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IOT BASED SMART SECURITY AND HOME AUTOMATION

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ABSTRACT

In the old days, electrical, electronic and electromechanical devices were supporting all the day to day life activities. Some devices were fully automated and some were semi-automated. Due to the advancement of computer and communication technology, the trend is more towards the automation of most of the activities which are needed in a day to day activity with very less human intervention. In this project, we are proposing an automated tool which works on the concept of the Internet of Things which is basically electronic and communication technology which controls the home appliances such as light, fan, curtain etc. The proposed system will be using Arduino as microcontroller through which the devices are controlled. The security nowadays considered as significant topic specifically in design smart home. The main purpose of design smart door lock, using Smart Door Authentication Algorithm is to compare the registered password security with each entered password which may contain some wrong or swapped characters. The results show more strength authentication for access in real-time.

***Keywords**: Android, Arduino UNO, Authentication, Bluetooth, Sensors*

I.INTRODUCTION

Figure (1): Smart Home Category

A smart home is a network of various sensors and controllers integrated together to provide the user with remote control of various devices within their home using IoT. The sensors sense various changes, monitor them, store the data and display them in order for analysis and control. This helps us customize our home to fit every family's way of life. This is a cost-effective system made from locally available components like Arduino controller, light sensors, PIR sensors, Gas Sensor etc. which allows us to control the appliances of our house. The Internet of Things [2] is connecting everyday objects intelligently to the Internet to enable communication between things and people, and between things themselves. For the Objects to collect and exchange data electronics, software, sensors and network connectivity are embedded into them. This technology has endless possibilities and infinite applications. Everyday devices are made smart and intuitive and by enabling them to share data intelligently they can be used to improve people's lives. IoT has made a huge impact in the way people live, work and communicate. In the existing model, there are only one or two independently executed modules using various technologies. But in our proposed model we have made one bulk project which means it contains each every device which is used in-house for example curtain, light, door etc. which is controlled by Arduino microcontroller through sensed information by the sensor. As it will contain a small house through which live demo will be shown how each and every device will work as this was not implemented in the previous model. The devices can be accessed through Android App it means if any operations we want do like make any devices on/off we can do through it that Android App. In the context of security we have provided door security by entering the password you can open the door and if any problem occurs. We have provided notification system in which if any problem occurs or about activities like fire alarm message will give to the user through GSM Module [5]. In this paper we present a low cost secure android phone based, flexible home automation system. Appliances at home are connected to the Arduino Uno board. The communication between the android phone and the Arduino Board is wireless through Wi-Fi [3] and Bluetooth [1]. The System architecture is explained in the section 3.In this we have proposed the algorithm called Smart Door Authentication Algorithm which is used for door security. That Algorithm is explained in Section 4.In Section 5 we have described the hardware's implementation. In Section 6 we then describe the system's software development. Finally we conclude our major findings and our future work.

II.LITERATURE SURVEY

1. **Bluetooth Based Home automation System Using Cell Phone - :**

The design is based on stand-alone Arduino BT board and the home appliances are connected to the input/output ports.

2. **Design Secured Smart Door Lock Based On Jaro Winkler Algorithm -:**

This paper is dedicated on an authentication problem in which password comparison is done with given input .If it match then only door will open.

3. Mobile Based Home Automation using Internet Of Things-:

In this paper, two prototypes namely home automation using Bluetooth in an indoor environment and home automation using Ethernet in an Outdoor environment are presented.

4. A Pilot Study-:

Development of Home Automation System via Raspberry Pi This paper demonstrates monitoring system function by including a web camera to the MCU for a live video feed.

5. A Time Synchronization Technique for CoAP-based Home Automation System-:

This paper proposes lightweight time synchronization Algorithm for CoAP.

6. Globally Accessible Machine Automation Using Raspberry Pi –:

An automation system is proposed for the users to control home appliances with high mobility and security using Raspberry pi.

III.SMART DOOR AUTHENTICATION ALGORITHM

As from name itself we can find the meaning of algorithm it means this algorithm is used for door security purpose, we have designed an algorithm which is totally based on the comparing string which we enter. The step for algorithm is as follow:

As we enter the password it will go to controller here Arduino Uno is our Controller which will do procedure of requested command.

