A1.3 Learning Activity

Objective

Perform a investigation and a presentation to be exposed in class about sensors

Development

1. Use the following list of models of comercial sensors to develop your activity:
    - [ ] 1.1 Encoder infrared sensor FC-03
    - [ ] 1.2 Transmitter/receiver pair presence sensor QRD1114
    - [ ] 1.3 Ultrasonic presence detector sensor HC-SR04
    - [ ] 1.4 Temperature and humidity sensor DHT11
    - [ ] 1.5 Temperature and humidity sensor DHT12
    - [ ] 1.6 Color sensor RGB TCS34725
    - [ ] 1.7 Infrared remote control sensor AX-1838HS
    - [ ] 1.8 Track follower sensor TCRT5000
    - [x] 1.9 Movement sensor PIR HC-SR501
    - [ ] 1.10 Distance sensor Sharp 2Y0A02/GP2Y0A02YK0F
2. Wait for the assessor to show you what type of sensor will be the one that your team will develop and once you have it mark the sensor within the previous point.
3. once you know the topic to develop, research and redact the following points in this document:

Engineering in Computer Systems, Information and Communication Technologies and Computing

Subject: SCC-1023/SC7A Programmable Systems

Team Members

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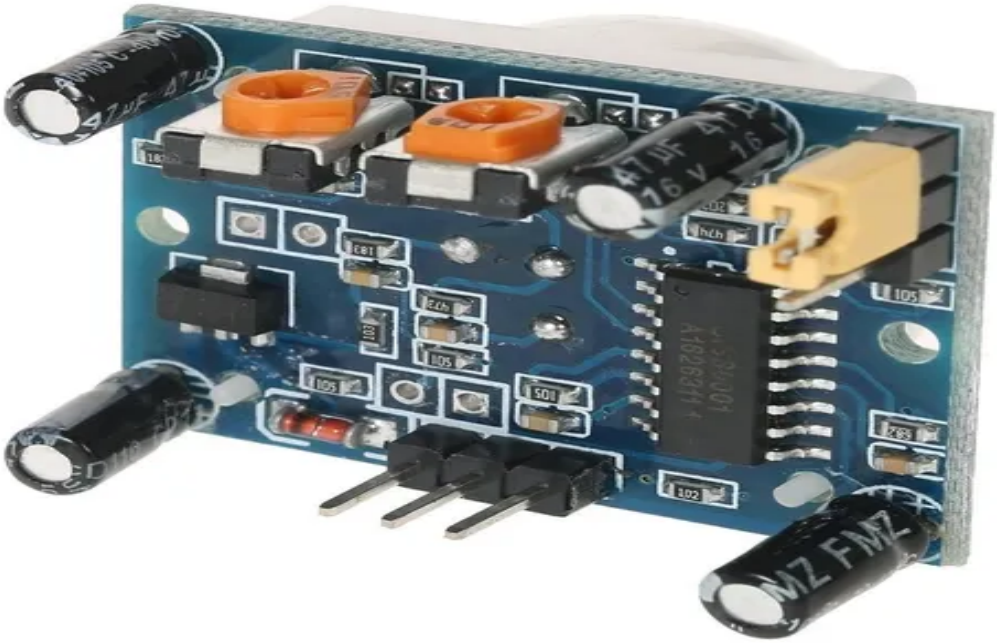
Introduction

There are many different types of sensors and all of them have a lot of applications and are useful for several different scenarios, this time we will talk about a motion sensor model PIR HC-SR501 which is a type of sensor that can react to the presence and movement of an object from its infrared radiation.

Definition

The PIR HC-SR501 sensor detects motion by measuring changes in the infrared (heat) levels emitted by objects around it. When motion is detected, the PIR sensor emits a stop signal on its output pin.

Images of the sensor



Vcc (5V - 12V)
OUTPUT
3V Regulator
GND
BIS0001
Time Delay Control
Sensitivity Control
HC-SR501 Pinout

Physical Properties

Property	Quantity
Weight	0.1 kg
Compatible	Arduino
steering angle	110°
Output Delay	3 to 300 seconds
Sensitivity adjustment	3 to 7 meters
Operating Temperature	-15° to 70° C
Dimensions	3.2 x 2.4 x 1.8 cm
Lens size	Diameter-23mm

Electrical Properties

Property	Quantity
Supply voltage	5 V to 12 V
Average consumption	< 1 Miliampere
output	0 V or 3.3 V

Explain how it behaves and to which stimuli responds

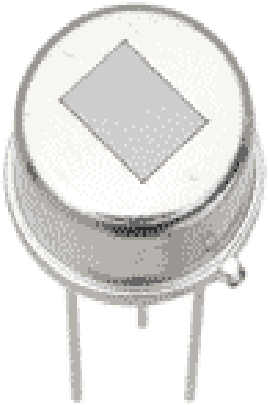
The HC-SR501 is a motion sensor module, which has a PIR sensor consisting of two deparated elements; on one hand it has a differential signal emitting device between it and another a sensor that will be the one that actually activates the alarm signal.

