

# Wearable IoT Sensor Network for Safety Environmental Monitoring

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**Abstract-** In wearable sensor nodes, the considerable task is the power supply to the sensor node. At night & during cloudy days solar energy disappears and so it can be associated in power management unit of sensor node. The advanced board like raspberry pi 3 has an inbuilt ethernet port, using this helps in getting more secure and powerful output. This also helps in reducing the wakeup time required for other wireless modules. To track adverse environmental conditions, we make use of wearable IoT sensor network. The data from sensor is stored in cloud and accessed data from cloud and made available to the user through an mobile application.

**Keywords –** wireless sensor network, Internet of Things, Raspberry pi, Sensor node, Ethernet.

## I. INTRODUCTION

Wearable sensor network is most modernized procedure to measure the percentage of harmful gases and other parameters. This process is a form of choosing a sensor node to measure values. Sensor node is actually a combination of sensors, processor or controller and a power source. Wearable sensor nodes have been used to accessing the skin temperature values [2] and other medical related issues.

This has been introduced in past years using it on human body to evaluate values and also used in motor vehicles and cars etc to monitor the surrounding environment. This work describes the use of raspberry pi wearable nodes. This has an onboard ethernet port and a Bluetooth port. This has an advantage of transporting information with more security.

## II. RELATED WORK

The work reported in [3] presents a wearable and wireless system for toxic environmental volatile organic compounds (VOC), temperature and relative humidity monitoring. A Bluetooth interface is used to transmit the data from the sensor device to a mobile phone [1].

The work in [6] defines an environmentally wearable sensor networks for monitoring the urban environment, it has use different sensors and an rechargeable battery which can last upto 7hrs. After it we need to recharge it for functioning. In past it is used on bicycle to monitor air pollutants and other gases like O<sub>2</sub> and PM<sub>10</sub>. Here zigbee module is used for wireless network. In previous work ATmega328 has been chosen for environmental monitoring and RFM95 as an wireless module accompanied to the micro controller for transmitting data.

