

Parent Detector

In this worksheet you're going to build a parent sensor in scratch. To sense those pesky parents coming and going, we are going to use a PIR sensor to do this. Then use scratch to take the sensor input and make it do something, in our case we are going to make a LED flash.

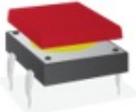
So what is a PIR



So a PIR or "passive infra red" is a sensor that detects changes in infra red light. So do you remember that box in the top corner of the rooms in your house? It's a PIR! A PIR use the range of light that us humans can't see, but this little device can. When it detects changes in the infra red light E.G. When someone walk in front of it, it tells what it's connected to that something has happened.

What you will need

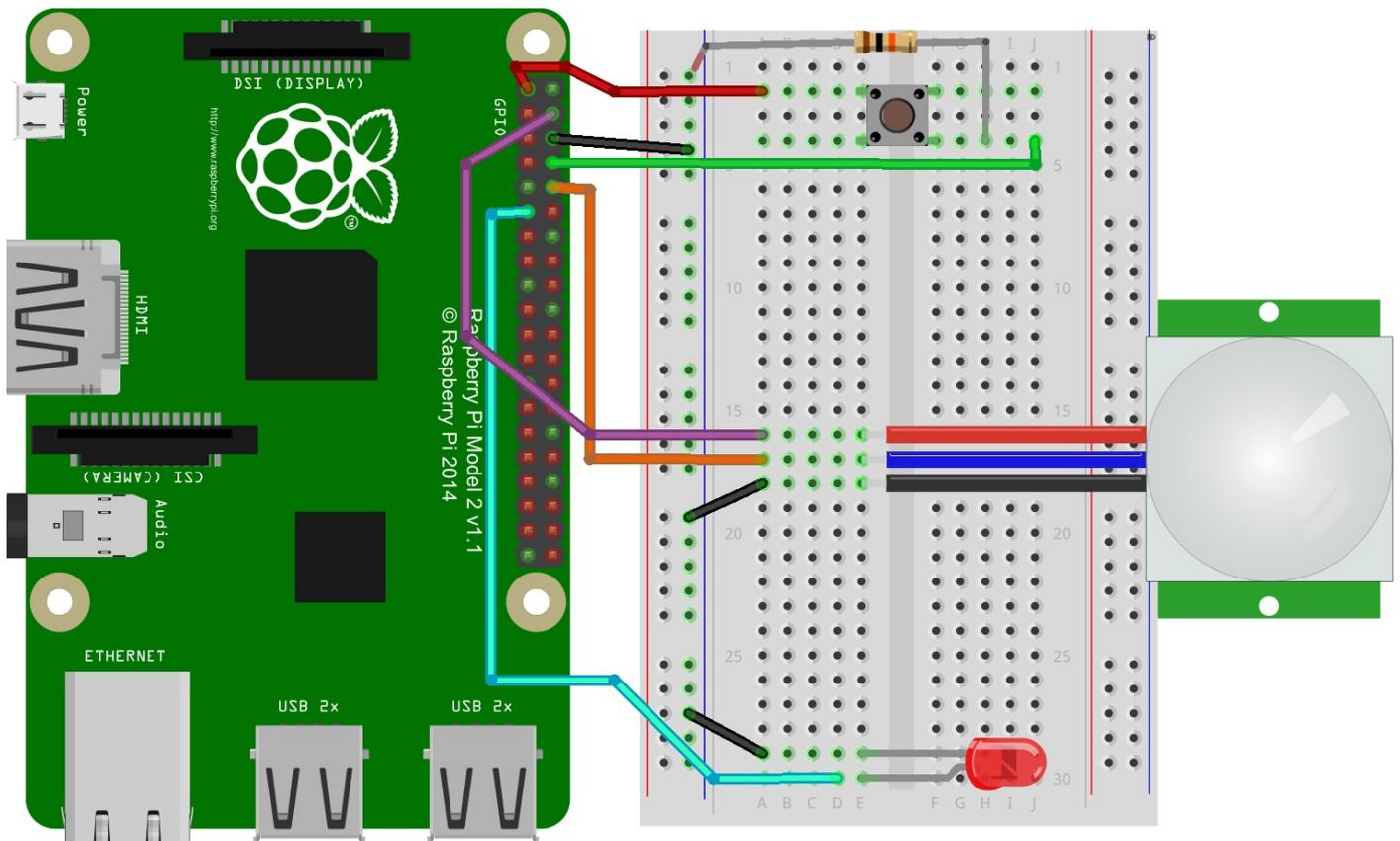
You will need the following items for the workshop.

Item : Amount		Item : Amount	
Red LED : 1		Button : 1	
PIR : 1		10K Resistor : 1	
Breadboard : 1		Male to Female jumper Wire : 8	
Male to Male Jumper Wire : 2			

Depending on the PIR you may need 3 more male to male jumper wires. You only need this if the PIR can't plug right into the breadboard.

The Resistor is colour specific. So make sure the coloured strips are right.

