SYSTEM TO CONTROL HOME APPLIANCES USING MOBILE GSM TECHNOLOGY

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ABSTRACT
Home automation is residential extension of a building automation, and it can be automation of the home, housework or any household activity. GSM based controlled home automation system gives a simpler solution with Android application technology. Since implementation of home automation using the current technology gives us more convenience, security and safety. Home automation needs to make use of new technologies to lower human efforts as well as save energy. So the inconvenience in controlling the electrical home appliances has been solved by this home automation system.

KEYWORDS: GSM module, Arduino Microcontroller, Android, Relay.

INTRODUCTION
Nowadays, the remote Home Automation turns out to be more and more important and interesting. It increases the value of our lives by automating different electrical appliances. As technology is advancing so houses are also getting smarter. Modern houses are slowly shifting from conventional switches to centralized automatic control system, involving wireless controlled switches. Currently, conventional wall switches located in different parts of the house makes it tough for the user to go near them to operate. As in today’s modern world human beings are hooked in using modern equipment. So this project uses the application of wireless communication i.e. GSM network for the home automation. This system explains the uses of GSM for developing a circuit to regulate the house hold devices, and also the model of the circuit and technique to develop the system. Various applications and limitations of the system are being explained. In this system Android App is connected with the system and home appliances are monitored from a long distance. In our daily lives we can come to such situation when we sometimes leave home without switching OFF the electrical appliances that we are using and then remember that some of appliances are still ON and we are away from home. Nowadays technology is so advanced that such turning ON/OFF devices can be made at single touch of our smart phones. The need of such system
is necessary so as to make convenient turning any device ON/OFF by our single command or touch. So this problem is solved by our system. The technology used in this system is of GSM technology so that, if we are at long distance from home then also we can turn off our home appliances. Thus it makes very much easier as well as saves our electricity also. The main objectives of this project are:

- To control home appliances
- To develop a single controlling remote device through android
- To ensure reliability with low cost
- To save energy.
- To help elderly & disabled person in home (if any)

LITERATURE SURVEY
The concept related to Home automation system has been developed in many ways so as to satisfy the conditions as per the requirements comes into existence. The Home automation systems can make use of host of communication methods such as Wi-Fi, GSM, Bluetooth, ZigBee. Such systems have been found already in many places for a wide variety of applications. As per survey of our Literature various workers gain achievement in this field. “Angel Deborah S [1]” along with their students has made a review study about different Home Automation Systems methodology like GSM based Home Automation System, Bluetooth Based Home Automation, Phone Based Home Automation, ZigBee.

<table>
<thead>
<tr>
<th>System</th>
<th>Primary Communication</th>
<th>Remote access</th>
<th>Number of Devices</th>
<th>Cost</th>
<th>Speed</th>
<th>Real Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>GSM</td>
<td>SMS messages</td>
<td>Access from anywhere in the world</td>
<td>Unlimited</td>
<td>High cost due to SMS charges</td>
<td>Slow due to delivery issues</td>
<td>No</td>
</tr>
<tr>
<td>Bluetooth</td>
<td>Bluetooth and AT commands</td>
<td>Restricted to Bluetooth range-meters</td>
<td>Unlimited</td>
<td>Fast due to proximity</td>
<td>Fast due to proximity</td>
<td>Yes</td>
</tr>
<tr>
<td>Phone Based</td>
<td>Phone lines</td>
<td>Anywhere with a phone line</td>
<td>10</td>
<td>Fast</td>
<td>Fast</td>
<td>No</td>
</tr>
<tr>
<td>Zigbee</td>
<td>Zigbee and AT commands</td>
<td>Around 10 meters</td>
<td>Unlimited</td>
<td>Fast</td>
<td>Fast</td>
<td>Yes</td>
</tr>
<tr>
<td>Wireless</td>
<td>Radio, infrared or other waves</td>
<td>Depending on range and spectrum of waves used</td>
<td>Unlimited</td>
<td>High cost due to licensing and other spectrum issues</td>
<td>Slow due to interferenc es</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Based Home Automation, Wireless Control Systems, Mixed Type of systems. The author of [1] also compared different system together so as to find out which one is better than other. The table from [1] is shown as below:- “Aporva Mishra [2]” with his colleagues has
developed a system which runs on Dual Tone Multiple Frequency (DTMF) technology using mobile phone that makes a call to the mobile phone attached to the robot. It receives DTMF tone with the help of the phone attached to the robot. The received tone is processed using DTMF decoder. Here the drawback is of using separate mobile phones for user and robot attached to system as well.