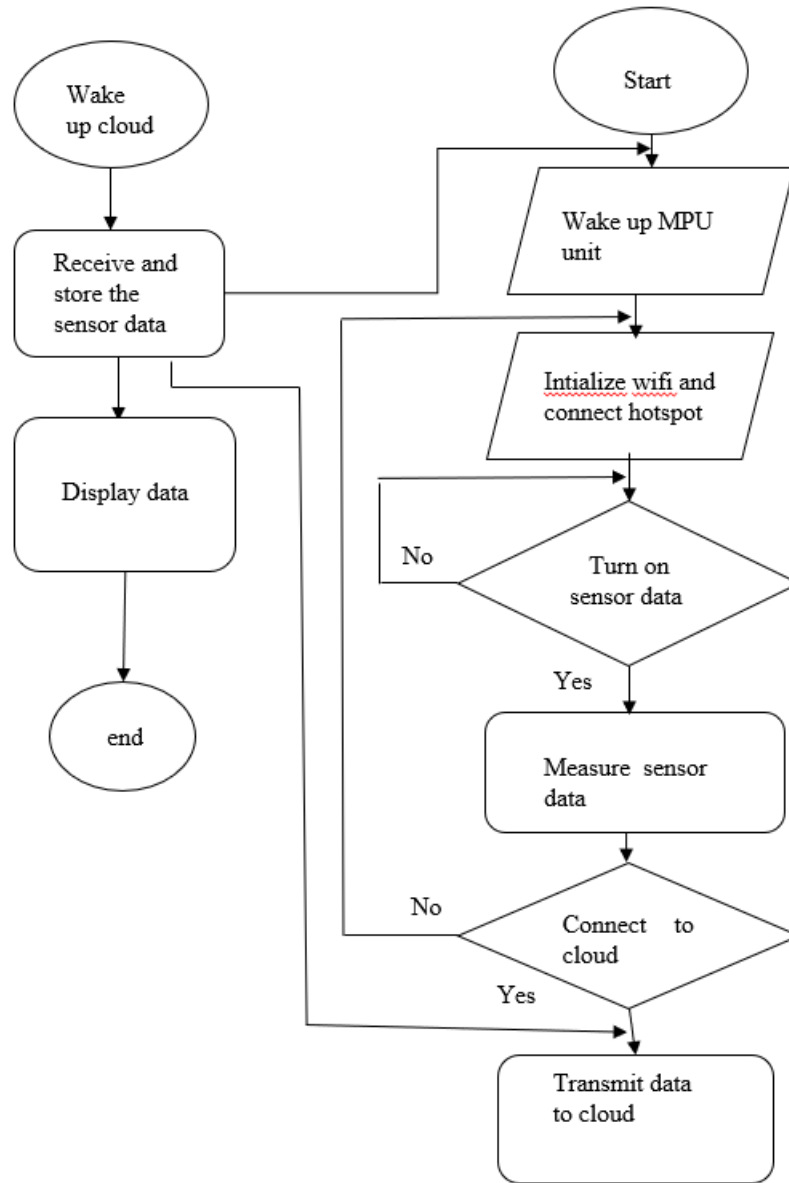
## III. IMPLEMENTED WORK

The components used for the implementing method are DHT11, MG811, CM1102, DSM501A, Power Source. DHT11 is a combination of temperature and humidity measuring mix with an 3.5 to 5.5V. This can measure temperature between 0 to 50<sup>0</sup> and humidity from 20 to 90% with an accuracy of  $\pm 1^0c$  to  $\pm 1\%$ . MG811 is an gas detector capable of detecting co and other gases. The uv index measurer GYML8511 operated at temperature of -40<sup>0</sup>c to + 85<sup>0</sup>c. DSM501A an particulate detector of low cost. It is able to measure PM<sub>2.5</sub> ions.

Raspberry pi 3 is an micro processor module with high performance and an inbuilt ethernet port for secure data transfer. This is an highly advanced module than micro controller using ARMv8-A

instruction set. we can store information and os installation in an micro sd card, it provides a slot for the sd card. The operating system for this raspberry pi are linux, windows 10 ARM64,RISC OS and other. It operates under 5v.

The sensor data is completed from the different types of sensors used and transmitted to the micro processor and the ethernet port is automatically switched on and the data gets transmitted without any need of waking up the Ethernet port. This data is transmitted to the cloud and from there it can be made available to the user through an application. Thus the user gets awareness about the surrounding environment.

