SASTA OLIPHANT SCIENCE AWARDS

SOUTH AUSTRALIAN SCIENCE TEACHERS ASSOCIATION

Prize Winner

Programming, Apps & Robotics

Year R-2

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Creature Detector by Benji Buchanan

The aim of the entry, and its scientific purpose and potential applications

My entry detects infrared activity using a PIR sensor. When the sensor detects infrared radiation it will send a signal to the Raspberry Pi Pico and then the Pico will turn on a LED. This could be used to detect creatures who have infrared radiation.

The type of robot or computer / device required to run the program

I am using a Raspberry Pi Pico to power the PIR sensor and turn on the LED. I am using the BIPES project website (http://bipes.net.br/ide/) where you put programming blocks together to make a program. My dad showed me how to use BIPES to program the Pico.

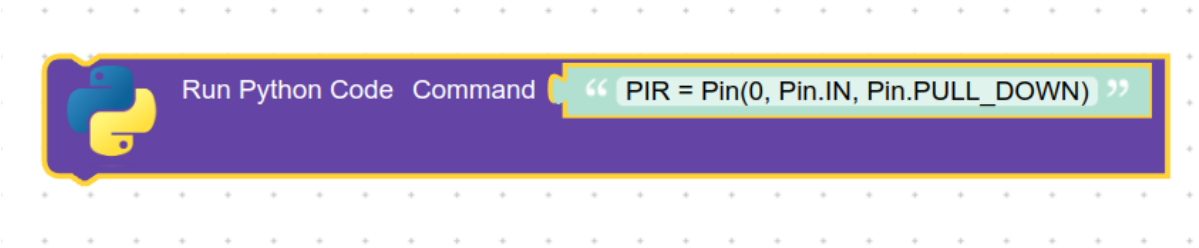
Clear instructions on loading or using the entry

1. Open Chrome web browser and go to bipes.net.br/ide
2. Load the XML file workspace.bipes.xml
3. Plug in the USB cable that connects to the Pico
4. On the website press the button to connect to the Pico
5. Run the program by pressing the play button
6. When the PIR sensor detects a warm creature, the LED will start to flash.

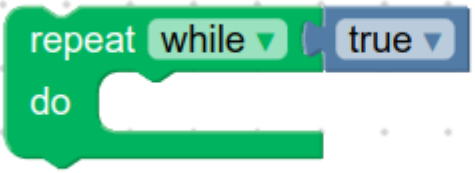
A hard copy of the program and an explanation of what the sections of the program do

These blocks import some code from libraries my dad helped me with them.

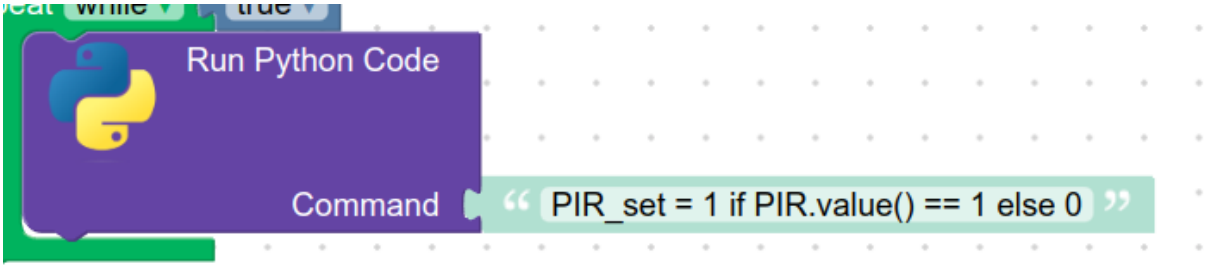
This block sets up the PIR on pin gp0 which is connected to the output pin of the PIR. We looked at a tutorial and copied this line.