The comparing of entered password is done with which password we have set, based on that further operation is depend if the password is correct door will open otherwise it will remain lock.

The equation for Algorithm is given as follow:

$$D(s, t) = 1/3((comp(s, t) + comp(t, s) + comp(s, t) - Trans(s, t)) \quad s \quad t \quad comp(s, t) \quad \ldots..(1)$$

In this equation s and t are string which we need to compare. And Door Authentication string comparator is done in the next equation. As follow:

$$D(a, b) = S(a, b) + P*N*(1-D(a, b)) \ldots. (2)$$

Where, a and b are the string which we need to compare, P is Algorithm constant ($P<0.25$) [7], and N is the number of character similarity.

In our work we have follow these steps of algorithm in Arduino Language platform based on the compare password and password which is send through the Keypad via Wi-Fi where we try to open and close the door .In these procedure we have set the threshold value for authentication access were the score of value should not less than the 0.9.

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Figure (2): Proposal Work Phases

IV.SYSTEM DEATILS

A. System Architecture

1. **Arduino UNO**: This is the main module through which all input and output processing is going to happen.
2. **PIR Sensor**: It is used to sense the human detection and if a human is identified it will perform an operation like for e.g. for opening gate it is used in this project, making lights on/off.
3. **LDR Sensor**: It works on the change in intensity of light. It will perform an operation like for e.g. as it identified there is brightness it will make light on and if there is enough light then its intensity will be low.
4. **GAS Sensor**: The Grove - Gas Sensor (MQ2) module is useful for gas leakage detection (home and industry). It is suitable for detecting H2, LPG, CH4, CO, Alcohol, Smoke or Propane. Due to its high sensitivity and fast response time, measurement can be taken as soon as possible. The sensitivity of the sensor can be adjusted by the potentiometer.
5. **Temperature Sensor**: It is used to sense the temperature in the room. If the temperature goes above-set threshold value then the fan will get on of Kitchen.
6. **Water Sensor**: It is used to sense the water if get split on the floor then we use to indicate through the sensor. A user will get a notification through alarm or buzzer.
7. **Wi-Fi Module**: The Wifi module is used to connect the devices which are place remotely.
8. **Bluetooth Module**: It is used to connect the devices which are going to place in the limited area it means in this project we are opening and closing curtain through this module so it is not necessary to connect it with Wi-Fi module as it in the house only.
9. **GSM Module**: This Module is used to send GSM to the user about notification about any suspicious activity in the home.
10. **LCD Display**: It is used to display the message for e.g. if water is purified then display message it is OK to use.
11. **Relay**: It is used to control the high voltage devices. It is used to maintain the voltage.

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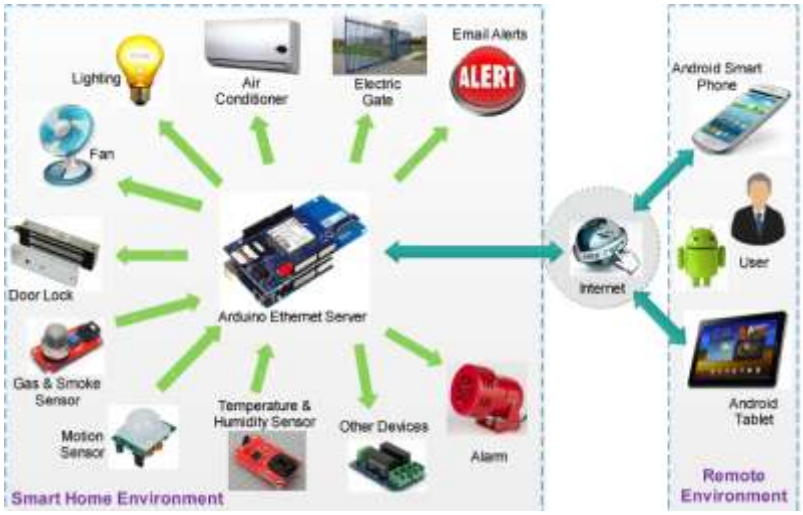

Figure (3): System Architecture

B. Hardware Implementation

This Home Automation is totally based on the various components, Like in the previous model there were only two or more components were involved. But in this system there are many components and various sensors are included.