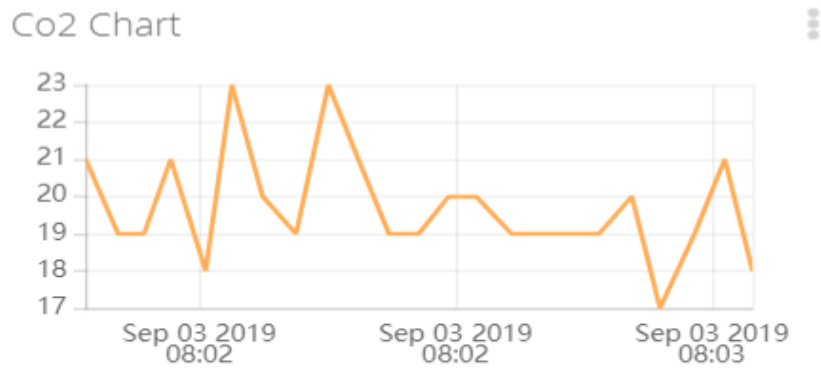


**Fig1. Flowchart for working of wearable sensor networks**

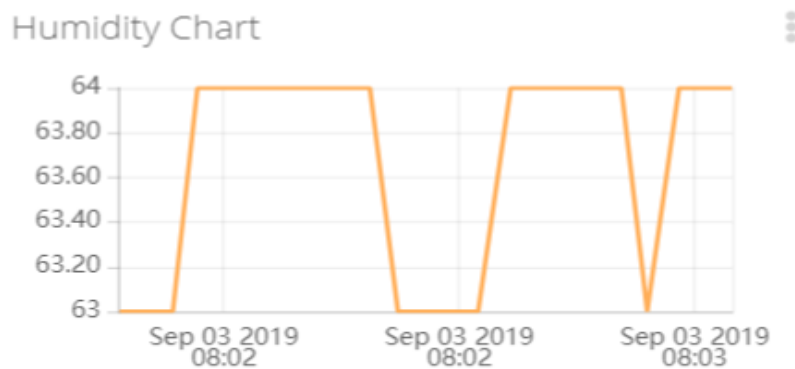
### IV.RESULTS



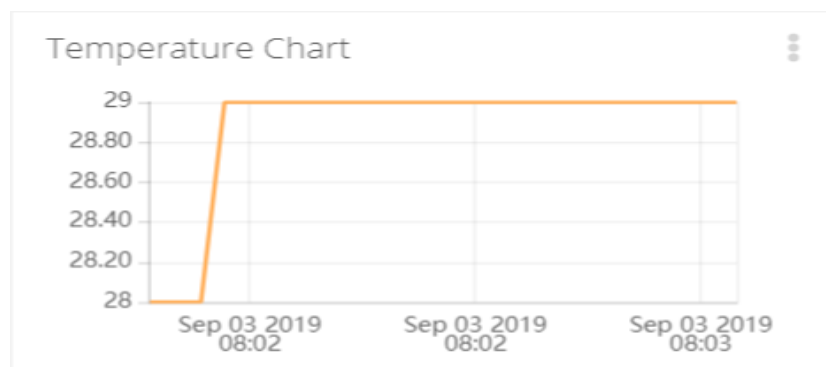
**Fig2. Dust particles data collected from sensor node**



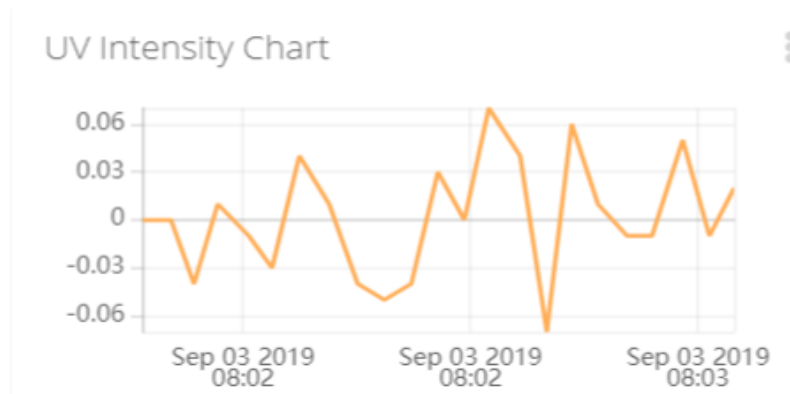
**Fig 3. CO2 data collected from sensor node**



**Fig 4. Humidity values collected from sensor node**



**Fig 5. Temperature data collected from sensor node**



**Fig 6. UV intensity graph data collected from sensor node**

The above graphs explain the percentage of the parameters in the surrounding environment. As we move from indoor to outdoor there will be changes in those parameters according to the changes in the surroundings. In fig.2 we can observe the dust particles have decreased from 250 to 100 and 0 this indicates the decrease in dust particles surrounding and movement from high dusted area to low dusted area. Fig.4 and fig.5 represent the temperature and humidity parameters, from those graphs we can observe that as temperature decreases humidity increases and vice-versa. Fig.6 is an UV index chart in more sunny day the UV index increases according to the sunlight.

## V.CONCLUSION

In this paper we made use of Raspberry Pi microprocessor for environmental monitoring through which we can process data in a more secure manner. We have shown the process of transmitting the data from processor to cloud since we don't make use of wires for transmitting information from processor to ethernet there is no loss in data and so it is the safest way to use for transmitting data.

## VI.REFERERNCES

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