1. Lets build the circuit.



First, TURN THE PI OFF by pulling out the power. If you don't turn off your pi and you plug something in backwards something called blue smoke will come up from the pi and/or what you are plugging in! So be careful!

PIR

The PIR is wired by having VCC going to the Raspberry Pi's 5v pin, coloured in purple. The signal wire from the PIR going to the Pi's GPIO 10 shown in blue, and ground going to the pi ground, shown in black, the ground is connected to the ground plain on the breadboard.

Make sure that the white dome of the PIR is pointing at you when wiring the PIR in to the circuit!

Button

As in the diagram you will need to connect one side of the button to 3.3v power from the Raspberry Pi, this is shown in red on the diagram.

Then you will need to connect the other side of the button diagonally to ground using a 10K resistor, the ground is in black but the resistor is the component that's made up of different striped colours.

On the row that connects the resistor and the button together we will connect a wire to the pi to take the input. This wire is shown in green.

LED

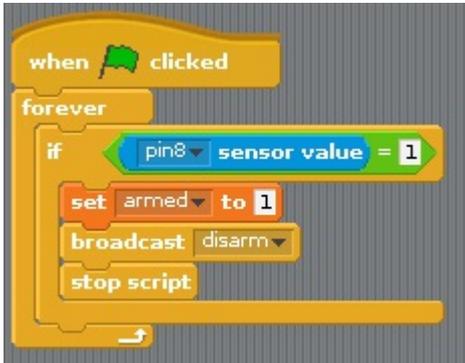
Connect your led by having the shorter leg of the LED connected to ground, shown by the black wire. Then have the long leg of the led connected to pin 11 of the Raspberry Pi, shown by the orange wire.

Lets Code!

First we will need to create a variable called "armed" in the variable tab of Scratch.

Now lets build the following blocks to make our alarm work.

Arming



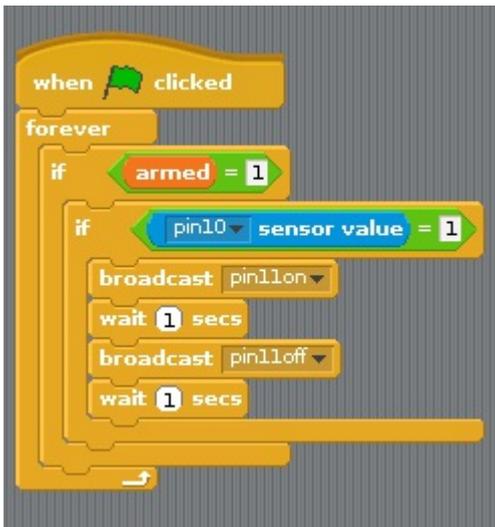
To starts lets make the code that allows you to "arm" the alarm.

So here is what each bit does.

- The first block allows the green flag to start the block.
- The forever the code between it running when it's looking for an input from the button.
 - Our if statement start what in it when the button is pressed.
 - When the button is pressed it sets our "armed" variable to "1".
 - Then after is tells the code that allows us to turn off the alarm to run.
 - Then it stops this block of code from running.

Now we have the code that allows us to turn on the alarm we can move on the block that sees if anything moves in front of it.

Sensing Movement

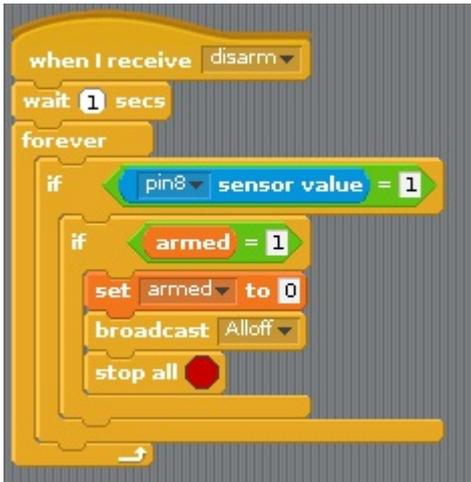


How lets build the bit of code that us to detect movement from the PIR.

- The first block allows the green flag to start the block.
- Keeps looping the block.
 - The our If sees if the armed variable is "1" and if it is YES starts the next bit.
 - This If sees if there is movement and if there is loops to the next bit.
 - Then it turns on the light
 - Waits one second
 - Then Turns off the light
 - Waits one second

It's great that we can see if there is movement and flash the LED but we need to be able to stop it if you want to stop it.

Disarming



How lets make the block that allows us to turn off the alarm.

- The first block waits till it receives a message from the Arming block before it starts.
- Waits one second before starting
- Then loops what is between the forever.
 - Waits for the button to be pressed before moving on.
 - If the armed variable is "1" then it moves on.
 - It sets the "armed" variable to "0"
 - Tells all the Pi's pins to turn off just in case the LED is on.
 - Stops everything.

What now?

How you have the basic to making a light flash here is some idea to add some spice to your project to scare away the intruder.

- Make sprit do something in scratch.
- Play a sound.
- Display a message to the intruder.
- Use a RGB LED to flash different colours.