

Smart Home Automation System

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ABSTRACT

Smart Home Automation System is a project to develop a prototype of home automation system using an-Arduino MEGA 2560 microcontroller. This project include the automatic opening and closing door system, automatic light control system and automatic fan controlled system based on temperature of the room. The door will be using Ultrasonic sensor and rotational moving motor connected to gear which will drive rail to slide the door open and close. Then, the lights will automatically turn on when someone enter the house (within the range of the house area). After that, the automatic fan control is based on the temperature of the room. As technology is advancing so houses are also getting smarter. Usually, conventional switches located in different parts of the house makes it difficult for elderly or physically handicapped people to do so. This home automation system is providing a solution to these problems. Therefore, this home automation system should be required by elderly and physically handicapped people as it is important to consider issue of controlling , monitoring electrical appliances and energy management in their houses.

KEYWORDS: Arduino, Ultrasonic sensor, Motor, Automatic fan

1 INTRODUCTION

The usage of home automation is getting popular and widely used in this new era of modernisation. Home automation is adopted for reasons of ease, security and energy efficiency to the consumers especially for handicapped or elderly users. This system is mainly implementation by sensors, controlling devices and then send data to microcontroller. It can prevent the people from wasting electricity if they forget to turn off the light or fan. This is because the system will be operated when the Ultrasonic sensor detect the presence of person entering the house. People nowadays have a lot of work to do in their daily routine. This system operates as a helper to ease the user to control electricity in the house, secure the security by using Bluetooth connection. In the other words, this system is more efficient and friendly user for both handicapped and elderly users. This is because the electricity can be operated without using the common method which is user need to switch on or switch off manually to control the light, fan and door. This system introduce the automation system by detecting the motion of the user within the range of the house area.

This project is to develop smart home automation system that integrated with Arduino as microcontroller [1]. This system is the new project which it uses the sensor to switch on the light and fan. The purpose for this project is to minimize the switch uses in the house. This is because every people always forget to switch off the light or fan when they are in a rush to go out of the house. This system introduces automated system where it uses motion sensor as the switch to switch on the light and fan [2]. Furthermore, this project is to identify the function of Arduino as the microcontroller of the system. Most of us do not know about Arduino and the function of it, so this system can introduce how Arduino is working.

2 OBJECTIVES

People always tend to forget to switch off switches in the house and electronic appliances when they are in a rush. Thus, with the existence of home automation system, there is less energy consumption as the action of forgetting to switch off electrical appliances can be prevent. Other than that, handicapped and elderly always have a problem to reach switches that a little bit higher. With the expansion of technology, everything is at the tip of our fingers, there is so much we can do. We can live without having to burden anyone. With the rise of home automation system in the recent times, improving standard of living, ease the use of home appliances is what home automation is offering. It offers one gets to control his entire house by only using a sensor, from opening the door, switching on the lights or fans and also offers efficient use of energy.

As for the objectives of this project, it is to develop a prototype of smart home automation system that integrated with Arduino as microcontroller. Next, to automatically switch on the light when people enter the house by using ultrasonic sensor to detect people's motion. Lastly, to detect surrounding temperature and turn on fan when temperature surrounding is high.

3 SIGNIFICANCE(S)

This project will help the people to overcome the wasted electricity problem. This is because, more people always forget to turn off the electricity when they are rushing to work. This is one of the method to minimize this problems. The ultrasonic sensor acts as a motion detection whether there is a person or not in that house to operate the electricity especially for light and fan. Since most of the work that is needed to be done by the worker has been efficiently done by the system, the people have no longer worry about the wasting electricity at home. Other than that, this project can control the fan to operate based on the temperature reading. It can reduce the movement of people to control the fan using the switch. People will feel more comfortable and does not have to move to turn on the switch manually.

4 METHODOLOGY

Flowchart

Fig. 1 shows the flowchart of the system. Firstly, the input must be initialized to make sure the system works correctly. Then, it was divided into three part where PIR sensor, Ultrasonic sensor and LM35 temperature sensor. This system will looping repeatedly until the power source is off. This system depend on the condition that set in the programme.

