Field Project
Session – 2022-2023

Topic – Smart Wearable Device For Women Safety using IOT

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What Is IOT?

- The Term “Internet Of Things” or IOT was first coined by Kevin Ashton in 1999.The Internet of Things (IOT) is an epi centre of the Digital Transformation Revolution that is changing the shape of business , enterprise and people’s lives

- The Internet Of Things (IOT) refers to the network of connected objects that can collect and exchange data in real –time using embedded sensors software and other technologies.

- In simple words IOT is nothing but just a way to

“CONNECT THINGS TO THE INTERNET”

How IOT Works ?

IOT System consists of four sections :

- Sensors/Devices- used for collecting the data by the environment.
- Connectivity- the system can be connected to the network/cloud through various communication protocols.
- Data Processing- the data from the cloud is processed using some software.
- User Interface- it is the point of human-computer inter

Applications of IOT

Major domains using Internet of Things ;

- **Home Automation-**it is the best example of IOT ,smart homes or IOT based homes automation are becoming popular , where consumer electronic gadgets such as fans , lights , air conditioners , televisions , etc. Can be connected to each other via internet . This interconnection enables the user to operate these devices from a distance.

- **Wearable Health Monitors-**these are both captivating and useful. They include smart clothes , smart wristwear , medical wearables ,etc. that provides us with high quality health services . They are designed to track activities such as pulse rate , step count, heart rate, etc.

- Agriculture – Through the implementation of IOT sensors , a significant amount of data can be obtained on the state and stages of the soil . Information such as soil moisture , level of acidity , the presence of certain nutrients , temperature and many other chemical characteristics , helps farmers control irrigation , make water use more efficient , specify the best times to start sowing and even discover the presence of diseases in plants and soil.

- Smart Grid And Energy Saving – The progressive use of intelligent energy meters , or meters with sensors , and the installation of sensors in different strategic points that go from the production plants to the distribution points , allows a better monitoring and control of the electrical network.

Sensors/Devices Used for the project

For the project of a smart wearable device for women safety using IOT , we have used the following sensors and devices for performing the respective tasks ;

