

Development of IoT Based Smart Security Automation System Using Mobile App

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Abstract – Securities in Nigeria has been over emphasized and yet nothing has been done about it, the vandalization of lives and properties of Nigerians has become uncontrollable in Nigeria, most especially in remote places and some north parts of Nigeria. Houses, lives and properties in Nigeria are usually very important, that the construction of fences and security agencies cannot grantee the high level of security in our homes, mostly in some private properties. A functional Security system at home is very vital to all Nigerians, as to ensure that users or persons who do not possess certain level of authorization are barricaded from entering the house. This paper is proposed to use the concept of internet of things integrated in an electronic board called Ardiuno Board, which has the capability to house different electronic components and also with a WiFi interface which makes it accessible to the internet, also the WiFi interface came with an App which establishes communication between the device and a mobile phone, where the house owner having the mobile App installed on his phone could receive an email on real time. Also, an sms module will be integrated in the system which will take care of the situation where the house owner many not have access to the internet. A motion detector which detects abnormal movement sends message to the alarm module which triggers an alarm and at the same time sends an email on real time and sms. The current security system has the capacity to alert the neighborhood on current threat to the house. This Home security system will build some level of confidence in house owners as Nigeria is faced with security challenges.

Keywords – *Arduino Uno, Mobile App, Smart Security Automation System.*

I. INTRODUCTION

Home security framework fundamentally is the technique for checking homes inside and outside space that is containing resources and information's, paying little mind to the size of the home, which is for the most part entryways and windows to shield homes from gatecrashers and unapproved people from going into or getting to the house. Home security framework in fact could additionally be depicted as the

assortment of programming and equipment gadget to shield our home from gatecrashers. Security frameworks are cutting edge way to deal with shield our homes from unapproved get to. It is a significant device in shielding our properties and homes from the peril of losing important things, for example, home apparatuses, individual working reports, vehicles, and generator machine and so on. Security framework alarms the proprietor about interlopers in our homes. Home wellbeing starts with the property holders finding a way to ensure their

home, its substance, and its occupant. The main way property holders secure their homes in this cutting edge time to uproot human security framework is introducing a keen security framework which is completely mechanized, trial commonly, sent in security required territory, for example, banks, enterprises, schools and have demonstrated proficiency as far as activity. Security frameworks can be wired or remote.

Home security frameworks takes a shot at an essentially idea of protecting home with sensors that speak with a control board or a war room introduced in an advantageous area some place in the home. Before now the issues of vandalizing properties and frailty are getting out of hands that even the police and protection from can't control it any longer, for the most part in some distant regions. The executives of security frameworks in Nigeria has for some time neglected territory which has as of late been consolidated in the e-administration program of Government of Nigeria. Home security framework is significant because of its various advantages in promising territory, these procedures is to control security utilizing Arduino board, with installed sensors and advanced mobile phone to decrease the human association and less of CCTV cameras to limit instability in home, with the assistance of web of things one can screen his/her home with a PDA. This examination will give different advantages, for example, more noteworthy wellbeing, solace, and security. This exploration application is significant and it will execute in future for supporting and helping unique needs of the old and individuals with disabilities for observing and control of homes security framework without anyone else, by utilizing Arduino board, movement finders which will be associated with the web, utilizing web of things to screen once property. These framework is easy to use, with the emotional increment in advanced mobile phone, PDAs have bit by bit turned into generally useful convenient gadgets. With the web of things homes can be checked from wherever once there is a network area.

II. CONCEPT OF INTERNET OF THINGS

Kevin Ashton, prime supporter of the Auto-ID Center at the Massachusetts Institute of Technology (MIT), first referenced the web of things in an introduction he made to Procter and Gamble (P&G) in 1999. Needing to bring radio recurrence ID (RFID) to the consideration of P&G's senior administration, Ashton called his introduction "Web of Things" to join the cool new pattern of 1999: the web. MIT teacher Neil Gershenfeld's book, *When Things Start to Think*, likewise showed up in 1999. It didn't utilize the specific term however gave an away from of where IoT was going.