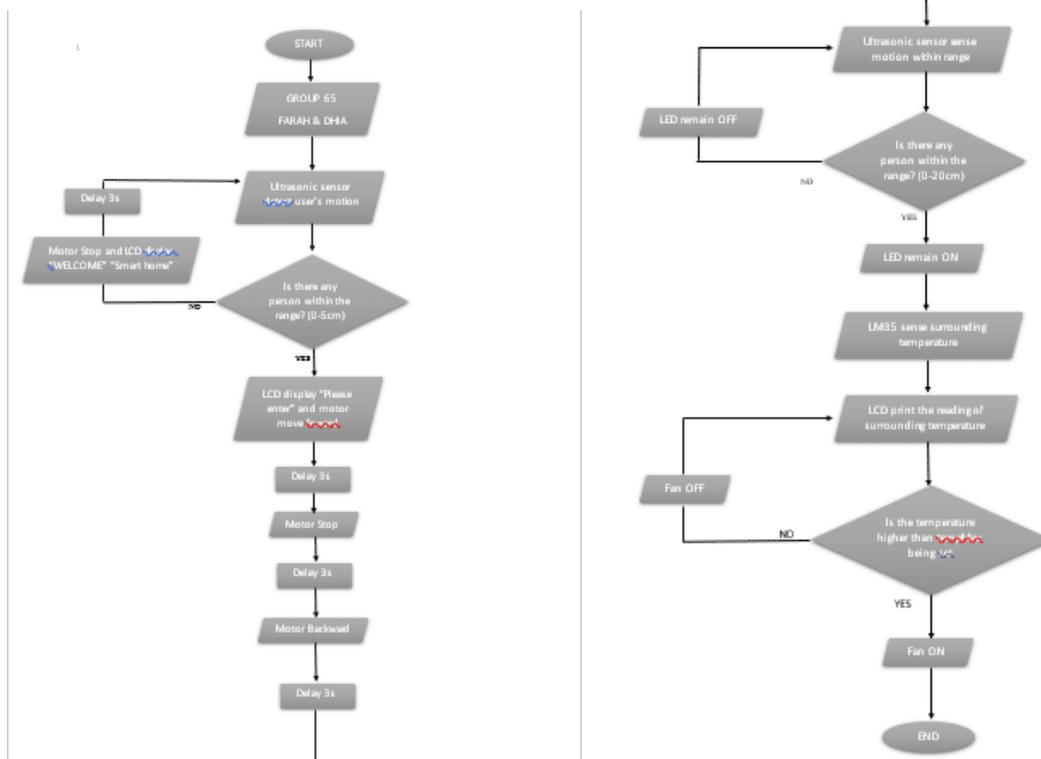


Fig. 1: Flowchart of the system

Block Diagram

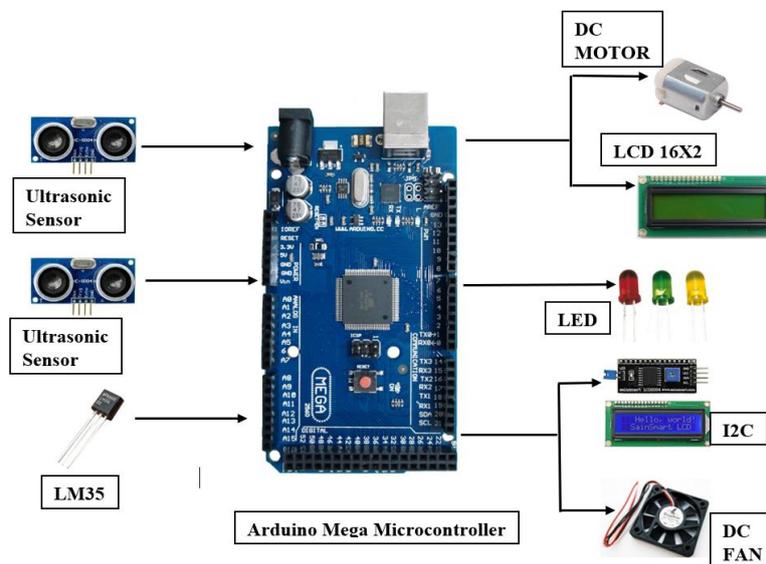


Fig. 2 : Block Diagram

Fig. 2 shows the block diagram of the system. There are three inputs and four outputs for this project. LM35 temperature sensor will sense the temperature and display it on 16x2 LCD. Then, the DC fan motor will operate based on the range of the temperature. For ultrasonic sensor, it will sense the object that move into the house. Then, the LED will light up as the sign of the operation by ultrasonic sensor. Furthermore, the PIR sensor also detect the object movement and it will operate the servo motor to open the door.

5. RESULT

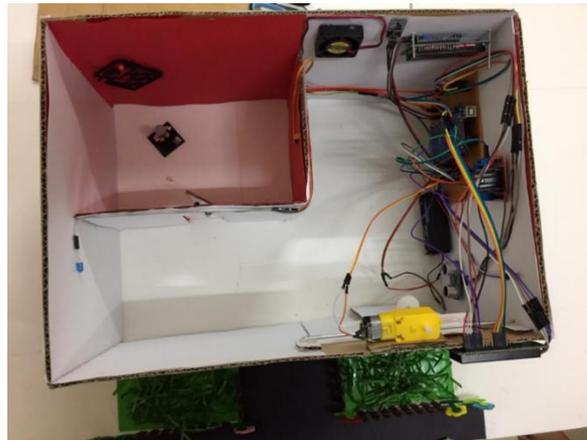


Fig. 3 : The arrangement hardware on the prototype

Fig. 3 shows the arrangement of hardware on the prototype. This arrangement shows how the simulation working on the real house. In this section, this project entitled Smart Home Automation System will be discuss, the operation works when Arduino Mega will supply to the components such as LCD, I2C, DC Fan and LED for the system to operate. The system will fully working once the connections are connected. There are three systems in this project which are smart automated fan, smart automated light and smart automated door. The operation for the door started when ultrasonic sensor sense motion within the range set in coding, it will lead for door to automatically slide open and delay instruction was given before the door automatically slide to close the door. Next, the operation for automated light operates when ultrasonic sensor inside the house detects motion of the user, it will light up the LED inside the house and will light off once the user get out of the house or outside the range of the house. Next, automated fan operates when LM35 temperature sensor read the temperature surrounding and will display it on LCD.

6 CONCLUSIONS

As the conclusion, a prototype of smart home automation system can be developed with Arduino Mega 2560 as microcontroller. Besides, ultrasonic sensor and LM35 temperature sensor acts as a medium of communication. Other than that, automated light system is running when people enter the house by using ultrasonic sensor to detect people's motion. Next, the surrounding temperature can be detected and switched on the fan when surrounding temperature is higher than range set by using LM35 temperature sensor. Hence, all the objectives were achieved.

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