 pm	yoonyouk
Roommate activity	0			February 1st at 5.	15:53 pm	yoonyouk

The final outcome resulted in the dorm setting with the product set up by the doorway so that the user can easily switch the device on and off as he or she walks in and out of the room. I would say the prototype has accomplished the fundamental components in executing its intended task and function. To take this project further, I think the next step is to improve the presentation of the product and the additional streamlining of the product's use.

## Reflection

As someone who has zero coding experience, I learned how to apply basic arduino coding and prototyping skills to create this project. I created the code for my Home Hack by combining multiple different codes from the Particle tutorials such as the switch input tutorial, the PIR sensor tutorial, and the basic LED circuit tutorial.

Although my product reports any movement, the PIR sensor may not always be accurate and sometimes tracks movement when there is nothing presented in front of it.

If I had to do this project differently, I would definitely make the components more integrative with the room. Currently the switch is stuck to a photon board that I taped to the side of the closet.

It would be better if the switch was actually integrated with the light switch, that way the user won't have to flip two different switches when entering the room. In addition, the messy jumper cables currently look very disorderly and unattractive. Hiding everything under some sort of designed container could improve the aesthetics of the product. If it were possible to place the PIR sensor in a more invisible location in the room so it was not so blatantly sticking out of the wall, perhaps the user won't feel like they're being watched. However, since jumper cables can only be so long, the distance between the sensor and the switch is limited.

# Summary description

As an IoT product, my device transmits information from the dorm to the internet, where a student on-campus dweller can easily access information about their room occupation.

### Links

http://diotlabs.daraghbyrne.me/1-a-simple-internet-appliance/iot-led/ http://diotlabs.daraghbyrne.me/3-working-with-sensors/sensors/ http://diotlabs.daraghbyrne.me/3-working-with-sensors/cloud-variables/ http://diotlabs.daraghbyrne.me/5-getting-input/switches/ http://diotlabs.daraghbyrne.me/7-communicating-events/events/ https://docs.particle.io/reference/firmware/photon/ https://playground.arduino.cc/Code/PIRsense https://learn.adafruit.com/pir-passive-infrared-proximity-motion-sensor/using-a-pir