Automatic Home Appliances and Security of Smart Home with RFID, SMS, Email and Real Time Algorithm Based on IOT

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Abstract:-_Internet of Things (IoT) is empowered by the headways in the innovations including sensors, Radio Frequency Identification (RFID) and communication advances. The most critical preface of IoT is to interface gadgets and sensors without human intercession. The proposed smart home computerization framework varies from different frameworks by permitting the client to get to and work the framework from anyplace around the globe through web alongside choice controls as per the requirements. The smart home computerization framework is likewise Short Message Service (SMS) and mail ID based Home Appliance Control System (HACS) and Security with the Radio Frequency Identification (RFID). This framework gives the controlling of home appliances remotely and giving security when the client is far from the place. In this paper, I propose a algorithm for brilliant home mechanization framework in light of IoT utilizing sensor nodes which are directly associated with Arduino. The Algorithm plays out some fundamental nearby capacities, for example, producing the alarm based on the gas sensor and Turning ON/OFF the lights in view of the motion sensor. In the proposed algorithm the Arduino is associated with the internet utilizing Wi-Fi module to monitor the power utilization of various home apparatuses and can be controlled from anyplace on the internet. The target of the proposed framework is to give a minimal effort and productive answer for home computerization framework by utilizing IoT._

Key words - Internet of Things, Short Message Service (SMS), GSM, mail ID, Radio Frequency Identification (RFID), Motion sensor, Gas sensor, Alarm system.

1. INTRODUCTION

The Internet of things [1] is a system of structures, gadgets, physical objects and different things installed with hardware gadgets, sensors and system network that empower these items to gather and trade information. By methods for IoT, we can control lights, fans and other installed gadgets machines which are connected with internet regardless of the possibility that we are absent in the building.

Mobile innovation is, maybe, the most quickly developing innovation. In 2G network, GSM have more noteworthy contribution than other advanced technologies. The administrations gave by the GSM are gathered into three primary categories, such as, Tele services (TS), Bearer services (BS) and Supplementary services (SS). TS benefit worries with customary phone calls, emergency calls and voice messages and so on. BS administrations are about data services, for example, SMS. SS are value added features; call cost, call hold, call holding up and so on.

RFID utilizes a little radio-frequency transponder called a RF tag. The tag is electronically customized with unique data, which can be read from a distance. The RFID works from frequencies running from a few hundred kilohertz (KHz) to several gigahertz (GHz). Normally, the RFID reader transmits the required power and information to the tag. There are two sorts of RFID labels, active and passive. Active labels are more costly, battery-powered and utilize higher frequencies, while the passive labels utilize lower frequencies, and don't have the internal power source. The reading reach is up to 100 meters for active and around 20 meters for passive labels.

For an excellent home automation the choice of sensors is important. A control system is great if the sensors utilized to quantify the desired factors can transmit the measured estimations of variables to the controller.

IoT has wide range of application; these applications are categorized as follows:

Building and Home Automation: - Structures and homes are automated by methods for temperature. Lights, AC and Fans are controlled based on room temperature watched.

Energy Optimization is one of the prime worries of IoT. On the off chance that we accidently left our home's lights we can turn them off with IoT innovation. Associated Appliances is another application based on IoT, which includes; smart fridges, smart vacuum cleaner and so forth.

Smart Cities: - Private E-meters is utilized to enhance the proficiency of service and meet occupant's needs by disclosing to us the measure of power consumed and its request. Smart Grids is utilized to control the energy producing and/or potentially consuming elements inside the electricity network. Smart Street Lights are utilized to monitor switching, voltage, power, alert, energy utilization and furthermore set parameters and electrical cable, light failure caution and so on. Surveillance cameras used for security reason, work in hidden mode, catch live occasions and save as video record, turning on and off, broadcast video live on internet.

Wearable's:- Google glass is one example which uses existing google applications like Gmail and google. Some medical instruments when connected with patient's body helps specialists to monitor him/her if he/she is not physically present there; e.g. savvy stethoscope, B.P. apparatus and so forth. Smart watches permits checking the metabolism and informs when metabolism is aggravated by using internet. Area and Tracking/Pet Tracking utilizes microchips which are put on individual/pet body to track its location effectively.

2. SYSTEM ARCHITECTURE

The system proposes two sub-system. Apparatus control subsystem draws in the client to control home Appliance remotely while the safety message subsystem gives the remote safety checking. The system is sufficiently enough to instruct client by means of internet and GSM from a particular Email and SMS to change the state of the home machine as per the client's needs and necessities. The second angle of security alert which is accomplished in a way that on the identification of intrusion the system permits programmed era of SMS in this way alerting the client against security hazard.

