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HOME AUTOMATION AND SECURITY SYSTEM

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ABSTRACT

Easy Home or Home automation plays a very important role in modern era because of its flexibility in using it at different places with high precision which will save money and time by decreasing human hard work. Prime focus of this technology is to control the household equipment's like light, fan, door, AC etc. automatically. This research paper has detailed information on Home Automation and Security System using Arduino, GSM and how we can control home appliances using Android application. Whenever a person will enter into the house then the count of the number of persons entering in the house will be incremented, in Home Automation mode applicances will be turned on whereas in security light will be turned on along with the alarm. The count of the number of persons entering the house is also displayed on the LCD screen. In Home Automation mode when the room will become empty i.e. the count of persons reduces to zero then the applicances will be turned off making the system power efficient. Moreover a person can control his home appliances by using an android application present in his mobile phone which will reduce the human hard work. At the same time if anyone enters while security mode is on a SMS will be sent to house owner's mobile phone which will indicate the presence of a person inside the house.The alarm can be turned of using SMS or Android application.

KEYWORDS

Home Automation, Global System for Mobile Communication (GSM), Short Message Service (SMS),Android Apps.

1. INTRODUCTION

Today we are living in 21st century where automation is playing an important role in human life. Home automation allows us to control household appliances like light, door, fan, AC etc. It also provides home security and emergency system to be activated. Home automation not only refers to reducing human efforts but also energy efficiency and time saving.[3] The main objective of home automation and security system is to control home appliances by using different techniques like android application, web pages, GSM when a person is away from home. The system alerts the person in case a burglar enters the house by sending SMS on person's mobile phone which will enable them to protect their home from burglars. The system also helps old people by controlling home appliances with the help of their mobile phones as they do not need to go to different locations for turning the appliance ON or OFF.

Main purpose of home automation is "SAVE ELECTRICITY". With this technology everyone can control the home equipment or office equipment automatically. The system is secured, user-friendly, reliable, flexible and affordable. [5]

Different techniques have been employed in order to implement home automation and security system efficiently. This research paper discusses Arduino, GSM, and Android based Home Automation and Security System with their implementation.

Home Automation and Security System based on Arduino implies that whenever a person will enter the house then the count of number of the persons will get incremented, bulb will start glowing and alarm will start ringing. The count of the number of persons present in the room will be displayed on the LCD screen. Whenever the room gets empty i.e. the count of the person reduces to zero then the bulb will automatically stop glowing making the system power efficient.

Home Automation and Security System based on GSM and Android application implies that whenever a person tries to enter into the house then a SMS will be sent to house owner's mobile phone indicating the presence of some person inside the house and the house owner can take some preventive measure in order to protect his house from the burglar. Moreover the person can control the home appliances using an android application present in the mobile phone which will reduce the human hard work. The list of various home appliances along with TURN ON and TURNOFF buttons will be provided in an android application. By clicking on that particular button the person will be able to TURN ON and TURN OFF the home appliances using an android application.

2. THEORY

2.1. HOME AUTOMATION SYSTEM USING ARDUINO

The design of Arduino based home automation system is given in Fig. 1.
Arduino is an open source architecture that uses Atmega2 microcontroller. For programming the microcontrollers, the Arduino platform provides an integrated development environment (IDE) based on the Processing project, which includes support for C, C++ and Java programming languages. Arduino has two variants Arduino Uno and Arduino Mega, Arduino Uno has 20 pins that can be used for both input and output whereas Arduino Mega has 80 pins for input and output, so it can connect number of home equipment's. It's ARM (Advanced RISC Machine) based processor also speeds up the processing.