The web of things, or IoT, is an arrangement of interrelated figuring gadgets, mechanical and advanced machines, items, creatures or individuals that are furnished with novel identifiers (UIDs) and the capacity to move information over a system without expecting human-to-human or human-to-PC connection. An IoT biological system comprises of web-empowered savvy gadgets that utilization implanted frameworks, for example, processors, sensors and correspondence equipment, to gather, send and follow up on information they gain from their surroundings. IoT gadgets share the sensor information they gather by interfacing with an IoT door or other edge gadget where information is either sent to the cloud to be examined or investigated locally. At times, these gadgets speak with other related gadgets and follow up on the data they get from each other. The gadgets do the majority of the work without human mediation, in spite of the fact that individuals can cooperate with the gadgets - for example, to set them up, give them directions or access the information. The availability, systems administration and correspondence conventions utilized with these web-empowered gadgets to a great extent rely upon the particular IoT applications sent. IoT can likewise utilize man-made consciousness (AI) and AI to help in making information gathering forms simpler and progressively unique.

The web of things offers a few advantages to associations. A few advantages are industry-explicit, and some are relevant over various ventures. A portion of the basic advantages of IoT empower organizations to:

1. monitor their overall business processes;
2. improve the customer experience;
3. save time and money;
4. enhance employee productivity;
5. integrate and adapt business models;
6. make better business decisions; and generate more revenue

2.1 Review of Related Literature

Right now, review a portion of the past methodologies utilized by analysts for home security system. Underneath, we give a concise audit of research considers that have been directed home security automated system.

According to [1], discussed on Design and Implementation of Security for Smart Home dependent on GSM innovation that gives two strategies to actualize home security utilizing IoT. One is utilizing web cameras with the

end goal that at whatever point there is any movement distinguished by the camera, it sounds a caution and sends a mail to the proprietor. This strategy for distinguishing interruption is very acceptable, though to some degree costly because of the expense of the cameras engaged with the procedure. The cameras should be of acceptable quality which implies it ought to have a wide range and the image quality ought to be sufficiently high to recognize development. Additionally in the event that you go for portable cameras, for example, arch cameras they will cost much more than the fixed ones.

In [2], propose SMS based framework utilizing GSM that utilizes internet providers to send messages or alarm to the house proprietor rather than the traditional SMS.

According to [3], executed a unique mark based confirmation framework to open an entryway. This framework helps clients by just permitting the clients whose unique mark are approved by the proprietor of the house. This framework can likewise be utilized to screen who all have utilized the sensor to pick up section into the house. The framework is combined with a couple of progressively home assurance highlights, for example, gas spillage fire mishaps. Albeit a decent framework, unique finger impression sensors are costly and mind boggling (as they need expanded sensor goal) to incorporate into an IoT arrangement.

According to [4], proposed a home mechanization framework utilizing man-made consciousness and furthermore proposed a model for digital security frameworks.

In [5], sufficiently organized the Mav Home experience at the University of Texas, Arlington. The undertaking utilized sensors to perceive the condition of the earth, and with the assistance of controllers, made the noteworthy move to deal with concordance. These sensors layout a spur of the moment structure to choose the choices.

According to [6], proposed Smart Meter Led Probe for Real-Time Appliance Load Monitoring' investigated an idea known as Non-Intrusive Appliance Load Monitoring (NIALM) to get machine explicit time and force draw qualities of gadgets by disaggregating the data gathered at the principle break level. They were of the assessment that Home Automation systems may turn into the essential apparatuses for keen vitality the executives sooner rather than later.

According to [7], proposed a Home-based System mechanizations that extend from basic frameworks, (for example, light and fan control) to additional as unpredictable frameworks, (for example, substantial electrical apparatuses)

around the house, to progressively snared frameworks, for example, security and apply autonomy for home consideration or home condition.