In this project I will create system which includes two units one is the home unit (fig 1) which will put in home and other will be security cabin (fig 2). In home unit, I have connected sensors input to 32 bit ARM 7 Controller. One is (LPG) gas sensor which is utilized to detect the leakage of the gas. If the gas leaked, exhaust fan will turn on automatically and alert will be activated, yet if nobody at home in that case GSM modem will send message to client and furthermore to the

security cabin that gas gets leak. Additionally I have keep feature that if security comes to door, client need to open the door by sending password of door remotely, he can open to avoid destruction in home. The second one of the sensor is PIR sensor they are often, referred to as "passive Infrared" sensors. PIR sensors allow you to detect movement, quite often used to identify whether a human has moved in or out of the sensor's range. They are not-expensive, small, low-power, simple to utilize and don't wear out.

It will connect with home window, entryway, and compound of garden. So if any intruder wants to come inside without client notice, alert will be active and send SMS and Email to client's cell phone. Likewise I have connected with RFID reader. If clients will show their card then just door will get open.
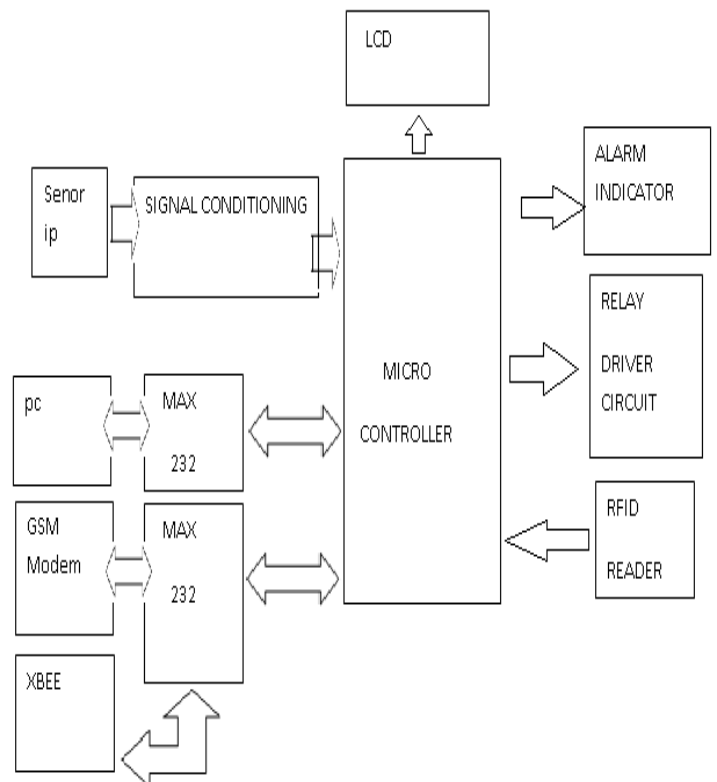

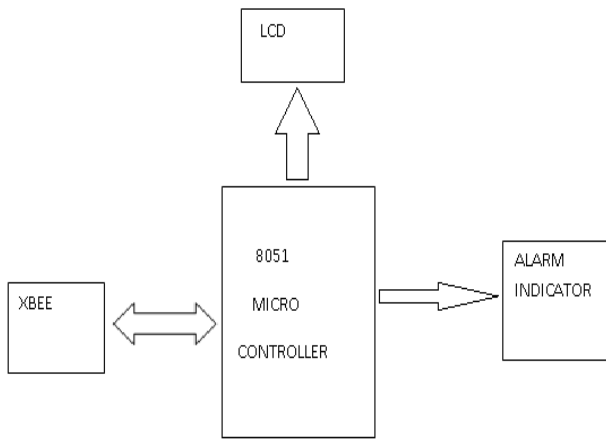Fig.1: Home unite block diagram

Fig. 2: Security cabin

The SHT75 band-gap temperature sensor was picked as it can measure both temperature and humidity. The SHT75 is a single chip relative humidity and temperature sensor module that gives digital output. It uses a capacitive polymer detecting component for relative humidity. Both temperature and humidity sensors are consistently coupled to a 14 bit analog-to-digital converter and to a serial interface circuit on a similar chip.

This outcomes in a superior signal quality, a quick response time. The Kelvin temperature is converted over to degree Celsius by the microchip programming.

In the case of a smoke detector when fire or smoke is detected, the lights in the entire house begin to blink and alert the resident to the probable fire. The home automation system can dial up the house owner on their mobile phone to alert them or call any fire departments.

A system used the following technologies:

A. Phones, Networks and Communication protocols: The generally accessible systems depend on GSM. The system gives a wide zone of coverage and can be used more cost-effectively for this system and correspondence protocols. The SMS is the most productive medium for communication. Cell phone or Cellular gadget is required for to make a SMS.

