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IOT-BASED ENERGY-SAVING ASSISTANCE FOR HOME AUTOMATION POWER SYSTEMS

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ABSTRACT:

In today's world, everyone is in their sophisticated zone and is overly reliant on automatic machines. They are made up of a large number of business buildings where the room light and fan are not automatically controlled. That is, manual methods are used in practically every structure where the room lights and fans must be turned on and off. People are forgetting to turn off the lights and fans when they leave their rooms. As a result, if the lights and fans are left on in the absence of a human person, a significant amount of energy is lost, resulting in power overutilization. As more and more consumer electronic gadgets are left on even when they are not needed, this indifference by users results in increasing wasteful power consumption; on average, 411 may be saved every month. If the previous system is totally changed, it generates a huge quantity of e-waste and is also costly; hence, the work given here is a compromise between the former method and an automated control system.

Keywords — IoT, Home appliances automation, automatic control.

I.INTRODUCTION

There are several systems available for home automation and also for all organization. Several attempts have been made to establish, implement, and maintain some kind of standards for home automation power systems. Automation of control systems is in the focus of technical advancements. Home technology is used to create a digital environment by regulating room temperature, various gadgets, security, and lighting. Home automation systems are designed to automate tasks such as controlling of home environment equipment like fan, light, AC, Television, etc... Wireless sensor networks can benefit for home automation systems. One of the most advantages in sensor networks with limited resources is energy efficiency. They should monitor and save energy in household appliances based on the human habits. This system was built so that users would not have to spend a lot of time configuring it.

II.METHODOLOGY

When the power supply flow on the components the light will glow on the relay which indicates that the system is on but the fan will remain idle. At initial stage there is no compression on the weight sensor the fan will be idle. Which means there is no human activity on the weight sensor so that it doesn't sense any weight on the sensor. The step down transformer is used because of the electronics are working in direct current (DC) but we have the components source in alternate current (AC).

For converting the 23V alternative current into the 12V alternative current we have used the step down transformer. Then we should convert the AC to DC for that purpose we have used the rectifier. It will store the DC current into the power supply board. With help of Arduino UNO, the relay is receiving the signal from weight sensor after the weight detection. Already mentioned above that the physical tension/compression on the weight sensor will be converted as a signal to the Arduino UNO the same process will be continued. Once the sensor gets compressed that physical tension will convert into the signal and that signal will pass on to the Arduino UNO. Through that the relay get activated and the fan also activated.

When the human gets into the system automatically the weight will be detected. Weight of that human is sensed by the weight sensor by the given pressure on the load cell. After the detection of the weight Arduino UNO will check the condition given to that. If the condition satisfies the fan will switch on otherwise the fan will not activated.

LCD display projection is used to display the weight unit measured by the weight sensor. The LCD display gives the projection of the measured weight and the condition given in the Arduino UNO. It displays the condition in two ways one is normalized and overloaded. The "Normalized" condition shows that the weight which is measured is on under the condition and results in idle position of the fan. The other one "Overloaded" indicates that the weight measured is satisfying the condition so the fan gets switch on.

The DC motor(fan) is Controlled by the weight detection is the main process. Here the fan has taken as an example of the whole home appliances. The weight sensor is the activator for the fan by the help of the Arduino UNO and the relay. When the human enters into the diameter the human weight is sensed by the weight sensor and the weight measurement is sent as a signal to the Arduino UNO. The condition applies now whether the measured weight

is under the limit or above the limit. If the fan is activated that means the weight is above the condition. If the fan remains idle, then the condition is not satisfied.

III.SYSTEM ARCHITECTURE & IMPLEMENTATION

The power supply is received at the first stage and is passed on to the switch (relay). The DC motor (fan) is linked to the weight sensor, the Arduino UNO, and other components such as a rectifier, stepdown transformer, and an IC. The process begins when the human enters the area that includes the diameter where the weight sensor can detect the human weight.

We have some weight detection parameters here.

When the detected weight exceeds the limit, the fan will turn on. If the weight does not reach the limit, the fan will not turn on. The weight will be crucial in controlling the fan in home appliances. It explains the connectivity of the components and the flow of all the process. The above If condition explains the weight detection limit for the controlling of the fan. The Arduino UNO helps us to fix the condition and also for the weight detection when the human enters. Once the human gets away from the area that covers the diameter of the sensing area the fan will remains idle.

