Smart Home Monitoring System

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ABSTRACT- The aim of this project is to style and implement a home automation system that controls and organizes various home appliances. The user (i.e. home owner) controls his home appliances using his smart phone. The house automation system processes user direct commands, user preferences and data received from various sensors to manage home appliances. The project is implemented in hardware and software components that interact through network connections. The most challenge is to implement the project in a cost-effective way specified it may be easily deployed and utilized by homeowners. An Arduino microcontroller and an itinerant with an Android platform running on top of it are the hardware and software used. For the network part, an apache local server is employed to form a connection between the microcontroller and also the mobile and permit data transfer to require place in an efficient matter. Different functions are implemented using this technique which has the following: Manually controlled by smart phone application: 1. Open and shut garage door. 2. Switch fan on/off. 3. Switch tank motor on/off. 4. Switch led on/off automatically controlled using smart phone application: 1. Switch fan on/off in step with the temperature. 2. Switch tank motor on/off in step with the water level. 3. Switch outdoor led on/off in step with the outdoor candlepower. 4. Display temperature.

I. INTRODUCTION

In an era where the technology accelerates increasingly, microchips made a large step within the digital revolution. Mobile phones, vehicles, embedded systems are becoming smarter and more powerful daily, and helping the soul face challenges and problems regarding time, economics, environment and communication from a unique perspective. Today, technology made its way through to be one in every of main essentials for humans to own a comfort lifestyle or maybe surviving in some cases. It's a matter of your time until everything is going to be smart enough and can be connected to the web. They'll be communicating without the interference of humans themselves. Technology has pros and cons, for several reasons it's been argued that technology isn't rising the humankind thanks to the downside effects which incorporates both laziness of body and mind, having personal security problems etc. we expect that the positive side is that the more dominate thanks to the pros which has having more safety in our transportation vehicles, homes, getting a far better healthcare, solving security problems. Additionally, technology provides us longer for various activities. As a component of the automation league, our homes are following too. Home Automation System, which is implemented during this project, is taken into account a part of the web of things concept. The vision which is able to carries with it 50 billion devices by 2020.[1] Home automation System consists of microcontrollers and sensors connected together via different communication models. There's no single thanks to implement it as we'll discuss later. Its applications are mainly found in line with the wants of the user and considering his budget too. As a function of the house Automation System as an example, microcontrollers are programmed to stop working the unused home appliances thus decreasing unnecessary power consumption and saving power, energy and bills for one home user. However, implementing it country-wide; the decrease within the consumption is often noticed.

Smart Home-Control and Monitoring System Using Smart Phone

The architecture employed in this paper is meant supported low cost and versatile home automation system. The monitoring system uses an embedded micro-web server and Android based smart phone with in-built support for Wi-Fi to regulate and access the devices reception. The architecture is split into home environment and remote environment. In home environment we've got Arduino device working in coordinate with sensors/devices for receiving sensor information and controlling devices accordingly. The system consists of a micro webserver supported Arduino Ethernet-Shield and Router to form the access available for the opposite devices. Remote environment has the functionality of monitoring using Android based Smart phone. So any Android based Smart phone with inbuilt support for Wi-Fi will be accustomed access and control the devices reception.
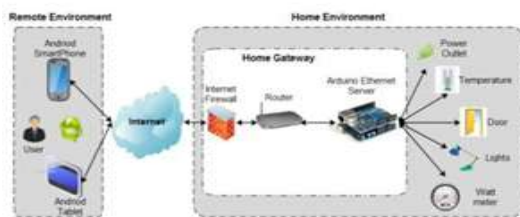

Proposed Method

Security has becoming a crucial issue everywhere. Home security is becoming necessary nowadays because the possibilities of intrusion are increasing day by day. Safety from theft, leaking of raw gas and fire are the foremost important requirements of home security system for people. Smart Home may be also referred to as Automated Home or intelligent home which indicates the automation of daily tasks with electrical appliances employed in homes. this might be the control of lights, fans, viewing of the house interiors for surveillance purposes or giving the alarm alteration or indication just in case of gas leakage.

