

SMART SECURITY AND HOME AUTOMATION SYSTEM USING IOT

Submitted in partial fulfilment of the requirements for the award of Bachelor of Engineering degree in Electronics and Communication Engineering

By

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ENGINEERING
SCHOOL OF ELECTRICAL AND ELECTRONICS ENGINEERING**

SATHYABAMA

**INSTITUTE OF SCIENCE AND TECHNOLOGY
(DEEMED TO BE UNIVERSITY)**

Accredited with Grade "A" by NAAC

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

BONAFIDE CERTIFICATE

This is to certify that this Project Report is the bonafide work of **JILLELAMUDI MANOJ KUMAR (3613370)** and **KAIPA SAI ESWARA REDDY (37130176)** who have done the Project work as a team who carried out the project entitled "**SMART SECURITUY AND HOME AUTOMATION SYSTEM USING IOT**" under my supervision from September 2020 to April 2021.

Internal Guide

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Submitted for Vivavoce Examination held on_____

Internal Examiner

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DECLARATION

We, **JILLELAMUDI MANOJ KUMAR (37130170)** and **KAIPA SAI ESWARA REDDY (37130176)** hereby declare that the Project Report entitled “**SMART SECURITY AND HOME AUTOMATION SYSTEM USING IOT**” done by us under the guidance of Dr.G.MARY VALANTINA at Sathyabama Institute of Science and Technology is submitted in partial fulfillment of the requirements for the award of Bachelor of Engineering degree in Electronics and Communication Engineering.

DATE :

PLACE:

1.

2.

SIGNATURE OF THE CANDIDATES

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We wish to express our thanks to all Teaching and Non-teaching staff members of the Department of **Electronics and Communication Engineering** who were helpful in many ways for the completion of the project.

ABSTRACT

This project proposes the study of Internet of Things (IOT) based home automation system. Internet of things(IOT) based home automation system can be controlled over mobile devices. This system can perform varied functions to be performed at home. This allows accessibility over internet from any corner in the world. The main focus of this project is to minimize the usage of electricity and reduce human efforts. The Home Automation system (HAS) incorporates various aspects of technologies such as wireless networking, communication over cloud. The data to be analyzed is stored onto the cloud. The user can access multiple appliances over the internet as per their convenience. This is a low cost system. This system can control multiple devices.

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LIST OF ABBREVIATIONS

ABBREVIATION	EXPANSION
IOT	INTERNET OF THINGS
SH	SMART HOME
WWW	WORLD WIDE WEB
WS	WIRLESS SERVORS
APP	APPLICATIONS

CHAPTER 1

INTRODUCTION

1.1 IOT(INTERNET OF THINGS)

What is the Internet of Things?

In a nutshell, the Internet of Things is the concept of connecting any device (so long as it has an on/off switch) to the Internet and to other connected devices. The IOT is a giant network of connected things and people – all of which collect and share data about the way they are used and about the environment around them.

How does it work?

Devices and objects with built in sensors are connected to an Internet of Things platform, which integrates data from the different devices and applies analytics to share the most valuable information with applications built to address specific needs.

These powerful IOT platforms can pinpoint exactly what information is useful and what can safely be ignored. This information can be used to detect patterns, make recommendations, and detect possible problems before they occur.

For example, if I own a car manufacturing business, I might want to know which optional components (leather seats or alloy wheels, for example) are the most popular. Using Internet of Things technology, I can:

- Use sensors to detect which areas in a showroom are the most popular, and where customers linger longest;
- Drill down into the available sales data to identify which components are selling fastest;
- Automatically align sales data with supply, so that popular items don't go out of stock.

The information picked up by connected devices enables me to make smart decisions about which components to stock up on, based on real-time information, which helps me save time and money.

With the insight provided by advanced analytics comes the power to make processes more efficient. Smart objects and systems mean you can automate

certain tasks, particularly when these are repetitive, mundane, time-consuming or even dangerous.