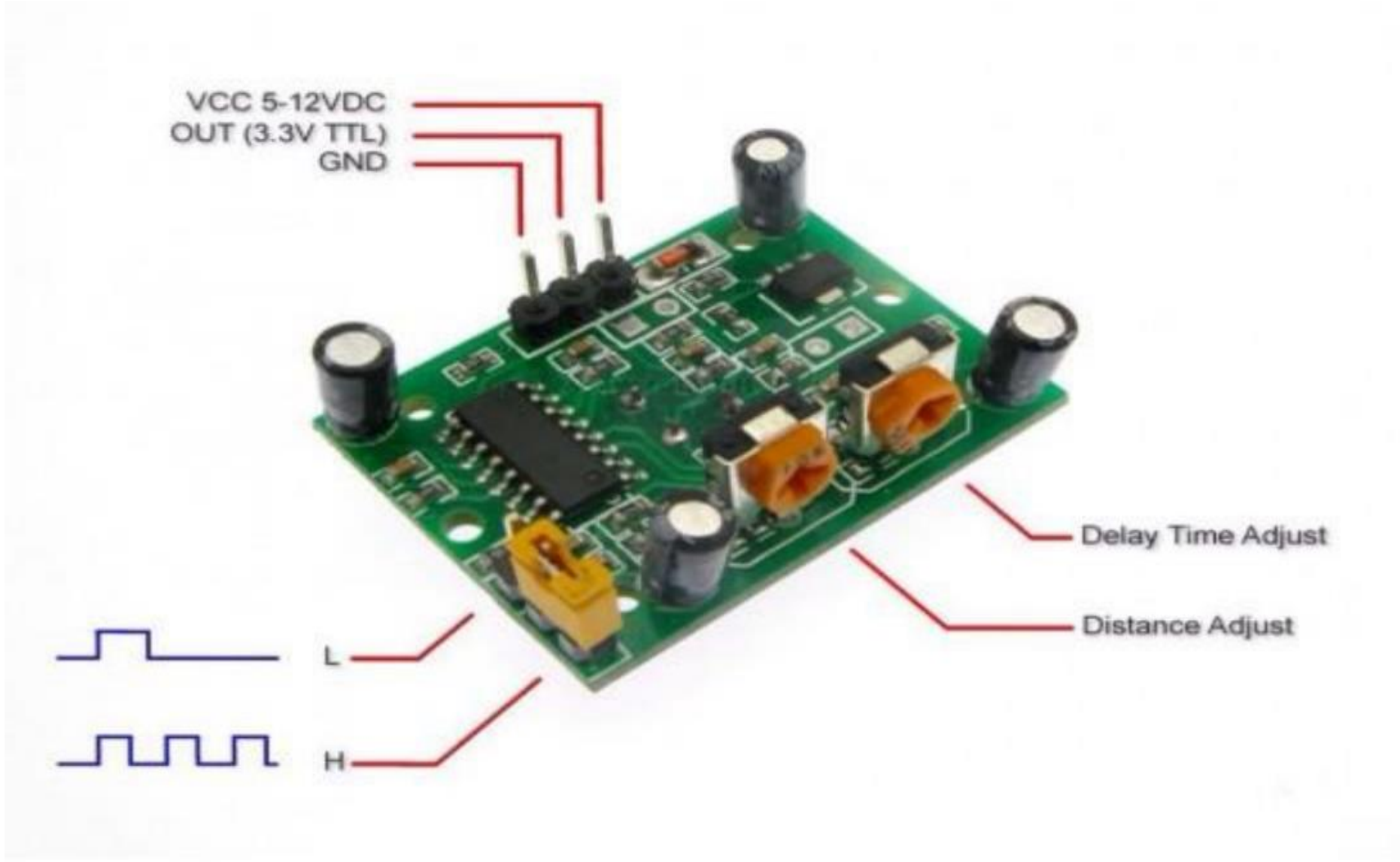
- PIR (Passive Infrared sensors)
- Body temperature sensors (LM 35)
- Ultrasonic sensors
- Node MCU

PIR SENSORS

A Passive Infrared (PIR) sensor recognizes infrared light emitted from nearby objects . You may assume that " passive " IR sensors mean these devices are less complicated than their active counterparts , but you'd have mistaken. A passive IR sensor's Functionality may be more difficult to understand .

- PIR sensors Functions-

first, realize that everything – humans , animals , even inanimate objects – emits a certain amount of IR radiations . How much IR radiations they emits relates to the body or object's warmth and material makeup . Humans can't see IR , but we've designed electronic detection devices to pick up these signals . PIR sensors are used in thermal sensing applications , such as security and motion detection . They are commonly used in security alarms , motion detection alarms and automatic lighting applications .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How do PIR Sensors Work ?

- Passive infrared (PIR) sensors use a pair of pyroelectric sensors to detect heat energy in the surrounding environment .

- These two sensors sits beside each other , and when the signal differential between two sensors changes the sensor will engage . That may mean it triggers an alarm , notifies authorities , or maybe turns on floodlight .

- IR radiation focuses on each of the two pyroelectric sensors using a series of lenses constructed as the sensor’s housing . These lenses widen the device’s sensing area.