III. MATERIALS AND METHODS

The Home Security framework are basic nowadays, installing various frameworks detectors to make sure about homes are difficult to keep up and costly. Arduino utilizing the use of web of things in home security framework, is intended to assist people with securing their homes from burglary across the board. Arduino Uno board in Home Security System utilizes movement Sensors and IR sensors. Information from these sensors is then sent to the Arduino, which has an inbuilt sign converter, Arduino then sends information over to the Wi-Fi module – ESP8266. ESP8266 is a chip utilized for interfacing smaller scale controllers to the Wi-Fi system and make TCP/IP associations and send information. Information, which is detected by these sensors, is then sent to the IOT. To expand on the burglary location, which have associated secret word module by which a client just can enter the secret key. The entryway would open just if the secret key entered is right. The IR sensor should be introduced on the entryway, which is, as a matter of course initiated. In the event that an individual enters the right secret word, the IR sensor is de-enacted for 10 seconds and the ringer won't turn ON. On the off chance that someone attempts to go into the house without entering the secret phrase, for example by harming the lock or somewhere in the vicinity, when the individual passes the IR sensor, the ringer would be turned ON. The ringer would be turned ON regardless of whether an off-base secret phrase is entered for continuously multiple times. To exhibit the entryway, with the utilization of a DC engine. The bell will turn ON in any event, when it identifies incense sticks just as a handle fire.

3.1 Components Required

Various hardware materials are required to have a home automation system. Some of the essential components, are listed below to have an idea about the proposed system.

1. PIR sensor
2. Microcontroller-Arduino
3. LCD Display
4. ESP8266
5. Buzzer
6. Keypad

3.2 Analysis of the Proposed System

In this paper, the proposed Home Security System, because of its integration capacity and flexibility into modern

home security system will provide enough security from burglars using alarm system, immediate notification to the homeowners through sms or email. The main purpose of this system is to implement a simple and affordable, but efficient and reliable home security system, Confidentiality and Authorization. The system will be applicable in some areas: In hospital for patient surveillance, city buses or in Wi-Fi enabled trains to reduce crime, in any big housing apartments, in organizations or in institutions, in the companies where surveillance is needed.

3.3 Structure of the proposed framework

The proposed system provides remote control of home security system using Arduino board an application of

Internet of Things. The principle Objectives are as per the following:

1. To establish connection between Arduino-Uno boards with the internet.
2. To design and to implement Arduino-Uno interfaced with sensors and actuators.
3. To acquire data parameters including motion detector for security.

Below is the structure of the proposed system.

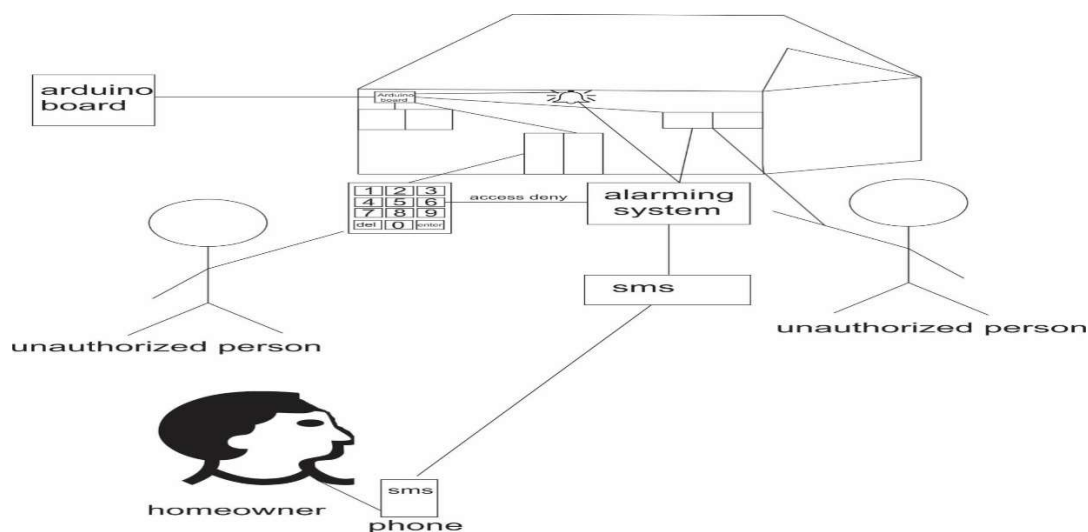


Figure 2. Structure of the proposed system.

