Home Security and Energy Efficient Home Automation System Using Arduino Mega2560

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Abstract —the project aims to provide an efficient, low-costautomated energy management system for houses. It also provides a facility for surveillance of the house. The system has been built after evaluating the utility features of surveillance and energy management systems available at present and is an attempt to improve these features. In addition to providing a cost -effective solution for energy management in the household, it also provides features to cater to natural disasters like fire. The system is built on an Arduino microcontroller board and uses embedded C++ as the programming language which provides a facility of easier coding for new features.

Index Terms—Microcontroller, Finger Print Sensor,Global system for mobile communication, Vibration sensors, LCD, LM35 and LDR

I.INTRODUCTION

In this 21 st century, with increasing crime rates, everyone wants to protect one's assets. The people want security when they are away from home. This home security system

Provides advanced security for the home owners.

Electricity is central to all the activities of the modern society. Energy related issues in present day are a big problem and still there are many instances where people are in a hurry and forget to switch OFF the lights and fans. In such situation, a system that saves electricity is of great use. The system incorporates twin features of improving energy efficiency and providing surveillance at low cost.

There are many times when we are in a hurry and wish that all the doors are locked and security is ensured. But to To ensure all this together that when people aren't around at home double security along with an energy efficient system can be successfully used.

The rest of the paper is sectioned as below. The related work of this paper is described in section II. Section III lists the problem formulation. Section IV and V describes the proposed and working methodology respectively. The result, conclusion and future work of this work is described in section VI, VII and VIII respectively.

manually re-check each door will take a lot of time and the same is true for electrical equipment. In such case there is a possibility that the lights or fans might have remained ON which will waste the electricity when not in use.

II.RELATED WORK

Security is of utmost importance to us. A security system if implemented should have the following important ideas in place. Firstly, the system should be made aware of to the perpetrator.

The home owner should then be alerted in order that he takes some action. Finally, there ought to be a recording device to trace what's happening, which could later be will not to assist the police to search out the stolen/misplaced things
The alert mechanism will be incorporated employing a cellular device like a portable. SMS was used to alert the owner [2]. Generally, the setup is created of 3 components: micro-controller, a GSM module and one or additional sensors started in a very remote array counting on the application [3] [4].

Biometric authentication system will be employed by authentication through images/videos captured in a very special terminal [5] [6].The design consists of Android phone with the home automation application, Arduino Mega ADK. The user can move with the automaton phone and send management signal to the Arduino ADK that in turn will manage different embedded devices/sensors [7].A scenario consists of a set of devices during a very specific state and could be activated directly by the user, by time information or by any event among the home.

The employment of mobile handsets as a consumer device to receive warning messages on implies that the user will not need to be compelled to hold an additional piece of equipment because the general public have already got a portable with them most of the time[10].
Light intensity level within the vary of ninety - hundred percent is optimum for traditional sight. If intensity is greater than 90%, no lighting required. Later for every 20% drop in intensity a 10 Watts lamp is turned ON to take care

of optimum lighting[11].Diminish the energy consumption by diminishing the wastage, turning off the lights when not required automatically by observing the light accessibility in a room[14][15].The GSM experiment showed that it takes regarding 8-10s for the safety system to reply the dweller and relevant civil authorities just in case of emergency [16][18].

Home security is important for occupants' convenience and protection. At entry purpose the system ought to secured this is often the most purpose to style this technique .This paper aims to develop a affordable suggests that of home security
System exploitation detectorslike   vibrationsensor.
Knowledge from ofthese sensors is regularly received and processed by Arduino board that acts as a microcontroller unit. Just in case ofuntoward things, the Arduino can trigger Associate in Nursing alarm and alert messages are going to be sent to user's mobile via GSM. So the system ensures home safety in addition, as security [23].

III.PROBLEM STATEMENT

Electricity is central to all the activities of the modern society. In the present day situation, energy catastrophe is a huge challenge; a system that saves electricity is of great use. The existing system did not provide to incorporate the features like improvement of energy efficiency and surveillance at low cost.

