

IOT GATEWAY SUPPORTED SELF-ORGANIZED WIRELESS SENSOR NODES FOR ENVIRONMENTAL MONITORING APPLICATIONS

A. ABDUL RAHMAN
Department of
Information Technology
Velammal Engineering
College,
Chennai, India

S. NIVEDHITHA
Department of
Information Technology
Velammal Engineering
College,
Chennai, India

M. RANJINI MARBAN
Department of
Information Technology
Velammal Engineering
College,
Chennai, India

J. SATHYA PRIYA
Department of
Information Technology
Velammal Engineering
College,
Chennai, India

V. VINOJA
Department of
Information Technology
Velammal Engineering
College,
Chennai, India

Abstract— With the growing development of monitoring systems around the world, here is a new system that adds a count to it. Environment is everything that is surrounds humans. So the proposed work deals with monitoring the appliances from remote location using IOT. IOT provides way to make devices communicate with each other and make it easier to be controlled from remote places and also wide range of wireless sensor networks(WSNs) adopted in the application environment[1,8]. These systems have the applications across industries through the unique flexibility and ability to be suitable in any environment. IOT is used in various fields like agriculture, health care, sports, telecommunication and transportation etc. In this busy world, we forget to maintain the appliances with proper care and even when an appliance is repaired it becomes difficult to spent time on waiting for the service person to arrive and then identify the problem and then would take some time to solve this. The proposed system continuously monitors the appliances with the help of sensors and is coordinated with the help of Raspberry-pi and which sends alerts to the user when there is a deviation from its expected working. So this

proposed system help the appliance owner to avoid damage of the appliance and which might eventually lead to major electrical accidents o and provide safer environment.

Keywords: IOT; sensor interfacing; alerting system

I. INTRODUCTION

In this fast-moving world people are busy and find it difficult to monitor the appliances timely and which leads to no proper usage and servicing of these appliances and even when identified it takes some time to rectify the issue by identifying the root cause for it. Now-a-days there are more cases that report electrical accidents due to the failure of the appliances. The failure of the appliances occurs mainly due to improper maintenance and faults inside the appliance[3]. Indoors is the place where we feel safe from any hazards, but recently the Environmental Protection Agency (EPA) has declared that indoor air quality is poorer than the outside air quality and might cause more harm to people[9].

In today's world, room heaters or coolers are commonly used. And in such cases, it is

possible that there might be leakage of lethal gases from them mainly from the refrigerant and compressors which when not identified can become lethal to the people. The poisonous gas that can be leaked from the device is Carbon Mono-oxide (CO) which could become lethal when its range exceeds 1000 ppm. Even when CO is present at smaller ranges it leads to ailments like headaches, fatigue, nausea, and vomiting.

According to recent research, it is evident that most of the electrical accidents are due to the presence of leakage of poisonous gas, presence of moisture that might lead to due to short circuit of the appliance[2]. The following are the commonly addressed problem in the device:

- When the system is in faulty condition.
- Over consumption of power.
- Leakage of gas.

These accidents can be prevented by taking timely actions.

Preventing accidents caused by faulty appliances can be reduced by alerting the user. This requires a device which can detect and alert the user[6]. This is done by detecting the sensor details and also monitoring the threshold value. The alert message is provided to the user.

II. EXISTING SYSTEM

The monitoring of the complete appliance as a whole is not present. Only the monitoring of power consumption of the appliance and they can be remotely controlled by using the smart switches. But monitoring the consumption alone won't provide the solution, as the user is unaware about its irregular working[9].

As many systems are used to detect the electrical appliances where each system has a unique concept or way of finding faults. Each of these systems has their own advantage as well as its disadvantage.

The monitoring of the complete appliance as a whole is not present. Some systems are used to find only the power consumption and some

other systems are used to detect the gas leakage[4]. But monitoring[6] the consumption alone would provide solution only about its electricity consumption as the user would be unaware about its regular working. The smart switches[2,4] help to track only the current consumption and using only this working condition and problem present in it cannot be identified. There are also gas leakage detectors which would help us identify the correct source of the leakage[4].

III. PROPOSED SYSTEM

This project deals with the monitoring the working of electrical appliances that are used in the day - to- day life. The present day smart switches monitor the current consumption of the electrical appliances and the user monitors these reports and can communicate with it via a mobile application. Now-a-days there are many electrical accidents that occur due to malfunctioning of the appliances though they are monitored by smart switches. This is because by using this device only the current consumption can be monitored[6] but, the appliance's working condition not only on current consumption but various other physical factors. This project provides with a solution to this by monitoring various physical parameters. Initially this is dealing with the three commonly used appliances; they are Air Conditioners, Washing machines and Fridges[7]. The parameters that are being considered are current, voltage, temperature, vibration, sound, draining troubles, accumulation of dust. Various sensors are used to monitors these parameters and a Raspberry pi is used to co-ordinate all the sensors[5]. But the effect of current consumption of the appliances also depends on the atmospheric conditions around the appliance which would involve further calibration of the device under various environmental conditions which is the future aspect or view of his project. This system detects faults at an earlier stage. It alerts the user within the specific time interval. It is user friendly. The user gets notification alert

and they need not to be present at the same location. It is cost effective. It prevents energy consumption.