1.2 OVERVIEW OF THE PROJECT

The project aims at detecting temperature using NodeMCU ESP8266 module. The devices can be read using mobile through Wi-Fi. The hunger for automation brought many revolutions in the existing technologies. These had greater importance than any other technologies due to its user-friendly nature. Wi-Fi: -is wireless technology that uses radio frequency to transmit data through the air. Wi-Fi transmit data in the frequency Band of 2.4 GHz. The range of Wi-Fi technology is 40-300 feet. Controlling devices for the automation of the project is NodeMCU. The data sent from mobile over Wi-Fi will receive by Wi-Fi module connected to NodeMCU. NodeMCU reads the data and decides to send the information to user.

1.3 OBJECTIVE OF THE PROJECT

An IoT based home automation system, using a microcontroller and android application. The micro-controller used is ATmega328. They have used GSM module which helps the system to be used remotely

1.3.1 a home control and monitoring system using an embedded micro-web server, with IP connectivity for accessing and controlling appliances remotely using Android based Smart phone app. To demonstrate the feasibility and effectiveness of this system, devices such as light switches, power plug, temperature sensor and current sensor have been integrated with the proposed home control system

1.3.2. a design and prototype implementation of a new home automation system that uses Wi-Fi technology as a network infrastructure connecting its parts. Their system consists of two main components; the first part is the server (web server), which presents system core that manages, controls, and monitors users' home. Users and the system administrator can locally (LAN) or remotely (internets) manage and control system code. The second part is hardware interface module, which provides an appropriate interface to sensors and actuator of home automation system

1.3.3. design and implementation of a low cost, flexible and wireless solution to the home automation.

1.3.4. a system with the ZigBee network and showed how to eliminate the complication of wiring in case of wired system.

1.3.5 OBJECTIVE

This project aims to develop a home automation system that gives the user complete control over all remotely controllable devices of his/her home using IOT. . A SH is a neighborhood with an automated device that contains sensors, actuators, and controllers to improve comfort, robotization, prosperity, and security of a progressively conspicuous lifestyle tremendous of occupants. In the bleeding edge world, sharp devices, telephones, clever TVs, remote contraptions, sensible coolers, and sensible sensors, have come to be locked in with each and each factor in people's standard everyday presence. An automation machine wishes to be made control the conversation between canny devices interior SHs. Various computerization structures have been made, and some of them are used as present day things in the market. A bit of these stocks are custom fitted to control home apparatus, both locally or remotely. Distinctive robotization developments, for instance, a way off the control for TVs, fans, constrained air frameworks, and track players, have been used to outfit home furnished with the important structures for basic checking and easy to control all the machines around us. With the expansive introduction of electrical imperativeness into the family and different properties and snappy improvement of real factors development, the mechanical capacity which used to be incorporated with another time of controlling family devices has started through the use of the use of mobile phones with short-broaden verbal exchange interfaces, as Bluetooth and ZigBee, and with the guide of the use of Wi-Fi frameworks and GSM modules. All of these structures and utilized sciences that executed up on the system are incredibly important for indoor supervise of home computerization contraption equipment and give a high extent of interface and doesn't engage tenants to show and control their living courses of action taking everything into account. Yet such structures license correspondence with inhibitors to yield convenience and giving full-comfort, prosperity, and force effectivity at all the events, and they have various points of confinement in execution and verbal trade run. Most of these structures do never again utilize the ground-breaking highlights of the rising craftsmanship advancement, which goals to join billions of sharp contraptions

(phones, workstations, sensors, and actuators) to the Internet. Two At present, larger piece of homes have a bit of the "intelligence" due to reality different contraptions have worked in sensors or electronic machine controllers. For instance, lights, indoor controllers, TVs, door locks, cameras, and coolers can be checked and controlled with the guide of an in all cases SH motorization system. Such a structure will end up an IoT-based computerization PC when it is given the web and getting result for the right data that towards section to the Internet. Likewise, nearby computerization structures broaden private security. For example, a couple of systems can educate property holders when any development is recognized at private even as they are mysteriously gone, and a part of the home apparatus can record to warmer stations if there ought to emerge an event of fire. It might be utilized and made to improve the present home computerization structures by techniques for strategy for showing a noteworthy administer over the Internet.