IV. PROPOSED METHOD

The proposed method aims at developing an efficient system for the common people like us providing security and energy saving at the same time.

The working of the modules has been explained in the following manner:
>   (a)Home security system module
>   (b)Energy efficiency system module

a)Home Security system module
All these systems together perform a double security checkto avoid any kind of theft and security related issues.
Users will have significantly portable finger print that they will scan at finger image. Software integrated hardware will help in determining whether the user is authorized or not and then system will proceed accordingly. The different scenarios corresponding to the way the user uses the system in a three scenarios and they are given below.
Scenario 1
The person will need to scan his/her finger image at the finger print sensor; it will then read the image and id information and send it to the microcontroller. Since the id image which is scanned is a registered finger it makes you an authorized entity for the system. In accordance with that, it will stop the buzzer alarm from ringing and be in that state for 5 seconds after that sensor will revert back to its previous state which is an essential part, since we do not want door

While it should seem like there are previously a few opportunities in the field of security and energy management system, but we recognized how often these systems were absurdly expensive either having extreme hook-up fees or forcing the owner into a monthly contract that becomes terribly expensive with time.
We want to devise a system that's each cheap and a onetime investment and feel there's a true marketplace for a solution. The system provides to incorporate the twin features of improving energy efficiency and providing surveillance at low cost.
Scenario 3

In case if the impersonator intelligently enough damages the finger print system because he can see that even after that he won't be able to trespass without alerting the home owner. This is ensured by the vibration sensor which the person will interrupt resulting in activating the burglary alarm along with initiating the Arduino (multi-controller) to further activate the GSM900a module which will call the owner.

b)Energy Efficient system module
The LDR (light dependent resistor) is used in order toControl the number of lights to be switched ON in a room by constantly checking the amount of light. On a normal sunny day, the lights will be OFF even if the temperature sensor marks the presence of people inside the room. But on a cloudy day, once the illumination levels are going to be low, the controller determines the estimated lighting by checking the illumination level and initiates the lights.
Along with this, the temperature sensor keeps a check that unwanted fan or AC doesn't remain ON and if required, they are adjusted according to the temperature of the surroundings and the number of people inside the room. Thus, energy spillage is reduced.
remains unguarded for a long time even after an authorized attempt.
Scenario 2
In this case, if an intruder wants to get inside and scans an unregistered finger id then the system will start the alarm. It will keep on buzzing till 5secs which give sufficient time for the security to reach the scene and avoid any kind of burglary.

The flowchart of the proposed method is shown in Fig.1.The steps are given below.
  a)The system will read the finger images.
  b)If the images or id is registered means the person
>   to enter into the home and go to step d;
>   otherwise go to step c.
c) The person doesn't have an image id and tries to get into the house. The vibration sensor will activate the burglar alarm as well as it will give notification to the owner as "unauthorized person" entered into the home.
d) If the person enters the home means the system will check for the environment temperature & cloudy day.
>   It increments the count value by 1.

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e)If the environment temperature is above the threshold value means fan and AC are automatically ON; Otherwise fan and AC are in OFF condition.

f)If the person enters the home means the system will also check for the cloudy day.

g)If the day is cloudy means fan and AC are automatically ON; Otherwise fan and AC are in OFF condition.

h)If any person leaves the home means the counter value is automatically decremented by 1.

i)When all people leave from home, the counter value is less than 0, the proposed system will switch OFF all the electricity consuming devices.

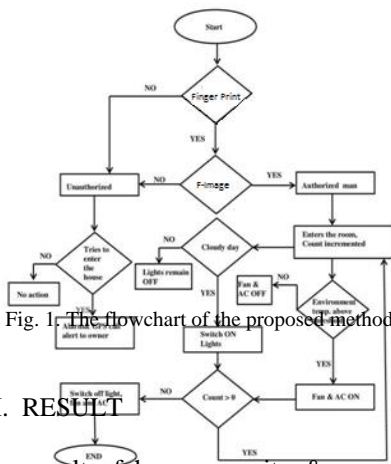Adjust the lighting & other electrical equipment when people leave the room is shown in Fig. 4.