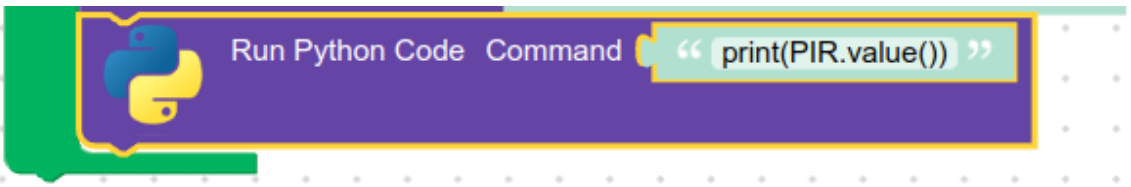
This block means do something forever



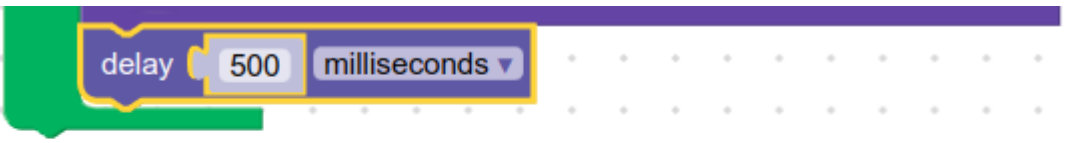
My dad helped me with this block, it sets a variable called PIR_set to 1 if PIR.value() is 1. Otherwise PIR_set is 0.



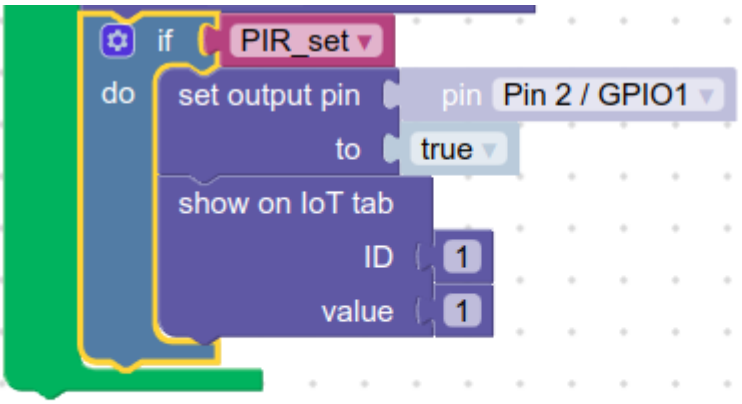
This block will print the value of PIR.value which is 1 or 0



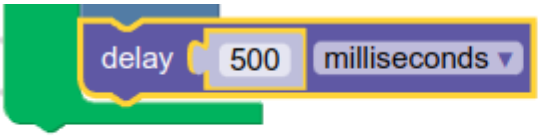
This block will make the program wait for 500 milliseconds and helps to make the LED flash.



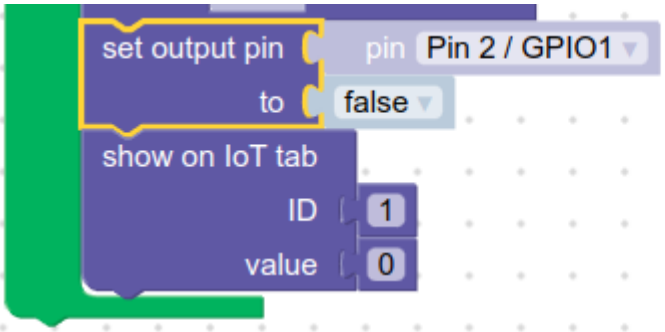
This block will check if PIR_set = 1 and then set pin gp1 to on. This pin is connected to the positive wire of the LED. My dad told me that we would need to use a resistor and helped me set it up. We also made an IOT dashboard with a flashing light using the show on IoT tab block.