Home security has changed plenty from the last century and can be changing in coming years . Security is a very important aspect or feature within the smart home applications. The new and emerging concept of smart homes offers a cushy, convenient, and safe environment for occupants. Conventional security systems keep homeowners, and their property, safe from intruders by giving the indication in terms of alarm. Those home security systems were very expensive and surprisingly ineffective. the necessity for an efficient and value effective system to cater the disastrous situations and so as to fulfil the safety concerns of home owners when the user is far from home, there was a powerful must develop a price effective and reliable system to satisfy the safety related needs of occupants. However, a wise home security system offers more benefits over conventional security systems nowadaysembedded system is intended to produce security thanks to tremendous improvement in microcontroller unit and widespread applications of GSM technology

Program flowchart of the home security system
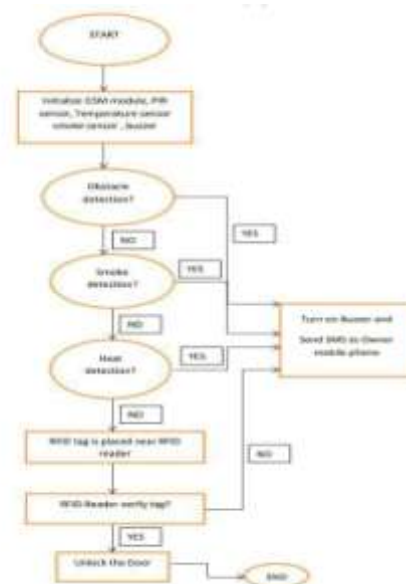
II. IMPLEMENTATION

1 NODEMCU

It is a developmental board integrated with ESP8266 chip. Owing to the facilities of the chip, the developmental board has the ability to connect to a Wi-Fi network and is loaded with microcontroller capabilities. They can be programmed to perform a specific dedicate purpose and the program is stored in a flash memory seen onboard the chip. The board is in turn connected to the relay through one of its GPIO pins; controlling the relay's triggering mechanism.

Advantage:

The main advantage of using NodeMCU is the presence of On-board Wi-Fi module thereby avoiding unnecessary additional components or Ethernet cables in order to obtain an Internet connection. Moreover the board is specifically designed to cater such needs; this is quite evident

from the fact that chip size is minimal and optimal, the power consumption is very meager, the board can be initiated into a deep sleep mode to save power and most importantly it contains a TCP/IP stack enabling the board to support any protocol functioning with TCP/IP as its base.

Fig. 3.2 NodeMCU

2. Relay module
Working:

A relay is analogous to an electronic lever that operates both electrically and mechanically; it triggers with a tiny low current and in effect it triggers another, much larger current carrying circuit. They're used widely as a result of the actual fact that a lot of sensors produce only tiny current and it's impossible to bridge the gap in current to drive bigger machinery. Electromagnet is at the most component of a relay and it performs the switching mechanism. There are two basic style of relay switching namely Normally Open Contact (NO) – Also called make contact. It closes the circuit when the relay is activated. It disconnects the circuit when the relay is inactive. Normally Closed Contact (NC) –Also called as break contact. When the relay is activated, the circuit disconnects. When the relay is deactivated, the circuit connects. The working of a five pin relay is sort of simple; when current flows through the control input terminal, the inductor coil gets energized and also the electromagnet attached to the movable slider is attracted towards the coil and closes the switching circuit.
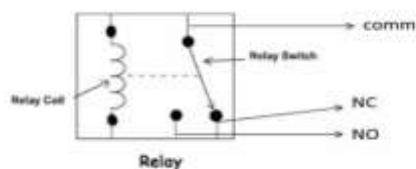

Fig.3.3-Basic relay structure

Advantages:

The control input for the relay from the microcontroller is fed as input into to the darling ton pair IC (ULN 2003); the output of which is given as relay's input. This is done because ESP8266 works on 3.3V logic and might not muster enough current to drive.