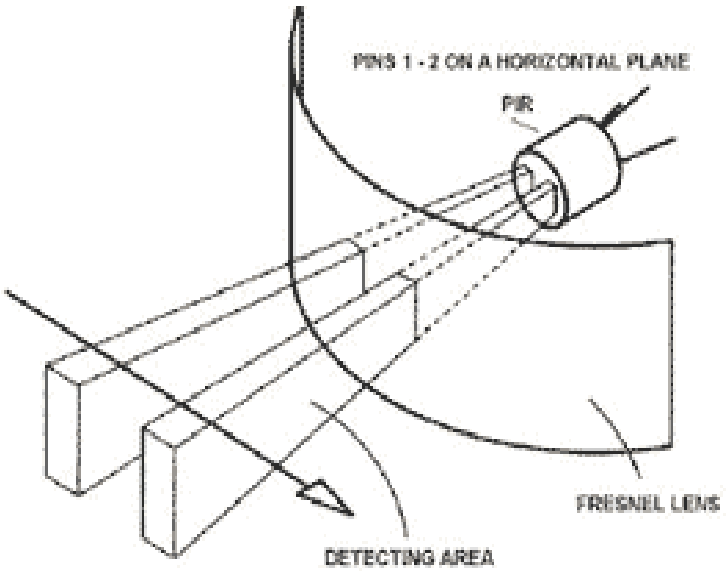
In this way, if an object crosses one of the fields, a differential electrical signal is generated, which is captured by the sensor, and a digital signal is emitted.

The PIR sensors are based on the measurement of infrared radiation. All bodies (living or not) emit a certain amount of infrared energy, the higher the temperature. PIR devices have a piezoelectric sensor capable of capturing this radiation and converting it into an electrical signal.

The other element remaining for everything to work is the optical sensor. It is basically a plastic dome formed by Fresnel lenses, which divides space into zones, and focuses infrared radiation on each of the PIR fields.

In this way, each of the sensors captures an average of the surrounding infrared radiation. When an object enters the sensor range, one of the areas marked by the optics will receive a different amount of radiation, which will be captured by one of the fields of the PIR sensor, triggering the alarm.





Application uses

The motion sensor has different applications which can be implemented to:

- The lighting of a corridor, which would light up when detecting the presence of a person. With this, in addition to avoiding having to turn on and off the light (and that we forget to turn it off), we can reduce the electricity expense to the minimum necessary.
- The doors of a shopping center that open (when someone approaches the door) and close (when they move away from the door) automatically, by the presence of a person.
- Another application would be escalators which are put into operation when detecting proximity of a person and also work while the person is using them, and stop until the person moves away.

- They can also be used for alarms that are activated when they detect the presence of a person who should not be in that place.

Conclusions

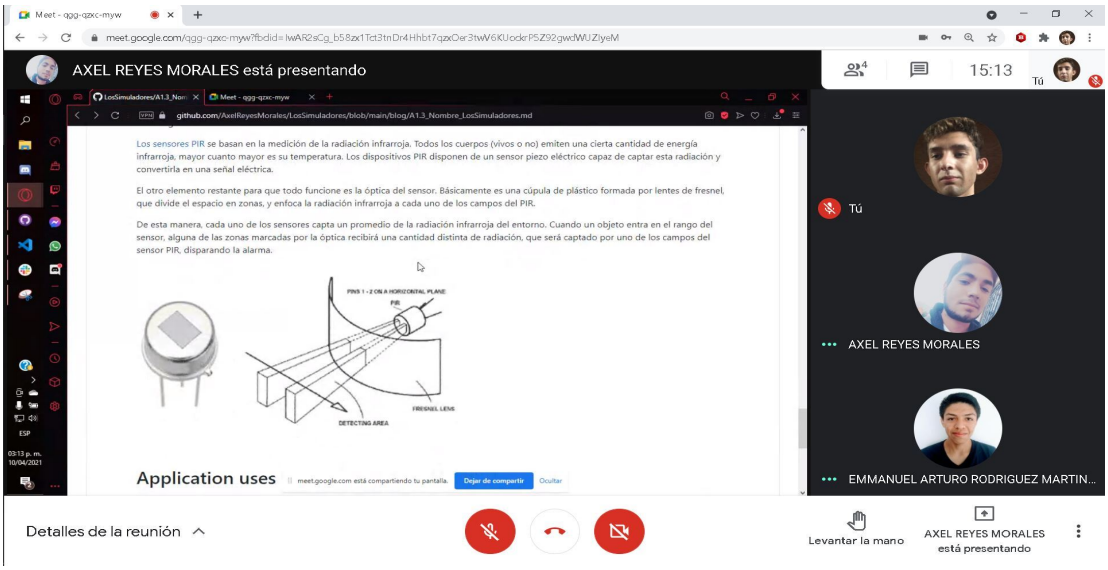
David: This model of motion sensor is very useful because it can be used for a variety of situations, other than that the operation of it is very interesting.

