

SMART TOUCH PANEL FOR AUTOMATION

Vishnudas Nayak P¹, Lakshya N K², Pavithra R³, Shashwath Rao⁴, Praveen Kumar M⁵

^{1,2,3,4} Students, Department of Electronics & Communication Engineering, Sahyadri College of Engineering and Management, Mangalore, India

⁵ Asst. Professor, Department of Electronics & Communication Engineering, Sahyadri College of Engineering and Management, Mangalore, India

Abstract - Switch is a device which is used for making and breaking the connection in an electric circuit. Traditional switches are outdated as they have mechanical moving parts which are prone to wear and tear. In the 21st century, the use of mechanical switches for switching on the appliance is outdated. Hence, the TFT display will act as a substitute to the mechanical switches. The TFT (Thin Film Transistor) display consumes less power and has very less response time. It displays information such as temperature, number of people in the room etc. The system contains 2 modes namely, automatic and manual mode. The automatic mode uses the data from the sensors to give the appropriate lighting and fans speed. If the lights falling on the sensors are not too much, then the lights will be switched on automatically. Similarly, depending on the temperature, the fan speed is determined. Whereas, in manual mode, the data from the sensors are not utilized. If a person enters the room, the appliances will work in their default working condition. The light and the speed of the fan can be controlled using the TFT display as well.

Key Words: TFT display, Automation, Manual mode, Automatic mode, Sensors, Raspberry Pi

1. INTRODUCTION

Switches are used in all households for switching on the appliances. It is an integral part of a house. Over the years, there has been no significant change in the appearance of the switchboard. These switches contain mechanical moving elements that degrade with prolonged usage. These switchboards even develop cracks on them leading to the potential leakage of current through it leading to electric shock to the person touching it which is

dangerous and unfavourable. According to a recent report, [1] 71.6% of total people electrocuted by low tension electric supply out of which 67.8% were electrocuted at their respective homes by iron, switches, cooler and other appliances etc.

Lately, there has been some development in this field. Many traditional switchboards are being replaced with contemporary touch switches that not only improve the appearance of our houses but also make using them easier and safer as well. But it isn't cost effective. It isn't affordable for the common man due to which it isn't widely used.

In the 21st century, the use of mechanical switches for switching on the appliance is outdated. The use of a TFT display will act as a substitute for the mechanical switches.

TFT (Thin-Film Transistor) is a device which is used to display the information of the fan speed, the status of lights in the room etc. The smart touch panel will be a cheaper alternative with rich

features. The smart touch panel uses a TFT touch display. This uses a single click on the touch panel to operate the household appliances. This also acts like a home automation device where the user can control the appliances through the internet.

In this fast-moving world, people usually tend to forget to switch off the lights and fans after use. On a long-term basis, this is a waste of a natural resource and a complete waste

of money as well.

The aged and the specially abled usually find it difficult to use the switches and hence have to experience difficulty to just switch on the lights and fans. All these can be avoided by implementing our project.

2. LITERATURE SURVEY

V. Ricquebourg et al.[2] explains why a network infrastructure is required to transport data from heterogeneous smart things. This article also discusses the necessity to use information for a software architecture. To do so, they employ a service - oriented strategy to manage data and deliver more tailored services through the use of heterogeneous sensors. They use a publish or a subscribe bus to manage sensor data as they model and infer utilising contextual knowledge.

V. M. Reddy, N. Vinay, T. Pokharna et al.[3] presented the usage of a cloud and web application to manage the switch's functionality. It's time to set up a cloud server. The switches are connected to a processor and a few electronic parts, including 555 timers, logic gates and flip-flops. The Web App is used to communicate with the processor. Following the control operation to the cloud, the processor uses the user's commands to control the switches and notifies the user of the switches' status.

G Indira Devi, D Chandra Mouli et al.[4] utilized TFT touch display to build a home automation system, as well as connectivity of bluetooth, switching by relay drivers, an app or a website to control the devices remotely.

M. Asadullah and A. Raza [5] studied different home automation systems and their benefits and drawbacks are highlighted. Although a home automation based on bluetooth system is versatile and inexpensive, it can only operate inside the range of the bluetooth. The elderly and handicapped benefit the most from voice recognition-based systems since they may manage their equipment simply by uttering their names. Such systems are noise-sensitive, and the signal-to-noise ratio can impair their accuracy (SNR). Another automation system utilizes ZigBee RF modules to create a wireless network, which allows users to manage house appliances remotely. A GSM-based home automation system is also being investigated, with the user being able to operate and monitor household appliances by sending a text message from their cell phone. A home automation system based on the concept of the internet of things can only function in the presence of the internet. The fast proliferation of IoT devices raises both dangers and opportunities. In terms of energy consumption, an EnOcean-based home automation system is more helpful. Due to the fact that they gather energy, their energy usage is nearly negligible.