BODY TEMPERATURE SENSOR

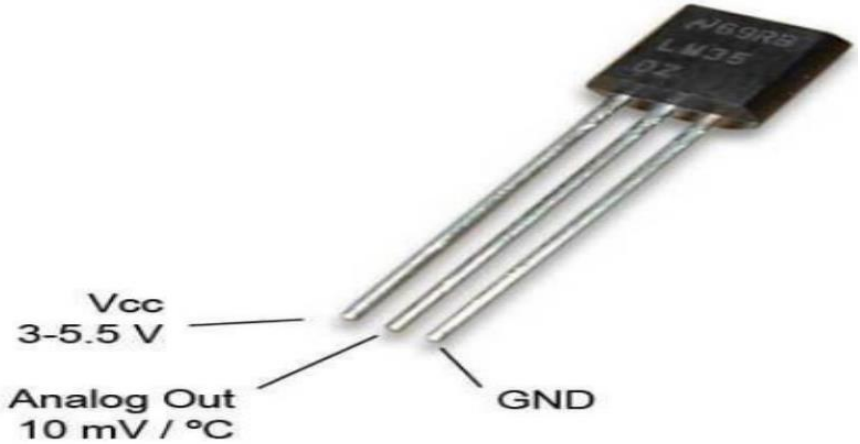
LM 35-

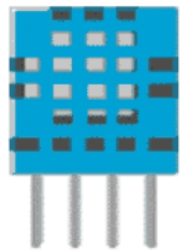
LM 35 is a most commonly used temperature sensor that shows values in the form of output voltages instead of degrees Celsius , it shows high voltage values than thermocouples and may not require the output voltages to be amplified .

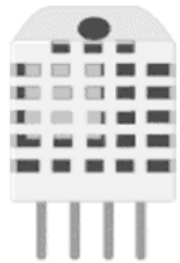
The output voltages of LM 35 is proportional to the temperature of Celsius . The scale factor is 0.01 V/ degree C. One of the most important characteristics of LM35 is that it draws only 60 microamps from its supply and has a low self – heating capacity .

LM 35 temperature sensor available in a variety of packages , such as T0-46 metal transistor package , T0-92 plastic transistor –like package , 8-lead surface mounted SO-8 small outline package .

DHT







	DHT11	DHT22
Operating Voltage	3 to 5V	3 to 5V
Max Operating Current	2.5mA max	2.5mA max
Temperature Range	0-50°C / ± 2°C	-40 to 80°C / ± 0.5°C
Humidity Range	20-80% / 5%	0-100% / 2-5%
Sampling Rate	1 Hz (reading every second)	0.5 Hz (reading every 2 seconds)
Advantage	low cost	More Accurate

ULTRASONIC SENSORS

- An ultrasonic sensor is an electronic device that measures the distance of a target object by emitting ultrasonic sound waves , and converts the reflected sound into an electrical signal .
- Ultrasonic waves travel faster than the speed of audible sound (i . e . the sound that humans can hear) .
- Ultrasonic sensors have two main components : the transmitter (which emits the sound using piezoelectric crystals) and the receiver (which encounters the sound after it has travelled to and from the target).
- In order to calculate the distance between the sensors and the object , the sensor measures the time it takes between the emission of the sound by the transmitter to its contact with the receiver. The formula for this calculation is **D=1/2 T*C** (where d= distance , t= time, c=speed of sound I . e approximately 343 meters/seconds).


HC-SR04
Vcc
Trig
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- An ultrasonic sensor emits sound waves toward ab object and determines its distance by detecting reflected waves.

- Ultrasonic sensors are used primarily as proximity sensors . They can be found in automobile self – parking technology and anti – collision safety systems .