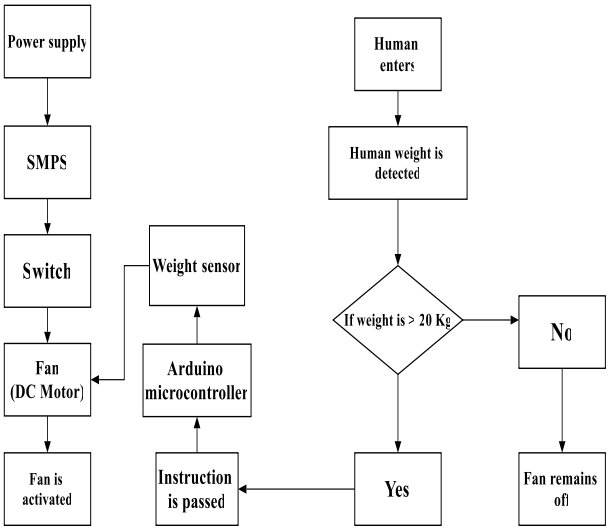

Fig 3.1 Overall Architecture

IV.ANALYSIS

The user no longer has to manually turn on or off electrical appliances. For example, when the user enters the bedroom, he or she has two options: either the fan will turn on and off automatically as the user enters and exits the room. The system is designed to control all of the electrical appliances in the home easily and efficiently, as well as to allow humans to control them by utilizing the IoT concept. A home automation system can notify the user of events that may occur while they are away, such as water leaks, gas leaks, fires, and unauthorized access to their home. Here's a comparative analysis of motion sensors, infrared sensors, and weight sensors.

- Motion sensors can provide accurate detection of motion within their specified range. However, accuracy can be influenced by factors like sensitivity settings, environmental conditions, and line-of-sight obstructions. Motion sensors can offer accuracy rates of 90%
- Infrared sensors can provide accurate detection of objects within their range. They are less affected by environmental conditions such as ambient light and can work well in various lighting conditions. Infrared sensors can achieve accuracy up to 95%.
- Weight sensors can provide accurate detection of the presence or absence of objects based on weight measurements. They are commonly used in applications such as smart floor mats or furniture to detect occupancy. High-quality weight sensors can achieve accuracy rates of 95% or higher.

Sensor	**Analyze**	**Accuracy**
Motion sensor	**Good**	**90%**
Infrared sensor	**Efficiency**	**95%**
Weight sensor	**High accuracy**	**< 95%**

Table 4.1 Accuracy table

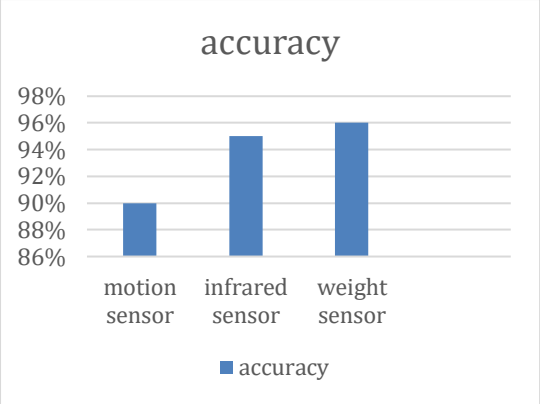

Fig 4.1 Accuracy chart

V.RESULT ANALYSIS

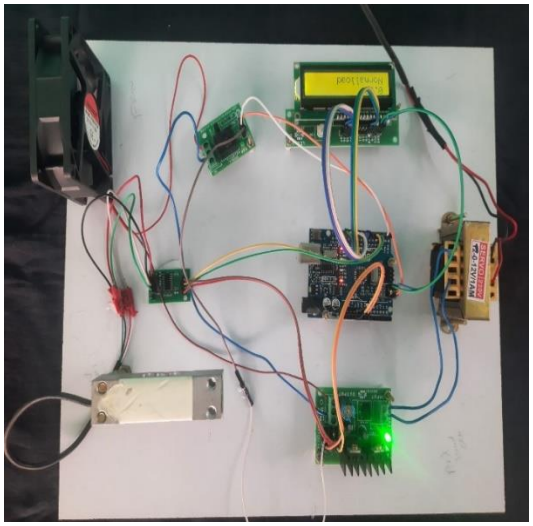

Fig 5.1 Overall circuit

The Figure 5.1 Overall circuit describes the overall view of the working model. This picture shows the connection of all hardware components. The glowing light is the relay which indicates that there is a power supply on the components. Here there is no compression on the weight sensor so the fan is on the idle state. Which means there is no human activity on the weight sensor so that it doesn't sense any weight on the sensor. Once the sensor gets compressed that physical tension will convert into the signal and that signal will pass on to the Arduino UNO. Through that the relay get activated and the fan also activated.