CHAPTER 2

LITERATURE REVIEW

According to our review, there stay numerous frameworks that can control home apparatuses utilizing android applications. Each framework has its extraordinary attributes. Work on building a home robotization framework is a ceaseless procedure. Here a portion of the models that have been talked about quickly about the framework beneath.

In the paper "IOT based observing a control framework for home computerization", she informed about the execution of IOT in checking home machines utilizing World Wide Web (WWW). According to our model the issue can be amended utilizing cloud application and each can be controlled naturally.

Vamsi Krishna Patchava, P. Ravi Babu proposed the framework for Home mechanization framework utilizing with Raspberry Pi by utilizing this framework it is significant expense and progressively reasonable. To turn out from this our framework is proposed with NodeMCU a minimal effort and quick handling framework.

Kumar Mandula in his paper applied home mechanization in two methodologies the utilization of Bluetooth and the utilization of Ethernet. Arduino is utilized for programming and controlling a lot of gadgets. Bluetooth is for speedy fluctuate correspondence. In this way, in brilliant home executed the utilization of Bluetooth, one can work the gadgets from household just inside the region of 10-20m. This confinement has been defeated in the following chart utilizing commonplace type of Ethernet. This paper talked about exclusively the control of various electronic units in local the utilization of cell application anyway it did exclude any wellbeing highlights.

Mitul Sheth in his venture talked about a lot potential units that can be connected to Internet the utilization of Android App and excellent methods of utilizing them; manual and computerized mode. The Smart Santander Project sent cycle 20 thousand sensors for estimating different parameters like temperature, dampness content, to identify phases of CO and NO2 gases for observing condition in nurseries and parks.

The model for overview of empowering advances, conventions by Andrea Zanella. They clarified and rehearsed in Padova Smart city venture and neglected to set up the association for additional usage to create and send an IOT in the city.

CHAPTER 3

SYSTEM ANALYSIS

3.1 EXISTING SYSTEM

The system has two parts, namely hardware and software. The hardware system consists of NodeMCU board, Relay driver, and home appliances. The software consists of the Application. Application language is used to configure the NodeMCU board. In this system, the components used are NodeMCU board, the relay driver. These hardware components are used in order to control the home appliances. NodeMCU board will help to develop an interface between the hardware and the software application. The NodeMCU Wi-Fi will help in transmitting and receiving the input given by the user.

Part1- The main path of the appliance is controlling basic power using webpage which is made by us. The main part of NodeMCU is that it acts as an interface between hardware component and software (Application).

Part 2- Project will be compiled. Compilation of all the modules will be done. The whole system will be executed and will be able to run perfectly.

3.2 PROPOSED SYSTEM

NODEMCU

NodeMCU is an open source IoT platform. The term "NodeMCU" by default refers to the firmware rather than the dev kits. It includes firmware which runs on the ESP8266 Wi-Fi SoC and hardware which is based on the ESP-12 module. The firmware uses the Lua, C, C++ scripting language. It is built on the Espressif Non-OS SDK for ESP8266.

Node MCU

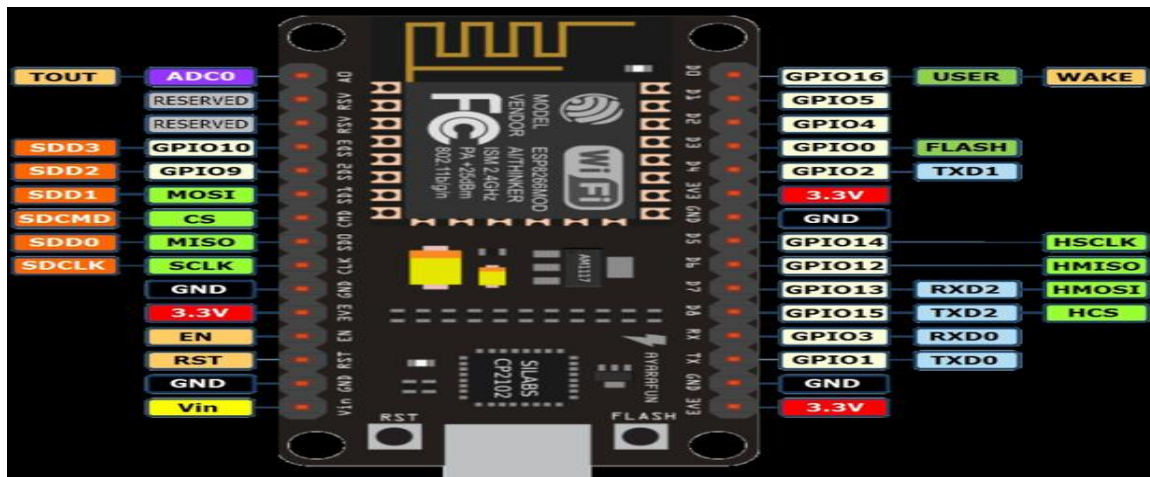
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Pins of NodeMCU