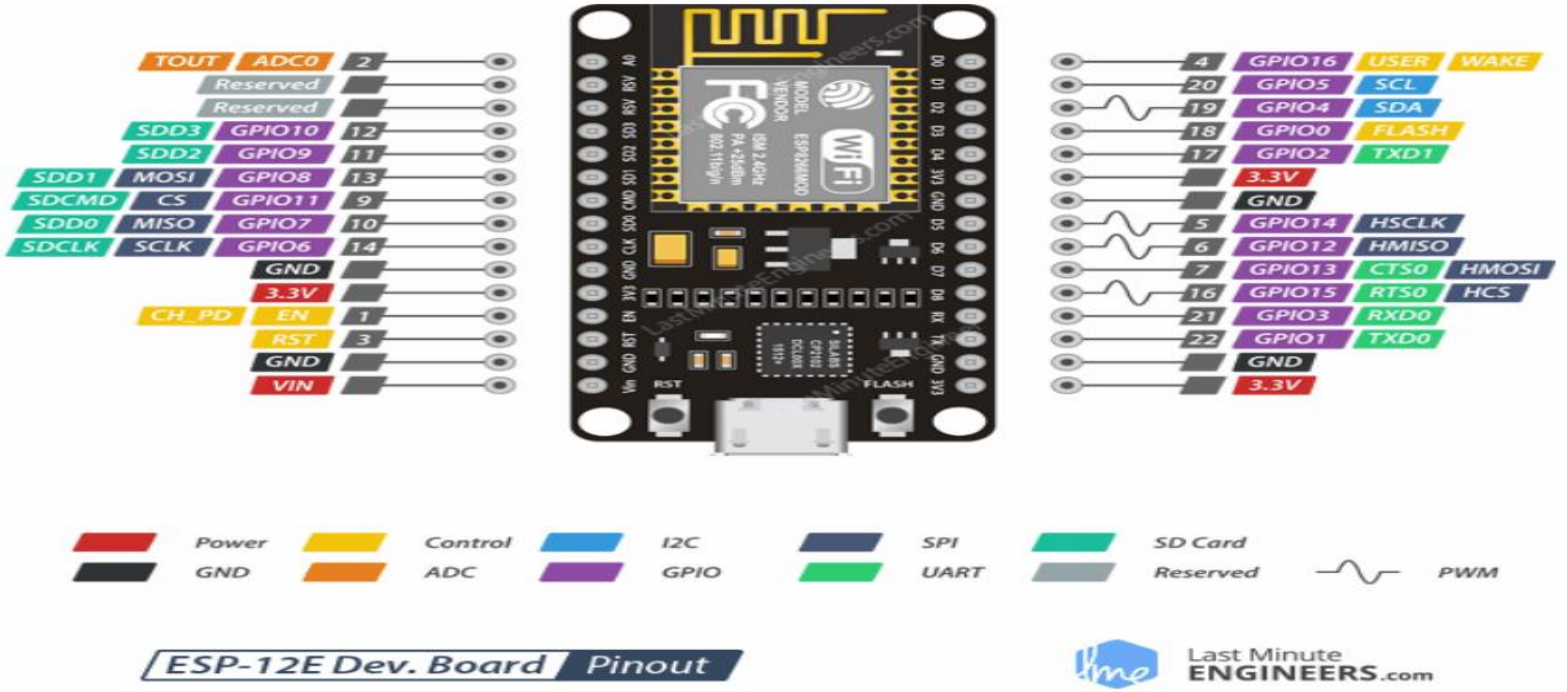
- Ultrasonic sensors are also used as level sensors to detect , monitor , and regulate liquid levels in closed containers (such as vats in chemical factories) . Most notably , ultrasonic technology has enabled the medical industry to produce images of internal organs , identify tumours , and ensure the health of babies in the womb.

NODE MCU

- The Node MCU (node micro controller unit) is an open - source software and hardware development environment built around an inexpensive System-on-a-chip (SoC) called the ESP8266 .
- The ESP8266, designed and manufactured by Espressif Systems , contains the crucial elements of a computer : CPU , RAM , networking

(Wi-Fi) , and even a modern operating system and SDK . That makes it an excellent choice for internet of things (IOT) projects of all kinds.

- However , as a chip , the ESP8266 is also hard to access and use . You must solder wires, with the appropriate analog voltage , to its pins for the simplest tasks such as powering it on or sending a keystroke to the “computer” on the chip.



You also have to program it in low-level machine instructions that can be interpreted by the chip hardware . This level of integration is not a problem using the ESP8266 as an embedded controller chip in mass-produced electronics . It is a huge burden for hobbyists , hackers , or students who want to experiment with it in their own IOT projects.

Layout for the project