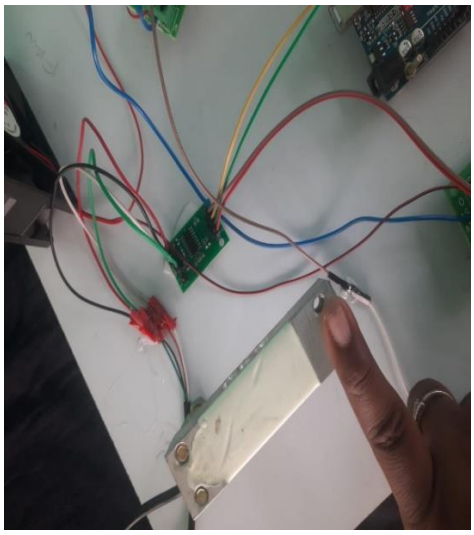

Fig 5.2 Compression on the weight sensor

The Figure 3.2 Compression on the weight sensor describes the weight sensor working. The finger represents the human physical appearance. Weight of that human part is detected by the weight sensor.

Compression given by the finger will help the weight sensor to detect the weight. After the detection of the weight Arduino UNO will check the condition given to that. If the condition satisfies the fan will switch on otherwise the fan will not activated.

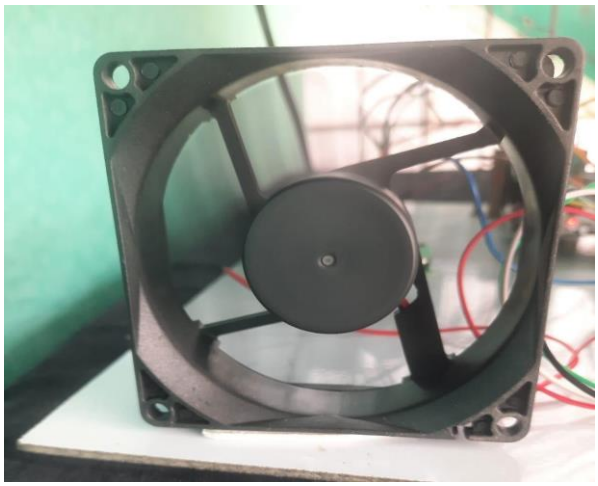

Fig 5.3 Function of DC motor(fan)

The Fig 3.3 Function of DC motor (fan) describes the activation of the DC motor fan. Controlling the home appliances by the weight detection is the main process. Here the fan has taken as an example of the whole home appliances. The weight sensor is the activator for the fan by the help of the Arduino UNO and the relay. When the human enters into the area the human weight is sensed by the weight sensor and the detected weight measurement is sent as a signal to the Arduino UNO. The condition applies now whether the measured weight is under the limit or above the limit. Here the fan is activated which means the weight is above the condition.

VII.CONCLUSION

An automation system consists of sensors, controllers, and actuators that collaborate to complete a task with little or no human interaction. To enhance the technology advancement and efficiency the weight sensor is used. It is another version of the automation by using the sensors. By comparing other sensors like motion, infrared sensor, ultrasonic sensor the weight sensor which is used here will give more accuracy on working and open to use for all kind of peoples around the world. It is user friendly for all. Whether they are normal or physically challenged people technology should be useful for each and everyone in the world around us.

VI. FUTURE WORK

Home Automation is developing new home automation technologies that will make homes smarter by using internet-based technologies. Home automation through digital transformation such as intelligent connectivity through cloud computing and IoT are some of the key trends that would shape Indian homes in 2025. Manufacturing, Agriculture, Healthcare,Transportation, Media/Advertising, Retail, Water and Waste Management, Power Distribution, and other industries can benefit from IoT technology. As a future enhancement this weight sensor capacity can be improved.

Because that will be helpful for huge amount of people gathering areas like auditorium, organisation, all kind of halls, etc. Once the capacity of the weight sensor is improved then it will be more efficient comparing to other automation.

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