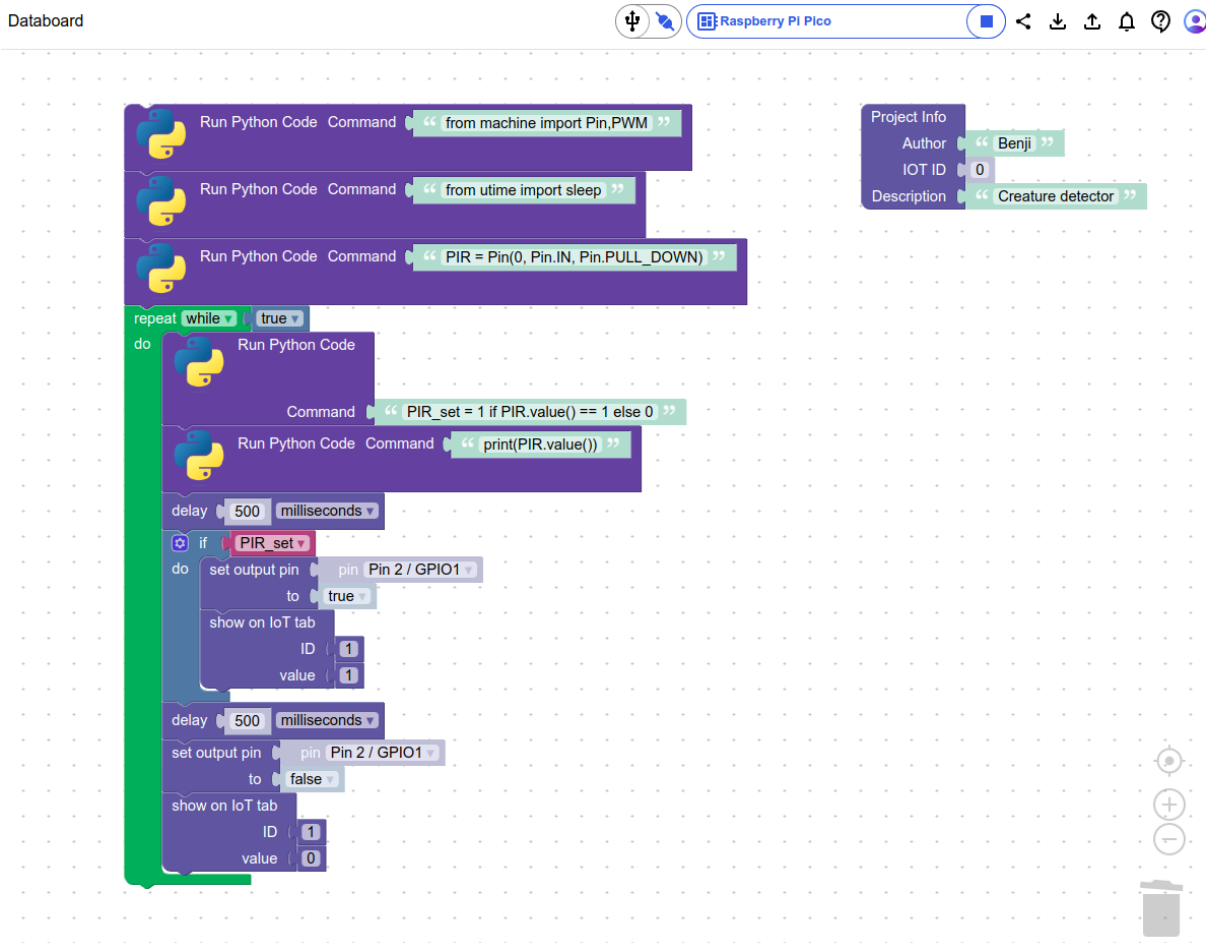
This is another block to make the LED flash correctly.



This block sets the gp1 pin back to zero which is off.