NodeMCU provides access to the GPIO (General Purpose Input/Output) and for developing purposes below pin mapping table should be referenced.

IO index	ESP8266 pin	IO index	ESP8266 pin
0 [*]	GPIO16	7	GPIO13
1	GPIO5	8	GPIO15
2	GPIO4	9	GPIO3
3	GPIO0	10	GPIO1
4	GPIO2	11	GPIO9
5	GPIO14	12	GPIO10
6	GPIO12		



CHAPTER 4

PROJECT DESCRIPTION

4.1 ARCHITECTURE DIAGRAM:

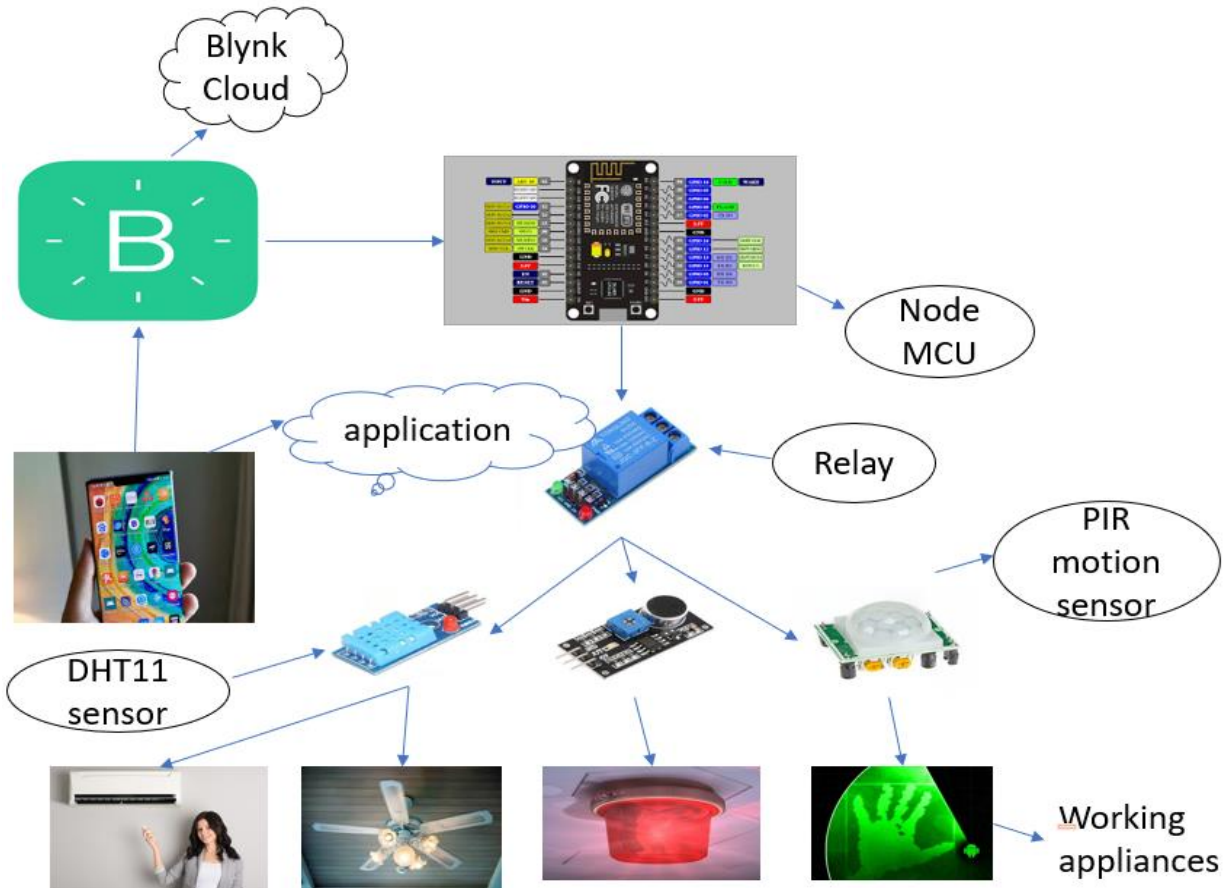


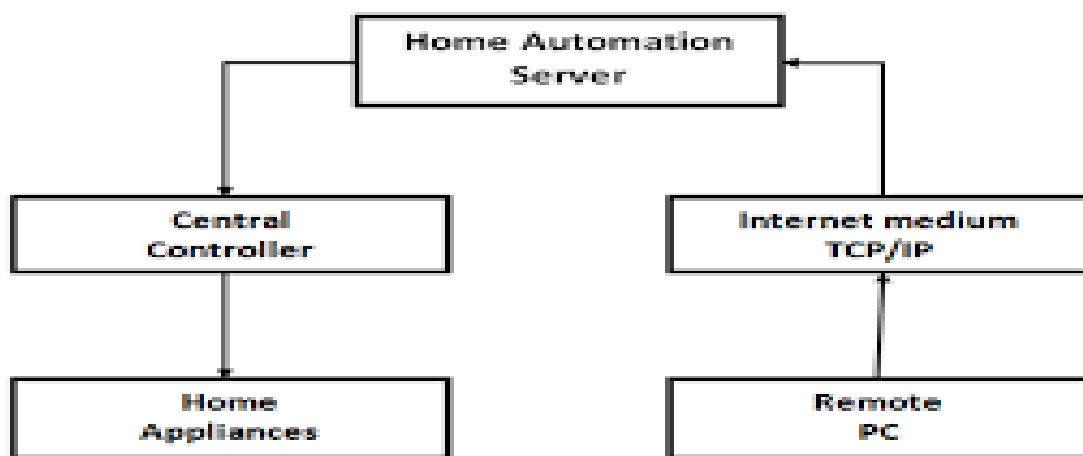
Fig 4.1 SYSTEM ARCHITECTURE

During the past few years modular sensor node architecture shown to be popular due to increasing demand on more energy efficient micro processors, accurate and sensitive sensor developments, improved wireless radios and improvement of wireless software architecture for efficient data management. Modularity design imposes greater flexibility for the end product. Same node can be utilized for specific application equipped with required sensor modules. This is highly desirable when each sensor node collecting microclimate, atmospheric and plant data within different vineyards requires different sets of sensors .The wireless microcontroller module controls the whole data communication aspect, while sensor data coordinating microcontroller module, collects and calibrates the data. It is possible to introduce various types of sensor modules

required by application.

Wireless Sensors (WS) measured based on the physical parameters of different types of disasters occur .we detect a disaster region by nature of waves generated and prevents the disaster that is going to happen .If disaster occur minimum losses. The rescue teams properly to save victim in disaster affected area and health services provided at limited time span. We use different sensor type for different sensor groups in environment monitoring their design and implementation require.