IV. PARAMETERS AND SENSORS TO MEASURE

TABLE 1: List of Sensors used.

Parameters	Sensors
Voltage	Voltage Sensor
Current	Current Sensor
Vibration	Vibration Sensor
Moisture	Moisture Sensor
Gas	Gas Sensor

Figure 1: Gas Sensor (MQ7) Module



Figure 2: 5A Range Current Sensor Module



Figure 3: Voltage Detection Sensor Module 25V



Figure 4: Water Sensor



Figure 5: Vibration Sensor



Figure 6: Sensor Interfacing

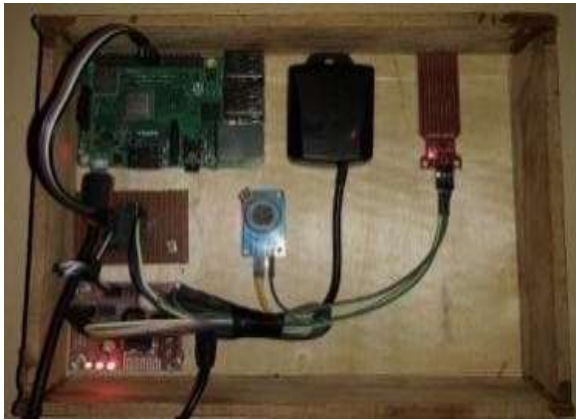
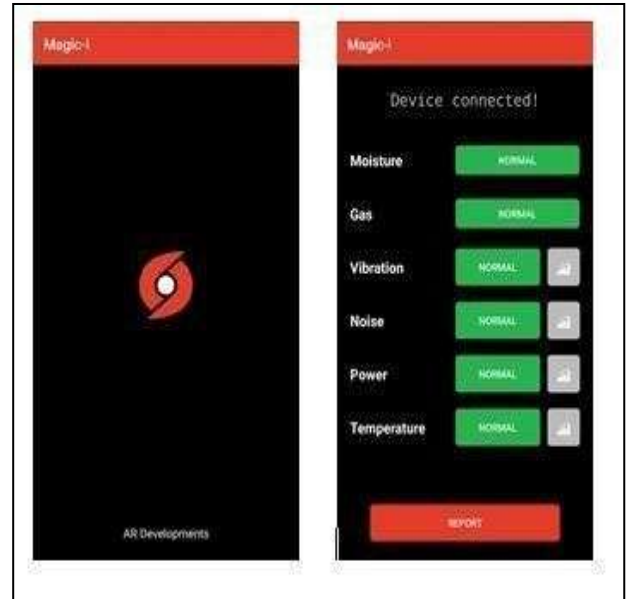


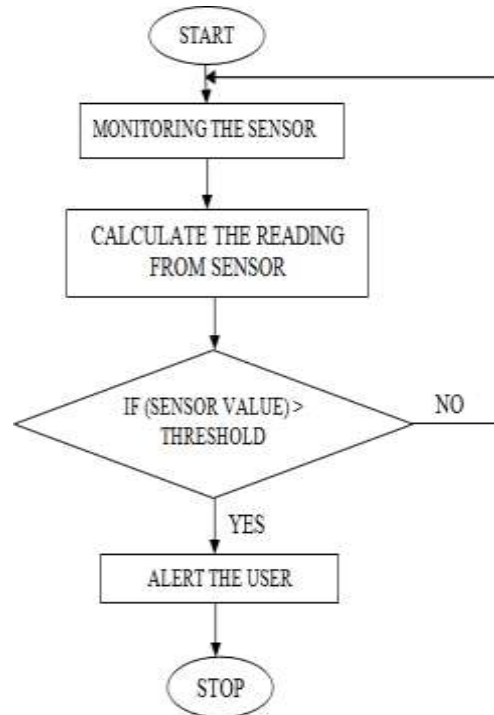
Figure 7: User Interface (AI development).



A. WORKING OF THE SYSTEM

- 1) Finding problems that occur in the appliances: This module deals with determining the various problems that can be easily determined from this system. Here problems are the ones which may lead to the damage of the entire or parts of appliance if not addressed immediately. By listing it would be easy to address the user regarding the issues in it.
- 2) Interfacing sensors and Raspberry Pi: This deals with Pi board, which would help the monitoring of the current conditions of the appliances and also helps to collect the conditions of the system at any particular time.
- 3) Set up the device to the appliance: This module deals with set up device to appliance only when it can gather the information from the device.
- 4) Controlling Pi using a Mobile application: Any device can become an IOT based device when it can be remotely controlled by the user. Here a Mobile Application will be developed such that it can be used to control as well as monitor its working.

Figure 8: The flow chart of working of the system.



V. CONCLUSION

This paper discusses about alerting the user regarding the faults in the electrical appliances using one of the most evolving technology IOT. Here it mainly discussed about adding additional parameters like vibration, gas and moistures including power and voltage consumption. Thus the proposed system would prevent the electrical accidents due to improper maintenance and it makes the user to know about all the working modules.

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