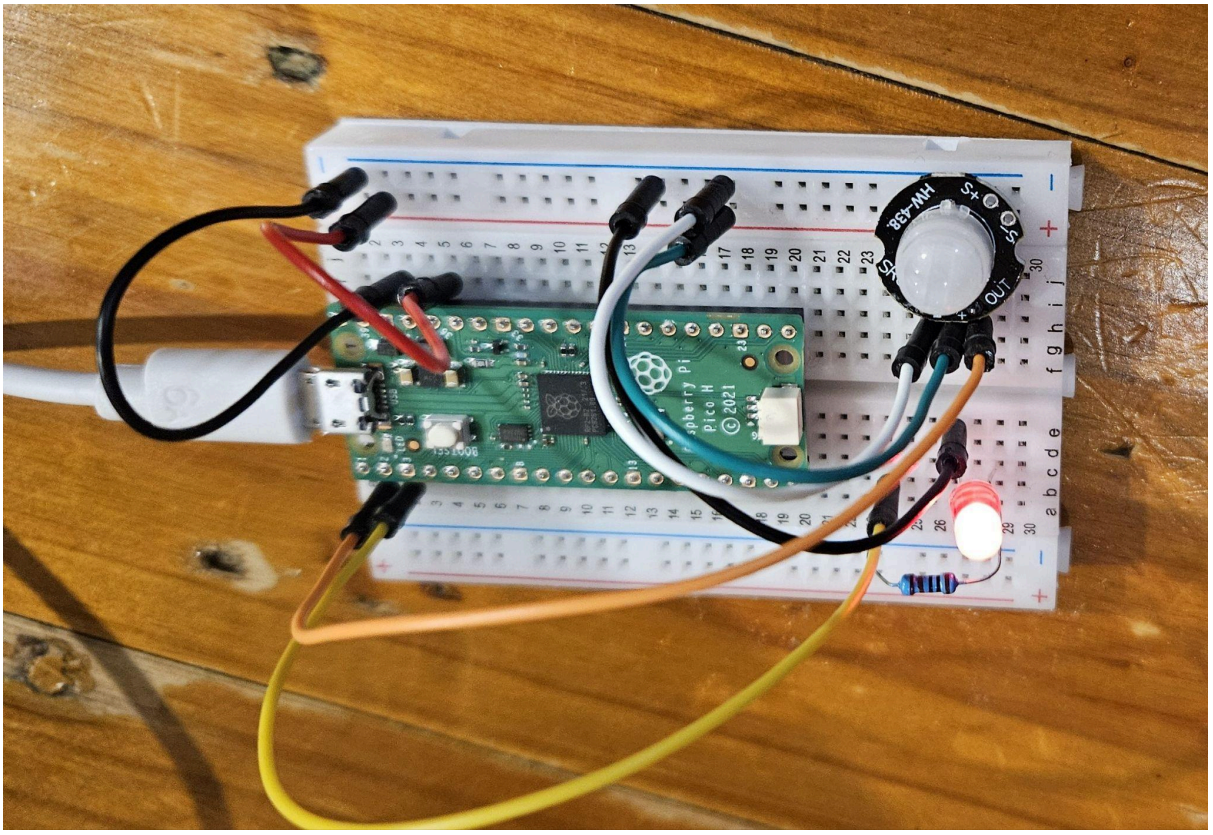
These are all the blocks put together



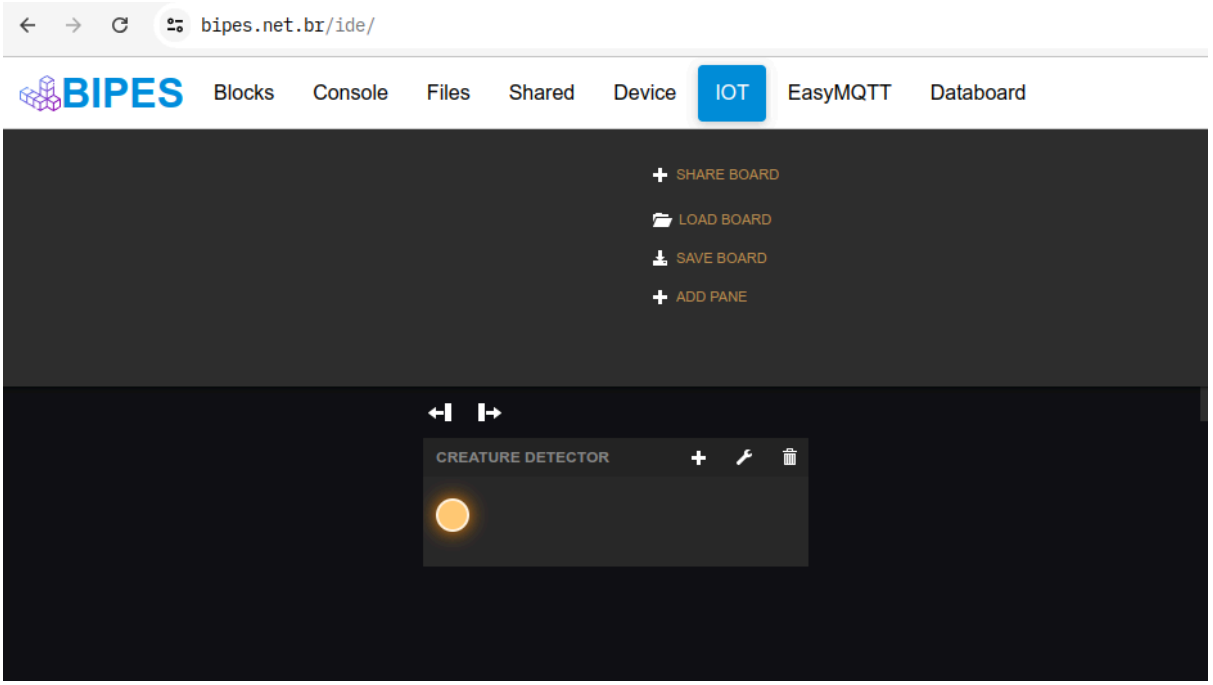
This is the actual Python code.

```
#Code automatically generated by BIPES (http://www.bipes.net.br)
#Author: 'Benji'
#IOT ID: 0
#Description: 'Creature detector'

import time
from machine import Pin

PIR_set = None

def gpio_set(pin,value):
  if value >= 1:
     Pin(pin, Pin.OUT).on()
  else:
     Pin(pin, Pin.OUT).off()

from machine import Pin,PWM
from utime import sleep
PIR = Pin(0, Pin.IN, Pin.PULL_DOWN)
while True:
  PIR_set = 1 if PIR.value() == 1 else 0
  print(PIR.value())
  time.sleep_ms(500)
  if PIR_set:
     gpio_set((1), True)
     print('$BIPES-DATA:',1,',',1)
  time.sleep_ms(500)
  gpio_set((1), False)
  print('$BIPES-DATA:',1,',',0)
```