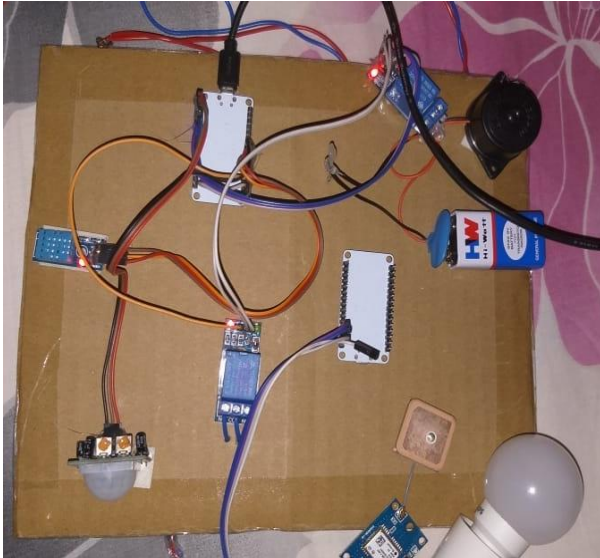
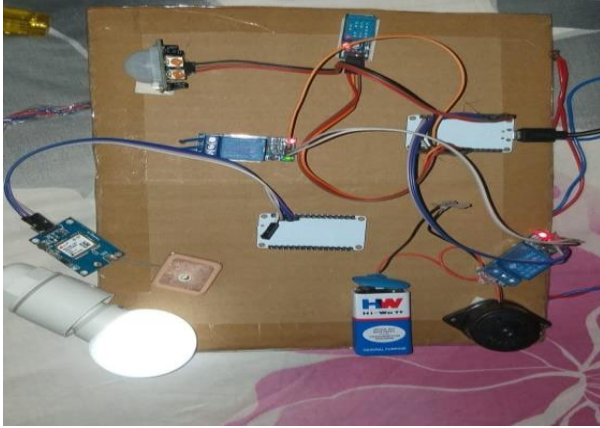
4.2 DATA FLOW DIAGRAM



Project Block Diagram

The data sent from the sensors are aggregated in the local base stations to provide inputs to the data processing centers.

4.3 CIRCUIT



CHAPTER 5

SYSTEM SPECIFICATIONS

LANGUAGE SPECIFICATION

This chapter describes the requirement analysis in accordance with the input and the resources and it also describes the implementation of the project with the technology used.

REQUIREMENT ANALYSIS

Requirement analysis determines the requirements of a new system. This project analyses on product and resource requirement, which is required for this successful system. The product requirement includes input and output requirements it gives the wants in term of input to produce the required output. The resource requirements give in brief about the software and hardware that are needed to achieve the required functionality.

5.1 SOFTWARE ENVIRONMENT

The software requirements are the specification of the system. It should include both a definition and a specification of requirements. It is a set of what the system should do rather than how it should do it. The software requirements provide a basis for creating the software requirements specification. It is useful in estimating cost, planning team activities, performing tasks and tracking the teams and tracking the team's progress throughout the development activity.

- Operating system : Windows
- Languages : Java
- Software : Arduino IDE
- Application : Blynk

5.1.1 ARDUINO IDE

IDE stands for “Integrated Development Environment”: it is an official software introduced by Arduino.cc, that is mainly used for editing, compiling and uploading the code in the Arduino Device. Almost all Arduino modules are compatible with this software that is an open source and is readily available to install and start compiling the code on the go. In this article, we will introduce the Software, how we can install it, and make it ready for developing applications using Arduino modules. we introduce some simulators for this interesting microcontroller development tools. It is easy to use and learn.

Arduino IDE Definition

1. Arduino IDE is an open source software that is mainly used for writing and compiling the code into the Arduino Module.
2. It is an official Arduino software, making code compilation too easy that even a common person with no prior technical knowledge can get their feet wet with the learning process.
3. It is easily available for operating systems like MAC, Windows, Linux and runs on the Java Platform that comes with inbuilt functions and commands that play a vital role for debugging, editing and compiling the code in the environment.
4. A range of Arduino modules available including Arduino Uno, Arduino Mega, Arduino Leonardo, Arduino Micro and many more.
5. Each of them contains a microcontroller on the board that is actually programmed and accepts the information in the form of code.
6. The IDE environment mainly contains two basic parts: Editor and Compiler where former is used for writing the required code and later is used for compiling and uploading the code into the given Arduino Module.
7. This environment supports both C and C++ languages.