This system involved the ESP8266 Wifi Module through which device are controlled like if any fire system alert the message is given to user for security purpose. In this it included the sound sensor through which light on off is done .The coding is done in the C language and our main server where actual our command is done is Arduino Uno Board. Which is our main controller through all devices is controlled. In our proposed model the new idea related gardening is done that watering the plant this idea is done through soil sensor and water pump through which monitoring is done of water. The soil sensor is used to measure the moisture level of water if it is necessary it will automatically water the plant. For security purpose in the Kitchen area the Gas Sensor is implemented for detecting leakage of gas for that purpose MQ2 is used. As in the home there are some high voltage devices which may affect sometimes to our hardware devices so to avoid this problem we have 4-channel Relay which is use to maintain the voltage between devices. For Door Security we have above explained algorithm is used. The main natural light coming source in home is through window curtain. As it means when we open the curtain then only the light will come, but as sometimes we feel lazy to open the curtain, so to overcome these problem we have implemented the smart curtain which will automatically open and close the curtain through sensor. These will really reduce the work of going and opening and closing the curtain. As sometimes the light of street lamp remains on we don't even remember for to avoid the over consumption of light we have placed the LDR sensor module which avoid the consumption of the light. The working is every simple it will on/off the light when brightness intensity is lighter get ON otherwise it will remain off as intensity is low.

C. Software Implementation

In the software implementation we have designed an android app which is user friendly. Through which monitoring is doing, it means the light which we used in the home it is monitor by the app we can then analyze how much light we consume.

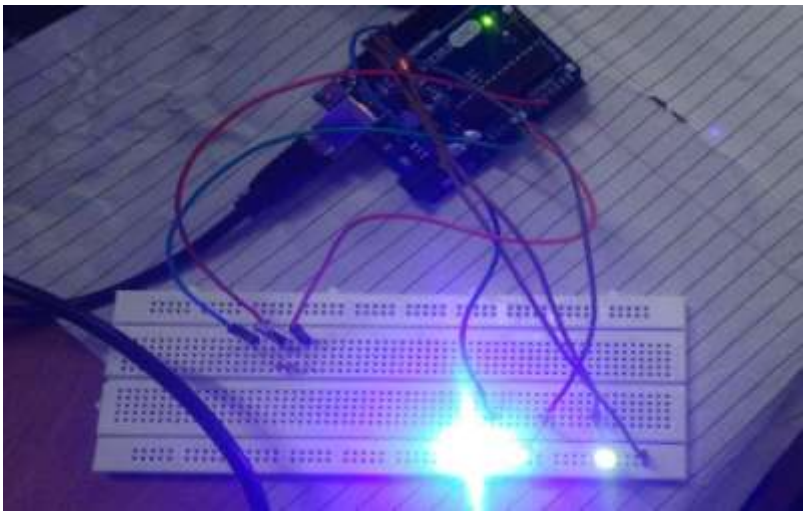

Figure (4): LDR Implementation

The App is totally based on Android [8] so it can benefit for the entire android user. As nowadays everyone is using smartphone so it will advantages for everyone. As this app will not only monitor the light consumption but other notification regarding gas leakage, water spilt etc. will be done.

The workflow for software procedure is every simple. The GUI will consider the Login Page through which authenticated user can login and if another member want then it have register for it. The Design is user friendly through all the activities is going in the home is monitored. As if any light remains on not having any person in room it will inform by notification .As while when in the garden the water tank is empty it will inform the user through notification.

D. Result and Analysis

In result analysis we analysis result of whole system through which we analysis the temperature result of kitchen through our design app its monitoring is done.

Figure (5): Temperature Graph

IV.CONCLUSION

This paper demonstrates the possibilities of implementing a system that will helps the old and disabled people not just for normal home owner. And furthermore these system can be implemented in the school, office etc. When user touches the icon from GUI on their android devices it will make devices on/off like light, fan it will make on/off as it will reduces our time and also helpful for the disabled people. And regarding speed control of fan we can do it remotely.

V.FUTURE SCOPE

In future this system we can connect to multiple actuating signals by adding multiple sensors. And this system can be implemented on a cloud.

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