B. I/O Interfaces between Micro controller and gadgets: Serial or parallel I/O will be considered for to connect the GSM receiver and the Micro controller. Using the micro

controller, a control circuit will be executed to control the electrical appliances (security system, ventilation system, light etc).

HACS system consists of the following components:

PC: This unit contains the software components such as the HACS System through which the appliances are controlled and home security is monitored.

GSM Modem: It is an equipment part that permits the capacity to send and get SMS to and from the system. The communication with the system takes place via RS232 serial port. Mobile phone can be joined at the place of GSM equipment yet it confines the equipment usefulness, for example, sending or accepting of SMS.

Mobile Device: Cellular phone containing SIM card has a specific number through which communication takes place. The gadget speaks with the GSM Modem through radio frequency. Mobile user transmits SMS using GSM technology.

Sensors: I used three sensors for security of the home like the LPG, PIR, SHT 75 for sensing the leak of gas, motion, humidity and temperature.

LCD: For display action of system I used 16 * 2 characters LCD.

RF ID reader: For reading active tags in kitchen foodstuffs scopes and in garage door.

Relay: Solid state relay provides fast operation with low maintenance. This relay consists of a coil of wire with a ferrous metal in the center that a small hinged and spring loaded piece of ferrous metal floats slightly above one end of the metal in the center of the coil. When energized the metal in the center of the coil becomes magnetic and draws the floating metal towards it. This in turn causes multiple contacts to make and break. There are two major advantages to these larger relays:

A) They can control multiple contacts
B) They can handle very large loads

RS-232: Is simple, universal, well understood data interface. The standards to 256kbps or less and line lengths of 15 Meter or less but today we see high speed ports on our home PC running very high speeds and with high quality

cable maxim distance has increased greatly. The RS-232 interface presupposes a common ground between the data terminal equipment (DTE) and data communication equipment (DCE).

Security for the HACS includes validation, access control, information integrity and information privacy. Validation of the client is by identifier and password. Property holders can monitor and change the condition of the system. Transmissions should to be encrypted for protection. To control and monitor specified security systems, security light sensors, smoke alerts, security doors, and other wired peripherals. For command SMS, owner has to validate with client name and password then send command through the SMS.

3. METHODOLOGY

The structure of the system is working with following steps:

A) The remote client sends SMS including verification data and commands to the receiver. specially for ON/OFF any appliances and kitchen foodstuff's report.

B) GSM receiver gets messages sent from client cell phone and send.

C) GSM receiver decodes the sent message and sends the commands to the micro controller.

D) The micro controller issues commands to the appliances and the gadgets connected will switch ON/OFF.

E) The Micro controller checks for completion status and apply operation on Electrical Devices.

F) GSM receiver informs results of their demand to the remote client by sending a finishing status message back to remote client as another SMS message.

For example procedure of expire date of foodstuffs, initially need to enlist their validity time in days on their labels then reader will read them and send data to controller. If expire date of foodstuff become two days then controller will call GSM modem. If no, then the reader will keep reading the labels until reach to limit value. At that point GSM modems send a SMS and Email to client, lastly it will reach to hand telephone to inform owner. In fig 3 these procedure is shown.
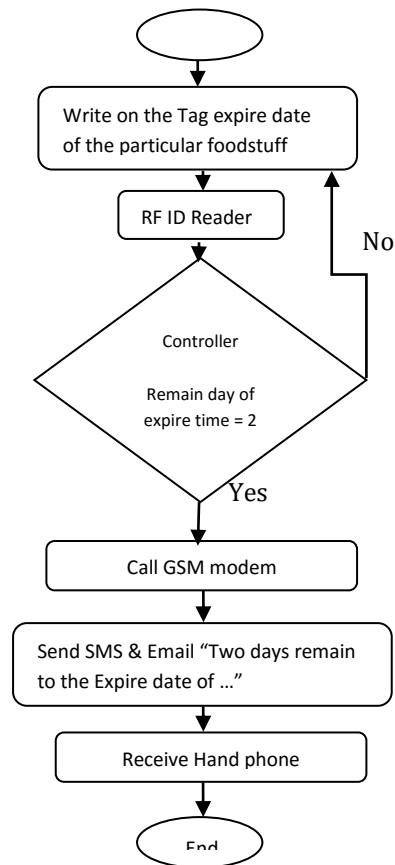

Fig: 3. Developing methodology of expire date of foodstuffs

4. SMART HOME ALGORITHM

In this segment, organize presumptions; arrange parts and operation of the proposed algorithm is clarified.