IV. ARDUINO UNO

Arduino uno is an open source, PC paraphernalia and programming association, attempt, and customer bunch that plans and produce microcontroller packs for developing modified gadgets and smart article that can distinguish and control inquiries in reality. The initiation of the Arduino broadens started at the Interaction Design Institute in Ivrea, Italy. The gear reference plans are appropriated under a

Creative Commons Attribution Share. The ESP8266 is a simplicity Wi-Fi chip with full TCP/IP stack and MCU (Micro Controller Unit) limit made by Chinese. These are the essential game plan of modules made with the ESP8266 by the untouchable maker AI-Thinker and remain the most by and large accessible. They are enormous implied as "ESP-xx modules". To shape a functional progression structure, they require additional parts, especially a sequential TTL-to-USB connector and an outside 3.3-volt control flexibly.

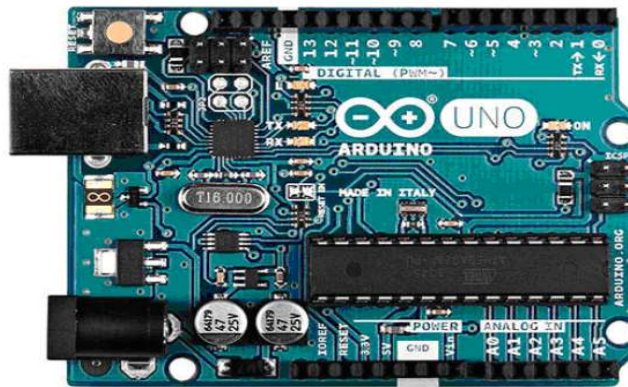


Figure 3. Arduino Uno.

4.1 Jump Wires

A breadboard is utilized to build and test circuits expeditiously afore finalizing any circuit design. The breadboard has many apertures into which route components like ICs and resistors can be connected. The apertures are generally spaced 0.1" apart to put up standard DIP machinery. A typical breadboard that includes top and bottom power distribution rails, Jump wires are generally used to establish connectivity with

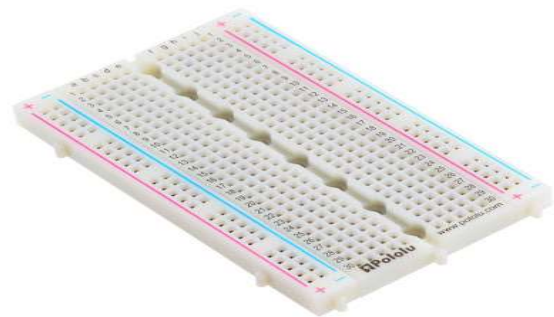


Figure 5. Breadboard.



Figure 4. Jump Wires

4.2 Bread Board and Jump Wires

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4.3 Reed Sensor Module

It comprises of a fixed glass envelope where there are two ferrous flexible reeds and is loaded with idle gas called rhodium. At the point when an attractive substance way to deal with the glass envelope, the reeds will meet up because of the attractive field subsequently finishing an electric circuit. At the point when the outer attractive field vanishes, two reeds will be isolated in view of their versatility, the circuit is likewise disconnected. It has been connected in printers, clothes washers, fridges, cameras, door magnets, window magnets, electromagnetic transfers, electronic measuring gadgets, level meters, gas meters, water meters, and so forth.

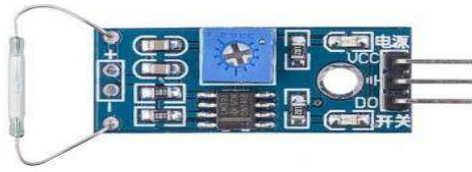


Figure 6. Reed Sensor Module.