3. METHODOLOGY

3.1 AUTOMATIC MODE

In this mode, the sensors play a vital role in determining the state of fan and light. If the light rays falling on the sensor are high, then the lights won't be switched on. Whereas if the lights falling on the sensors are not too much, then the lights will be switched on automatically. Similarly, depending on the temperature, the speed of the fan is determined. If there is low temperature, the speed of the fan is decreased and below a particular value, the fan will not turn on. If there is high temperature, then the speed of the fan will increase and above a threshold value, the fan will operate at its maximum capable speed.

3.1 MANUAL MODE

In this mode, the sensors do not have any role to play. The IR sensors just check whether the person in the room is present or not. If no one is present in the room, then all the appliances are switched off. As soon as a person enters the room, the appliances turn on. The freedom is given to the user to control the speed of the fan and to control the intensity of the light. The person can increase and decrease the speed of the fan according to his/her needs and comfort.

3.3 DESIGN

This system contains a temperature sensor, IR sensor and light sensor. These sensors are used to get the specific data. This data is then used to control the appliances such as fans, lights etc.

The IR sensors are kept near the entrance. The IR sensors are used to count the number of people in the room. As the count becomes greater than one, the lights and fans switch on and work according to the data provided by the sensors. If the temperature is high, then the fan speed increases automatically without the need of any human intervention.

Similarly, in the case of light's intensity. If a person forgets to switch off, the sensor detects the number of people and if it is zero, will automatically switch off the appliances irrespective of the data from the sensors.

There are two modes namely, manual and automatic. The above-mentioned steps are for automatic mode. In manual mode, the sensors have no role to play. If the appliance is switched on, it will work on its full capacity and the data from the sensor is neglected.

When the number of people is greater than zero, depending on the temperature of the room and the amount of light in the room, the fan speed and the intensity of the light is varied. This makes the experience of staying in the room a luxurious feel.

In manual mode, the TFT display is used in the place of traditional old switches. As the number of people becomes greater than zero, the appliances switch on and the person is given the freedom to change the fan speed and the intensity of the light based on their needs. The TFT display enhances the beauty of the house. It is durable when compared with the old traditional switches as it doesn't have any mechanical moving parts thereby reducing wear and tear. All these are present in the form of a mobile application as well. The appliance can be controlled with the help of the internet from anywhere in the world.

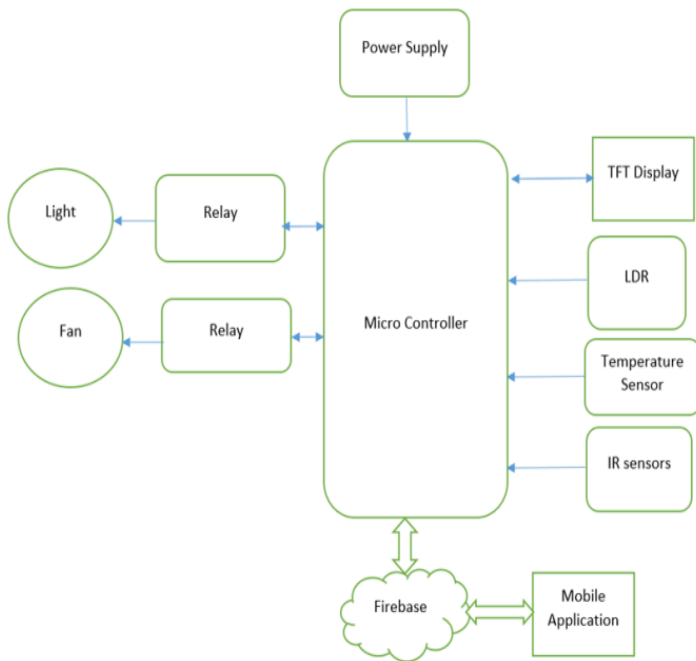


Fig -1: System Architecture



Fig -3: Top view of prototype model

4. FINAL PROTOTYPE OF THE PRODUCT

For the prototype model, we built a replica of a room using foam sheet. The touch panel has been kept in the model with the proper placement of the IR sensor near the boor and the placement of DHT and LDR at the appropriate places.