It will count the number of people present in the room with the help of IR sensor. When both the sensors will sense the person then only the count will be incremented. The count of number of people present in the room will bedisplayed on the LCD screen. If timer of second sensor is higher than timer of first sensor then this condition will indicate that theperson isentering the room. If timer of first sensor is higher than timer of second sensor then this condition will indicate that the person is leaving the room. Bulb in the room will start glowing as soon as the person enters the room and the bulb stops glowing when the room is empty. Therefore the system is power saving as the light bulb will automatically get switched off when the room is empty. The system provides a security based feature as the alarm will start ringing whenever a person will enter into the room. Piezo buzzer is used for the alarm in the system.
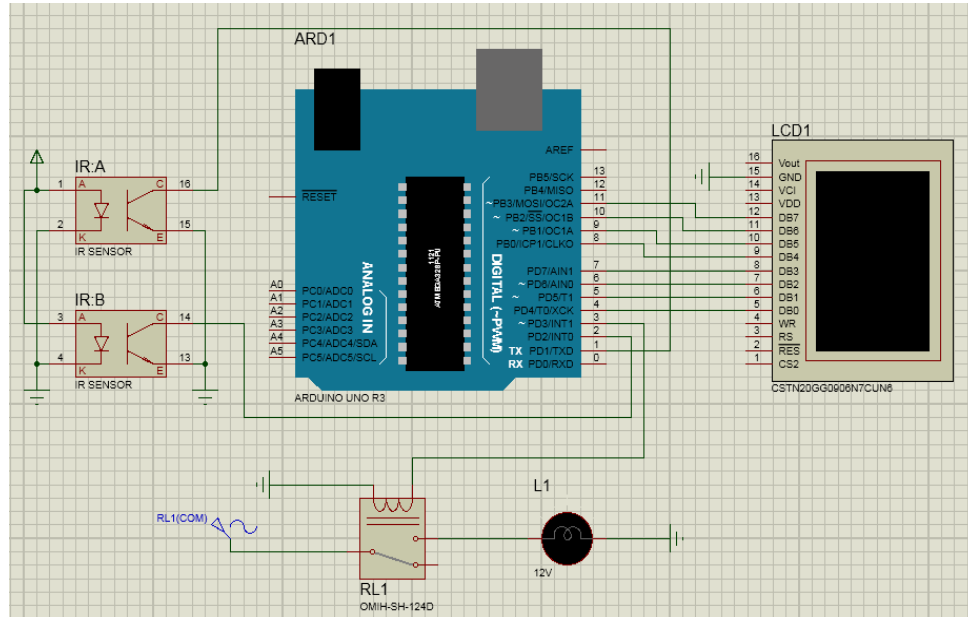
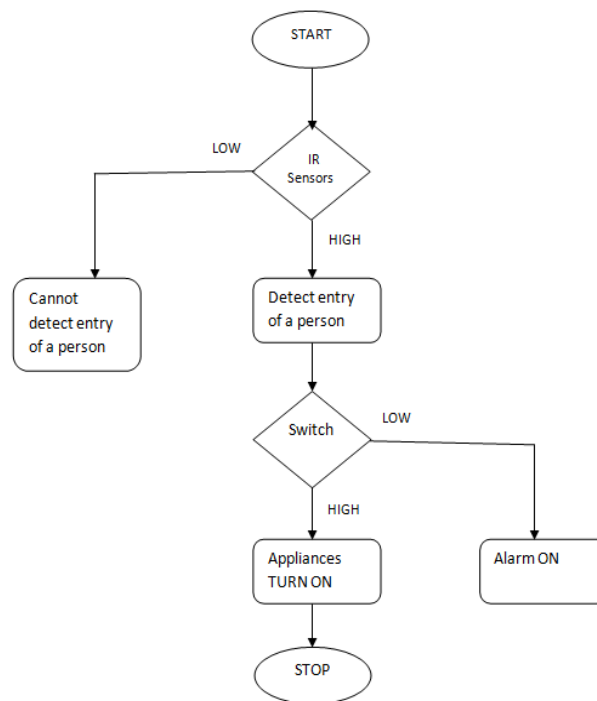Figure 1. Design of Arduino based home automation system

Figure 2. Flowchart of Arduino based home automation system

2.2. HOME AUTOMATION SYSTEM USING GSM AND ANDROID APPLICATION

Home automation system because of its wide spread coverage which makes it an online system. It has also become popular due to its security feature because of which it is not possible for other people to track the information sent or received. [1]

Android application is used to control various home appliances using mobile phone.A person can control various appliances of his home using an android application which is present in his mobile phone even if the person is away from his home.