4.4 ESP8266

The ESP8266 is an ease Wi-Fi chip with full TCP/IP stack and MCU (Micro Controller Unit) capacity created by Chinese. These are the primary arrangement of modules made with the ESP8266 by the outsider producer AI-Thinker and remain the most generally available. They are large alluded to as "ESP-xx modules". To shape a workable advancement framework, they require extra parts, particularly a serial TTL-to-USB connector and an outside 3.3-volt control supply.

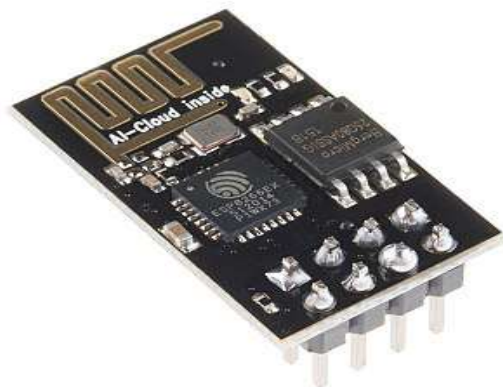


Figure 7. ESP8266 (Wi-Fi Serial Transceiver).

4.5 Configuring BLYNK App

After the client introduces the Blynk application on the cell phone, a record must be made in the application to get to its administrations. The first run through the application is opened, it will ask to either sign in or create a record. Make a record and add another undertaking to begin. Each venture has its own confirmation code which is utilized by the code to speak with that specific model. To interface with our parts, we have to add gadgets to our model. The application gives a flawless interface to include all the necessary gadgets and

setting them up as indicated by the code. The Blynk should be running out of sight for the client to get constant warnings.

V. RESULTS AND DISCUSSIONS

The framework for movement identifier was executed by coordinating the implanted sensor system and the versatile application will be introduced in the proprietor's telephone for sms interruption notice. The framework sensor security is plan for get to control of opening and shutting entryway distantly through remote correspondence module (Bluetooth) utilizing a secret key validation/approval methods. On the off chance that a substantial secret word is enter through the keypad actualized at the passage, this will control the entryway opening (get to concede) and send message to the home client for the security warning. Likewise, if an invalid secret key entered, it will denied client access to the passageway of the structure (denied get to) and send messages for interruption to the client as sms to his\her telephone.

This paper is proposed to utilize the idea of web of things coordinated in an electronic load up called Arduino Board, which has the capacity to house diverse electronic parts and furthermore with a WiFi interface which makes it available to the web, additionally the WiFi interface accompanied an App which builds up correspondence between the gadget and a cell phone, where the house proprietor having the portable App introduced on his telephone could get an email on constant. Likewise, a sms module will be coordinated in the framework which will deal with the circumstance where the house proprietor numerous not approach the web. A movement indicator which recognizes anomalous development sends message to the alert module which triggers a caution and simultaneously sends an email on constant and sms. The current security framework has the ability to make the area on current danger aware of the house. This Home security framework will manufacture some degree of trust in house proprietors as Nigeria is confronted with security challenges.

VI. CONCLUSION

The security system described in this paper is capable of detecting intruders and give notification based on real-time to homeowners. The system informs the authorized owner of an unauthorized intrusion via SMS no matter where the person is, except if the person is in the region where there is no network coverage at the time of the intrusion. This system is beneficial for people who wants to safe guard their properties and restrict access. This system is efficient, reliable and user friendly, that even old, young and disables can make use of the system without any help of humans, using Internet of

Things (IoT) applications is greatly affect human life. The IoT applications will go from a brilliant home security system to keen human services. IoT Applications is very important to be a concern. The general Security requirements for home in a smart home environment, are services provided over the wireless network. In this study, the security requirements for safe home security system service, including integrity, availability, and authentication. The purpose of the Internet of Things is to allow things to be connected anytime, anywhere, with anything and anyone ideally uses paths or networks and services. The Internet of Thing is a new revolution of the Internet.

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