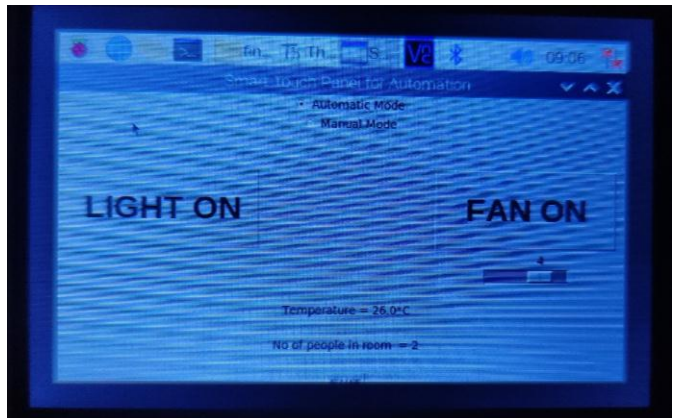


Fig -4: TFT Touch Display

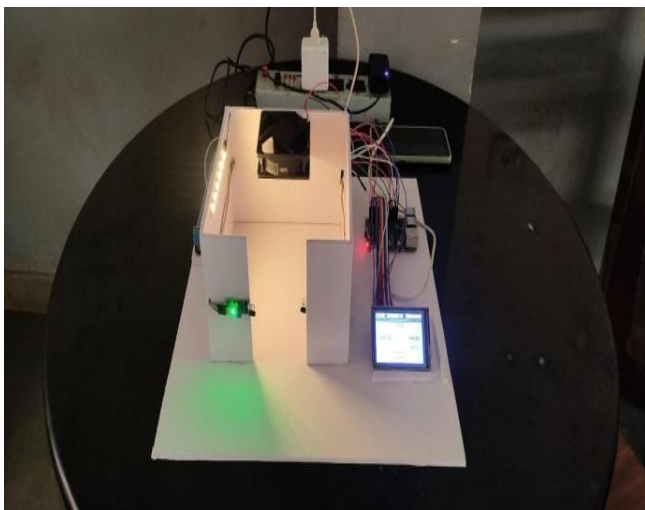


Fig -2: Prototype model

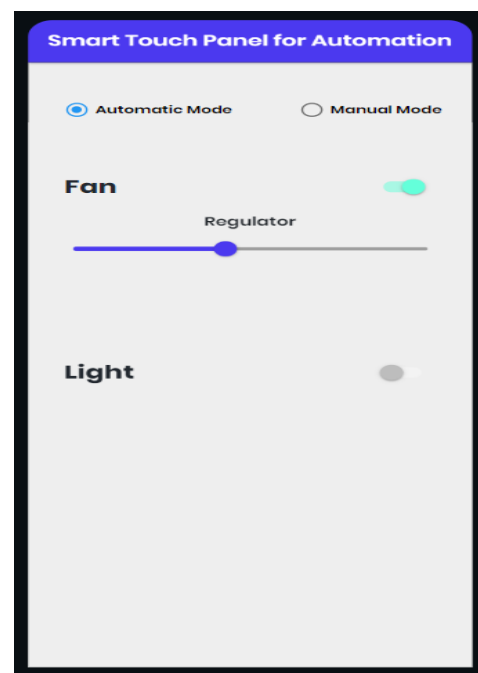


Fig -5: Mobile Application

5. RESULTS

This project mainly focuses on updating the old and outdated mechanical switches used in our homes. It focuses on replacing it with the TFT display which shows the temperature of the room, the fan speed and the number of people in the room. It even enables the appliances in the room to be fully automatic, solely controlled by the temperature and the amount of light in the room. The user also has the freedom to change the settings of the appliances according to their need.

6. CONCLUSION

This system replaces the old and dangerous mechanical switches with a smart TFT display which gives a luxurious feel to the user. Since this system is automated, the amount of electricity consumed decreases thereby reducing the cost. This system even gives the liberty to the user to set the fan speed and light intensity as per their needs. Even in manual mode, if the user forgets to switch off the appliance, as soon as the person leaves the room, the system recognises this and switches off all the appliances at once thereby eliminating the wastage of current. Since it replaces the switchboard containing the mechanical moving parts, it doesn't get spoilt and hence has longer lifetime usage.

7. REFERENCES

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BIOGRAPHIES



Vishnudas Nayak P,
B.E. Student, Dept. of Electronics &
Communication Engineering.



Lakshya N K,
B.E. Student, Dept. of Electronics &
Communication Engineering.



Pavithra R,
B.E. Student, Dept. of Electronics &
Communication Engineering.



Shashwath Rao,
B.E. Student, Dept. of Electronics &
Communication Engineering.



Praveen Kumar M,
Assistant Professor,
Dept. of Electronics & Communication
Engineering.