Fig. 3.4 Relay module with ULN2003 IC

Sensor:

A Sensor is an device which detects different physical changes within the surrounding. The output of the sensor could be a signal generated which might be transferred and processed to extract further information or to create another device respond during a certain way. The project contains different types of sensors to perform further tasks.

Temperature Sensor:

Temperature sensor is an electronic component sensitive to the temperature degree. The sensitivity differs in step with the economic process. The unit observed within the microcontroller is the electric pressure. The temperature is evaluated by observing the rise of the voltage of the sensor with the rise of temperature degree. In the project Temperature sensor is employed to live the temperature during a room and send the information to Arduino which successively switches the fan on/off.

The module has features like linear + 10-mV/°C multiplier, calibrated directly in Celsius (Centigrade), 0.5°C ensured accuracy (at 25°C), and rated for full ($-55\ ^\circ$ C to 150°C) range.
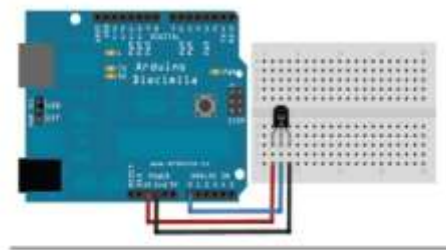
Figure 9 shows systematic diagram for temperature sensor

Android Studio:
Android is open source system and supported the Linux kernel, it's designed for devices with touch screens, and it's providing a testing and debugging tools for application. The artificial language employed in Android is Java, Android has SQL data base to store data, also it use the Android Software Development Kit which it's a process that's to use the creation of new applications running on Android. Android platform supports different connection technologies including Wi-Fi.

Advantages of using Android.
Easy development since it contains SDK, which provides build, run and debugging Android applications.

IoT Based Home Automation System Architecture
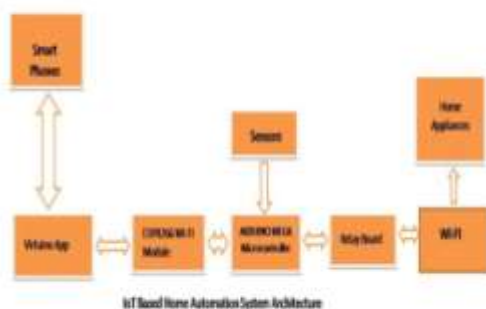
III. CONCLUSION
The project is implemented in hardware and software components that interact through network connections. The most challenge is to implement the project in a cheap way such it is easily deployed and employed by homeowners. The information is collected from sensors by the Arduino. Arduino microcontroller is

connected to the LAN with Ethernet shield. The configuration of the Arduino for Ethernet shield contains a static IP address for the shield and also the local server.

IV. FUTURE SCOPES
Arduino via the shield sends data every 5 seconds (can be adjusted) to the server via a URL using Get method. Server accepts the information and updates the database within the right columns and thru within the same time gets the manual/automatic command with other switch status from the proper columns too. The smartphone reads data from the server using JSON method to induce sensor values and display them on screen and updates the switch columns on the database if the user has clicked on them

Limitation
The project has few limitations that as follows:
1. The system is vulnerable to the different types of attacks.
2. Hardware limitation i.e. Arduino UNO have low performance and low number of pins
3. The need of a laptop as local server
4. There must be an internet connection on the router.
5. Low range of connectivity i.e. we can't connect outside the range of LAN.

V. FUTURE WORKS:
To feature the protection mechanisms like the authentication within the transportable and making an access list on the database to stop any unauthorized access. Data must be sent encrypted on every occasion during a different key through the network to forestall the sniffing and replay attacks.
2. To urge feedback from ON/OFF switches.
3. Schedule an idea for electronic devices selected by the user to manage children usage as an example computers and television.
4. Schedule a concept for electronic devices selected by the user to regulate air conditioners and washing machines.
5. Implement fire detection system and turning off the facility just in case of emergency and notify the user on his smartphone.
6. Alert the user the gas jar emptier a gas leakage is detected

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