The design of the GSM and Android application based home automation and securitysystem is given in Fig. 3.

System can perform communication by two methods-

- GSM(Global System for Mobile Communication)
- Android Application

SMS communication is possible using GSM module(ELEMENTZ SIM900A UART).SMS communication is used majorly during Security mode when connectivity and security is essential for the system. Whenever a burglar tries to enter the house then SMS is sent on the house owner's mobile phone in order to inform the house owner about the presence of some person inside the house when the owner is away from his home. Then the house owner can call the police or his friend in order to protect his house from burglar. Moreover the alarm will also start ringing when a burglar enters a house when the system is operating in secured mode.

Android Application is employed for changing the setting of the room. Android application will contain the list of various home appliances that needs to be controlled using mobile phone. When we will select a particular appliance from the list then the action will be performed on that appliance only. Two actions will be performed on that appliance. The action will be either to turn on or off the appliance. Whenever we will choose to turn on the home appliance, the appliance will be turned on by clicking on the 'TURN ON' button present in the android application and when we want to turn off the home appliance, the same will be turned off by clicking on the 'TURN OFF' button provided in the android application. The alarm can also be turned off using Android application present in the mobile phone.
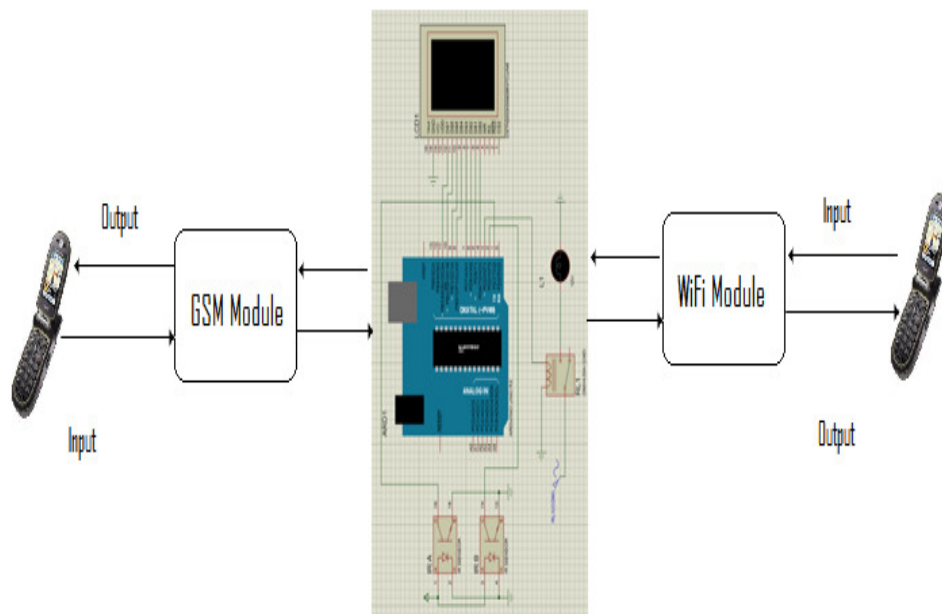

Figure 3. Design of GSM and Android application based home automation system.