A. Network Components

Automation part is built by using following components:

Arduino is used for controlling the entire computerization part of the smart home automation. It is connected with the other modules used as a part of automation as appeared in figure 3. It actuates different gadgets on the basis of sensor's information. Sensors attached to Arduino comprise of: Electromagnetic door sensor, Temperature and humidity sensor, Gas Sensor, Motion Sensor, Electromagnetic Relays are used to control and computerize the electrical appliances on the basis of detected information.

Energy checking part is used to monitor and control the energy utilization of home machines particularly overwhelming machines by using web page on a LCD. This

part includes following modules: CC3000 Wi-Fi module is attached to Arduino; which expects to give information on the web page for further handling, activities and controlling.

B. Network Model

This segment briefly talks about the system model of the proposed system. The proposed model is primarily based on two sections; Smart automation and Smart energy monitoring. These models are discussed in rest of this segment.

Automation: - In this segment, sensors are connected with the controller (Arduino) and gives Automation features of items, for example, Light is turned ON/OFF based on movement detected by the sensor or any action saw by the sensor. Besides, an alert is created when gas leakage is observed. Likewise, informs when the main door is left open for no less than 30 seconds.

Energy Monitoring: - In this segment, temperature and current sensors are connected with the controller (Arduino). Temperature sensor is used to automate the fan in the room as the fan will automatically turned ON/OFF when the temperature increase to certain value and the fan speed will automatically increase with the increase in temperature. Current sensor is used to monitor the energy utilization of the machines at home and a Wi-Fi module is utilized to send the information to the internet and is accessed to on a web page. The estimations of energy utilization and temperature are appeared on web page and the control of the appliances is also connected with the web page which can be accessed globally and can be controlled.

C. Algorithm Working

The algorithm is written on Arduino chip [25] for the smart home system. In smart home system, the Passive Infrared (PIR) movement sensor is installed on the top of the door to monitor the movement when a human goes into the room. At the point when a human goes into the room the sensor distinguishes movement, the lights turned ON. Otherwise, sensor continuously senses the movement (lines 1-5). A gas sensor is installed in a kitchen for the security reason to deal with the critical circumstance. The MQ5 sensor sense the information, if its values is greater than a predefined limit (1050), as a result, alert is turned ON to notify the client that there is leakage or high measure of gas is recognized in the kitchen (lines 6-10). If an intrusion identification is observed, which implies the door is

observed open for over 30 seconds then alert is turned ON to tell the client (lines 11-16). Lines 16-20 describe the working of Fan which depends on room temperature. In the event that the temperature identified less or equivalent to 24°C then the Fan is turned OFF, then again, if the temperature exceeds from 24 °C the Fan is turned ON and the speed of Fan is specifically corresponding with the temperature. Therefore, with the increase of temperature, the speed of Fan is increased. The detailed working of algorithm is as follows:

Algorithm: Smart Home System

Algorithm

1.   **If** motion sensed by the PIR sensor **then**
             Turned ON Light
2.   **Else**
             Keep sensing
3.   **End if**
4.   **If** MQ5 gas value greater than or equals to 1050 **then**
             Start Alarm
5.   **Else**
             Keep sensing
6.   **End if**
7.   **If** electromagnetic door sensor lost the line of sight connection for 30 sec **then**
             Start Alarm
8.   **Else**
             Keep checking
9.   **End if**
10.   **If** temperature less than or equals to 24°C **then**
             Turned OFF Fan
11.   **Else**
12.   **If** temperature greater than 24°C **then**
             Turned ON Fan (Speed of Fan increased with the increase in temperature)
13.   **End if**
14.   **End if**

5. CONCLUSION and FUTUTRE SCOPE

I have implemented the Home system for automation appliances and Security control unit for security of smart home based on a internet and cell phone. I worked in two primary scopes: Energy efficiency and Environment. In the

paper minimal cost, safe, available, auto-configurable, remotely controlled answer for smart homes has been described. Some approach discussed in the paper is novel and has achieved the objective to control home appliances remotely utilizing the SMS-based system fulfilling client needs and necessities. GSM technology capable solution has proved to be controlled remotely, give home security and is cost-effective when contrasted with the already existing system. An IoT based algorithm is proposed for the smart home system to monitor the gas leakage, to automate the Fan, energy observing, etc. In future, this work can be implemented in a real home to automate it as smart home. The system is extensible and more levels can be additionally created utilizing automatic movement, include energy and water meter for avoiding from extravagance, enhance the health care system, make truly smart kitchen. There are some smart cameras that can distinguish skin shading. We can change the modem and use 3G modem so the system will send video or voice message to the client. We can add another innovation to make truly smart home, for example, an Ad-hoc innovation and Wireless Sensor Network (WSN) innovation so we will able to make M2M communication. For outlining, we ought to survey any issues like an virus or hacking. So, we probably built up the safe system that can ensure the home system to the attack of a virus or hackers.

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