Various workers have studied about such system working and developed as well as design their work practically but it was developed as per the requirements as they faced and technology they used to do their work complete. Such as “N. Sriskanthan” explained the model for home automation using Bluetooth via PC but that work lacks to support mobile technology. “Muhammad Izhar Ramli” designed a prototype electrical device control system using web. They also set the server to auto restart if the server condition is presently down. “Al-Ali and Al-Rousan” has presented a design and java based automation system through World Wide Web. “Pradeep G” proposed home automation system by using Bluetooth. “Hassan” has developed a telephone and PIC remote control device for controlling the devices via cable network but there was a lack of wireless communication. “R. Piyare” have introduced design and implementation of a low cost, flexible and wireless solution to the home automation. In the field of home automation researchers like “Das S.R. et al” and “Laur” have achieved a great success about microcontroller based systems [1][3][4].

**PROPOSED SYSTEM**

The proposed system of our project includes mainly Android smart-phone, Arduino, electrical devices, GSM module, Relay, Sensors which is our main connectivity technique used in our project. The other hardware required are LED, Resistor, Capacitor, Transducer, PCB etc. The various parts or hardware of diagram are explained below as follows:

![Figure 1: Block diagram](image-url)
GSM
GSM is a mobile communication modem; it stands for Global System for Mobile Communication (GSM). The idea of GSM was developed at Bell Laboratories in 1970. It is mostly used mobile communication system in the world. GSM is an open and digital cellular technology used for transmitting mobile voice and data services operates at the 850MHz, 900MHz, 1800MHz and 1900MHz frequency bands.

Relay
Relay is used to control the on/off operation of device. Relays are driven by the transistors. We are using single pole double throw (SPDT) relay. To perform switching of relay transistor BC 548 is used. Relays are used because :- Relay can switch AC & DC, whereas transistor can only switch DC. Relays can switch high voltage, transistor cannot. Relays are a better choice for switching large currents (i.e. >5A). Relays can switch many contacts at once.

Arduino uno
A Microcontroller is a mini computer situated on a single integrated circuit made up of a processor core, programmable i/o peripherals and memory. It is an open-source microcontroller platform with development environment which gears processing/wiring language that is a subset of C and includes several libraries. The Arduino uno is easy to use but powerful single board computer that has acquired substantial traction in the hobby and professional market. The Arduino is open-source, that means hardware is reasonably priced and software is free. The Arduino Uno R3 is a microcontroller board built on the ATmega328 (AVR architecture). It has 20 digital input/output pins out of which 6 can be used as PWM outputs and 6 can be used as analog inputs. It is powered from USB port or from external DC power supply.

LDR
It stands for Light Dependent Resistor. An LDR as it name suggests, offers resistance in response to the light in the vicinity. When intensity of light increases, the resistance decreases and vice versa. When there is no light, LDR has a resistance of the order of mega-ohms which then decreases to few hundred ohms in the presence of light.

CT Sensors
CT stands for Current Transformers. These are sensors which measure alternating current. CT’s are used for measuring alternating current of entire building electricity consumption. Current Sensors and Current Transducers are perfect for controlling loads of current on pumps, driving fans, blowers, heating coils and many more.

IMPLEMENTATION & WORKING

The implemented circuit is shown in figure 2.
WORKING:
When power is supplied to the system. Initially the fan is on and light is off. Ct sensor senses the current and sends an impulse to the arduino then arduino sends electrical impulse to GSM module. A message goes from sim mounted on GSM to the number which is registered that fan is on and the user can use android application to off that fan if he/she is away from home. User also gets a message as acknowledgement that fan is off. Thus in turn saves electricity. User can even switch on the light or load. Load can take only 5 volt meaning charger can be connected to it. When user turns on the load then a message is received as an acknowledgement to the user’s phone that loads is on, similarly for load off.

TESTING & RESULT

Figure 3. Login window

Figure 4. Menu
Testing

We checked that each and every component is working. Android app is working according to our commands. When we press light on button, light gets on and we receive acknowledgement. When we press load on, charging starts and we receive acknowledgement. When fan is on, we receive a message fan is on.

Applications

- Industrial automation - In industry, it is used to control or switch on any automatic process control machinery.
- Can also be used for security purpose after modification (we can control gate system or we can interface wireless camera and can control it using our mobile)
- Automatic production machinery could be controlled even during odd hours with your mobile phone.
- To control (ON/OFF) the home appliances according to their status when we are going away from home.

Conclusion

In recent years, there has been a growing interest among consumers in the smart home concept with the knowledge of new techniques in ‘Electronics’ we are able to make our life more comfortable. One such application of electronics is used in GSM based home appliances controlling system using Android mobile. The approach we followed is based on...
GSM technology. The main aim of our project is to use and implement smart home system using the embedded system concept. This project paper consists of information regarding our system overview, its Requirement Analysis and the Design Methodology. The system provides the flexibility & reliability with low cost as well as less maintenance. It provides remote access to the system to deliver service for a long distance. With this system, we can control as well as monitor the devices at long range of distance from our home or in home the remote access at any time in a day.

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REFERENCES