There are two type of communication possible-

- Input
- Output

In Input communication user sends new configuration to the system using SMS or an Android App. The input communication is used for the secured mode. Whenever a person enters into the house, SMS is sent to the user in this communication.
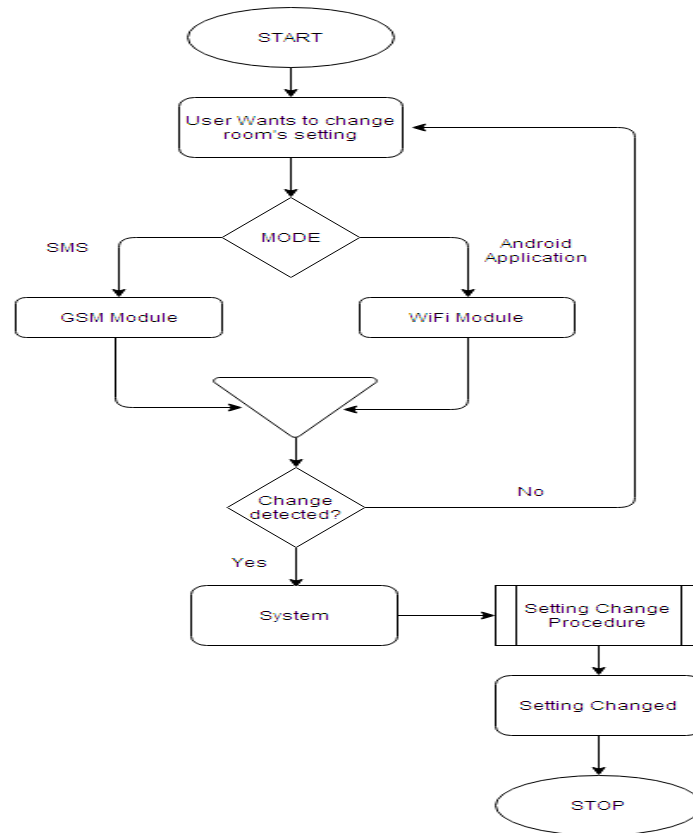

Figure 4. Flowchart for input communication

The output communication will occur in two modes-

- SMS (via GSM module)
- Android application

In output communication system sends an alert message to the user about a burglar using GSM module. The GSM module will send SMS on user's mobile phone indicating the presence of burglar inside the home. The output communication is also used to change the setting of the room as the system will continuously monitor the input. If any change is detected in the settings then the settings of the room are changed accordingly. Home appliances can be controlled easily using android application. They can be turned on and off using android application present in their mobile phones.
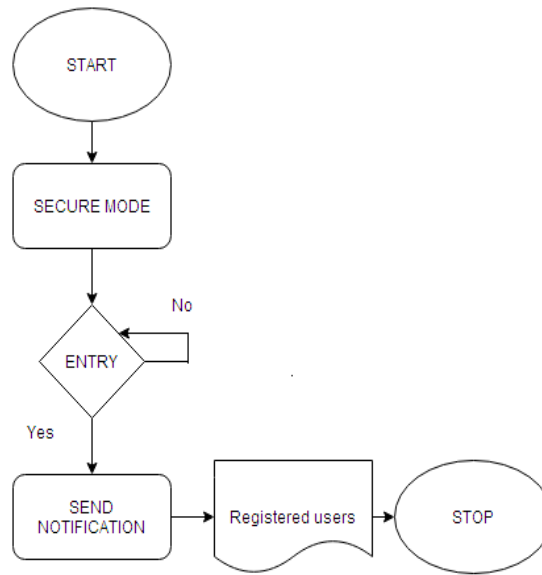
Figure 5. Flowchart for output communication

3. CONCLUSIONS

From the above research paper, it is concluded that all the home automation system techniques uses wireless technology.Arduino, GSM and Android based home automation techniques have been implemented in order to provide ease to the people to control their home appliances. Different home automation techniques using Arduino, GSM and Android are given with their design, implementation and flowcharts which gives the successful layout of their strengths and weaknesses

Main purpose of home automation system is to provide ease to people to control different home appliances with the help of the android application present in their mobile phones and to save electricity, time and money. This system also helps the user to protect their homes from burglars when they are away from the home by using alarm as the alarm will start ringing whenever a burglar tries to enter the house and the person will receive a message on his mobile phone whenever some other person will try to enter the owner's house.This system is also used to display the count of number of persons entering the house on LCD screen.

ACKNOWLEDGEMENTS

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