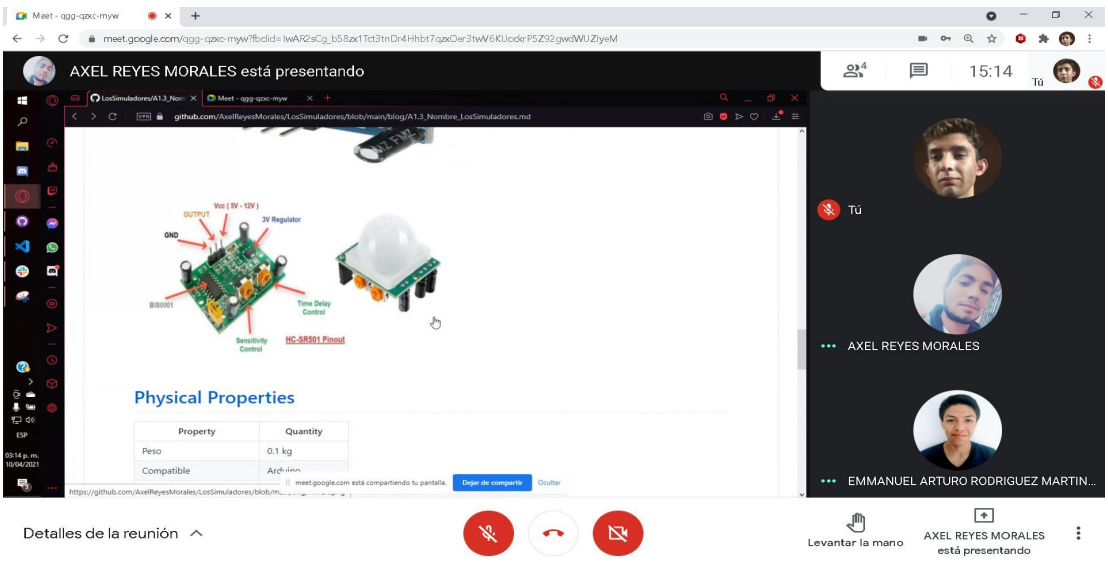
Emmanuel: In conclusion, the motion sensor PIR measures the changes of the objects around it by means of infrared levels that the objects emit. This is very helpful and they can be used for different functions, for example to the security of a place.

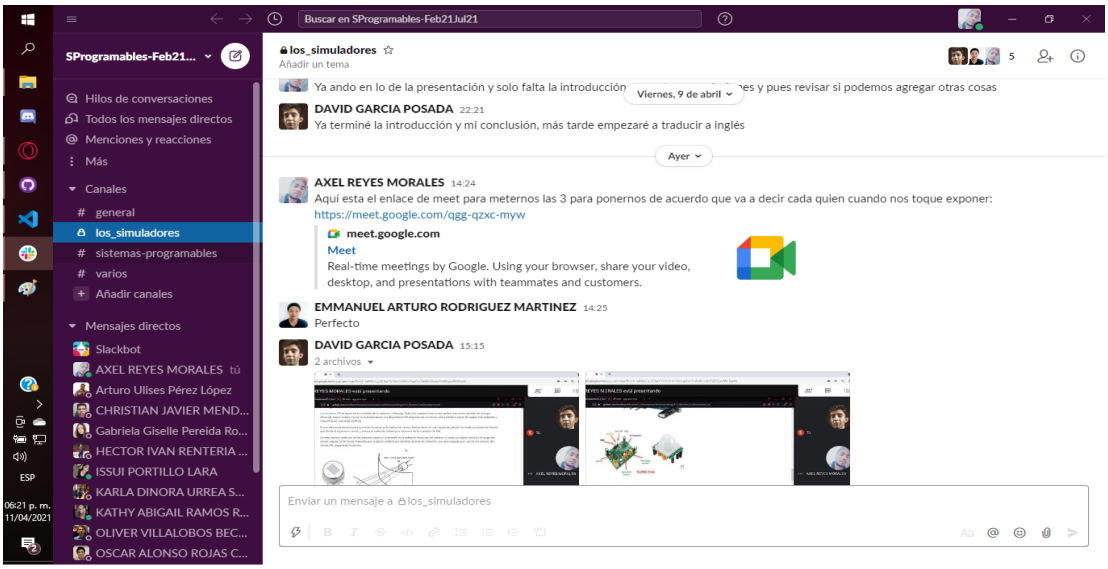
Axel: To conclude I can say that this sensor can serve us for many things in which we need to check if something is in motion, as it can detect things through infrared radiation.

Oscar: This sensor let us use to interact with the enviroment or when we want that a user triggers some action on a circuit without touching it .

4. Insert images of **evidence** such as meetings of the team members taken from the development of the activity







Repositories

Axel Go to my repository

David Go to my repository

Emmanuel Go to my repository

Oscar Rojas Got to my repository