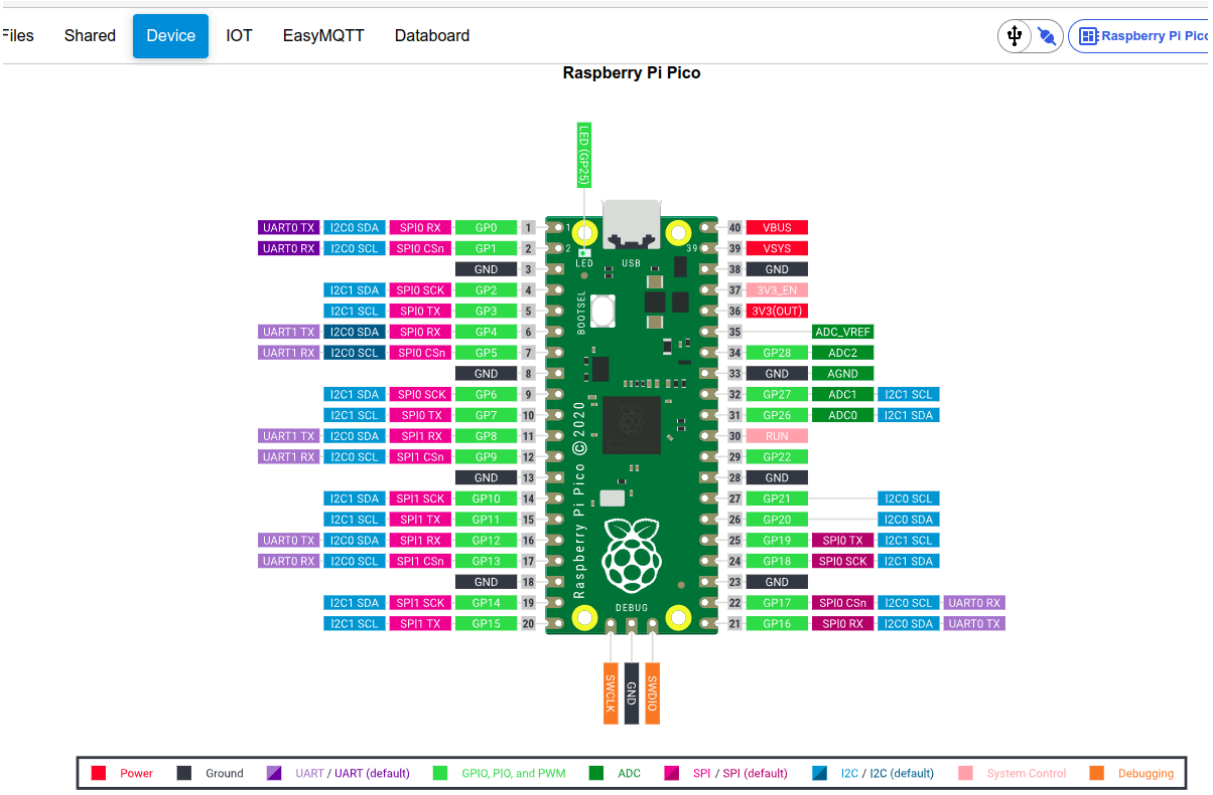
This is a picture of the Pico with PIR sensor and LED which I built with my dad



This is the IOT dashboard



This is how we could workout which pins to use



Bibliography

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https://projects.raspberrypi.org/en/projects/santa-detector-scratch2/2

https://www.elecrow.com/pico-starter-kit-for-raspberry-pi-with-25-lessons.html

https://developers.google.com/blockly