Fig. 1. The flowchart of the proposed method

VI. RESULT

The result of home security & energy efficiency system modules are given below. Registering of images or id by the owner using finger print sensor is shown in the Fig. 2.

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Fig. 2. Enrolling with Sensor

If the house owner wants to take away the finger id from any of the members staying at his residence, he needs to

Scan the

Fig. 4. Based on Light intensity for electricity saving
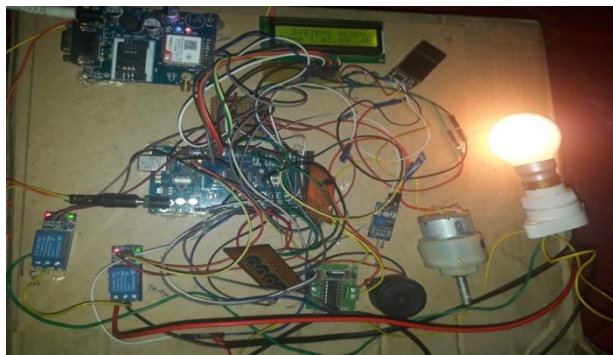
rescan the finger print followed by finger image is shown in Fig. 6. Unauthorized entry is shown in Fig. 7. The overall working model is shown in Fig. 8

Fig. 5 LCD show the Message sent

Existing finger print systems don't seem to be as efficient, however, if these finger print systems are clubbed with vibration sensors and GSM900a then the existing system will perform higher.If the person tries to surpass the finger print, then the vibration sensors at the doors are activated and therefore the alarm can buzz together with a call to the registered numbers.

finger id, the user registered hence allowed entry. Depending on environmental conditions lights, fans and AC will be switched ON as determined by sensor values is shown in Fig. 3.

Fig. 8. Complete Project Result

Fig. 3. AC bulb ON

Once the finger print is scanned and placed within the slot the security check is passed and electricity is ON . However, the lights , fans, air-conditioner don't have a modulator or sensor installed in room to detect if they're unnecessarily ON whichmay be avoided by implementing this technique.

Fig 6: Message Format Of The GSM

VII. CONCLUSION

The project can be implemented for a double security check for home when the homeowner has gone out where he will be informed through a call that a burglary has happened at his residence and he should immediately attend to that. It also caters to the need of energy management, which checks the presence of people inside and switches on the lights and fan based upon the weather condition. All this will give a person the freedom to work on more important issues.

VIII.FUTURE WORK

This system can be used for hostels where the corridor and bathroom lights always remain ON. The lights remaining on costs a lot to the University and by the use of this system the energy saved can be used in places which are deficient in power. In this way, we can contribute a little towards humanity and can take one step forward to save the nature and our planet Earth which has given us everything

Fig. 7. Unauthorized entry or scanning of unauthorized

When all people leave switch OFF all the electricity consuming devices and activate the double security check system if in a sleep state. LCD show the Message sent is shown in Fig. 5.
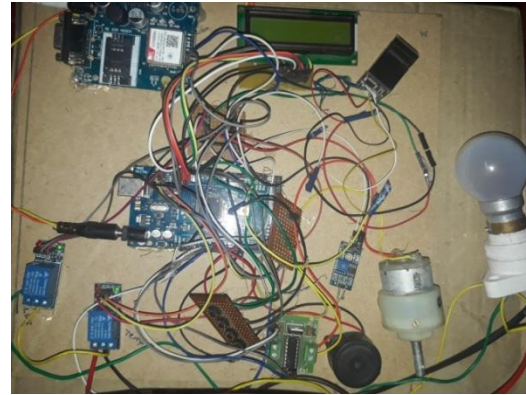
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