How to get Arduino IDE

we can download the Software from Arduino main website. As I said earlier, the software is available for common operating systems like Linux, Windows, and MacOS, we select to download the correct software version that is easily compatible with our operating system.

Details on IDE: The IDE environment is mainly distributed into three sections.

1. Menu Bar
2. Text Editor
3. Output Pane.

5.1.2 BLYNK APPLICATION

Blynk is a platform with iOS and Android apps to control Arduino, Raspberry Pi and the likes over the Internet. It's a digital dashboard where you can build a graphic interface for your project by simply dragging and dropping widgets. It's really simple to set everything up and you'll start tinkering in less than 5 mins. Blynk is not tied to some specific board or shield. Instead, it's supporting hardware of your choice. Whether your Arduino or Raspberry Pi is linked to the Internet over Wi-Fi, Ethernet or this new ESP8266 chip, Blynk will get you online and ready for the Internet Of Your Things

Blynk was designed for the Internet of Things. It can control hardware remotely, it can display sensor data, it can store data, visualize it and do many other cool things. There are three major components in the platform:

Blynk App: – It allows you to create amazing interfaces for your projects using various widgets which are provided.

Blynk Server: – It is responsible for all the communications between the smartphone and hardware. You can use the Blynk Cloud or run your private Blynk server locally. It's open-source, could easily handle thousands of devices and can even be launched on a Raspberry Pi.

Blynk Libraries: – It enables communication, for all the popular hardware platforms, with the server and process all the incoming and outgoing commands.

Now imagine, every time you press a Button in the Blynk app, the message travels to the Blynk Cloud, where it magically finds its way to your hardware. It works the same in the opposite direction and everything happens in a blink of an eye.

Characteristics of Blynk are:

- Similar API & UI for all supported hardware & devices
- Connection to the cloud can be done using Ethernet, Wi-Fi, Bluetooth, BLE and USB (Serial)
- Set of easy-to-use Widgets
- Direct pin manipulation with no code writing.

5.2 HARDWARE ENVIRONMENT

The hardware requirements may serve as the basis for a contract for the implementation of the system and should therefore be a complete and consistent specification of the whole system. They are used by software engineers as the starting point for the system design. It shows what the systems do and not how it should be implemented.

- Hard disk : 120 GB
- Monitor : 15' color with VGL card support
- Ram : Minimum 256 MB
- Processor : Pentium iv and above (or) equivalent
- Processor speed : Minimum 500 MHZ

5.2.1 MODULES

- A modular design reduces complexity, facilitates change (a critical aspect of software maintainability), and results in easier implementation by encouraging parallel development of different part of system. Software with effective modularity is easier to develop because function may be compartmentalized and interfaces are simplified. Software architecture embodies modularity that is software is divided into separately named and addressable components called modules that are integrated to satisfy problem requirements.
- Modularity is the single attribute of software that allows a program to be intellectually manageable. The five important criteria that enable us to evaluate a design method with respect to its ability to define an effective modular design are: Modular decomposability, Modular Comps ability, Modular Understandability, Modular continuity, Modular Protection.
- The following are the modules of the project, which is planned in aid to complete the project with respect to the proposed system, while overcoming existing system and also providing the support for the future enhancement.

TYPES OF MODULES

1. SERVER
2. HARDWARE SETUP
3. NODEMCU
4. RELAY
5. BUZZER
6. DHT11

5.3 MODULES DESCRIPTION

5.3.1 SERVER

Server will establish the communication between the device and system. Through the hardware cable communication is executed between hardware kit and system. For every action server will response based the hardware performance.

5.3.2 HARDWARE SETUP

The ZigBee Alliance is an association of companies working together to define an open global standard for making low-power wireless networks. The intended outcome of ZigBee Alliance is to create a specification defining how to build different network topologies with data security features and interoperable application profiles. We use two process of Wireless communication in this project. First part is proceeds using Zigbee between the system is connected. Zigbee supports Mesh & Star Topology.

5.3.3 NodeMCU

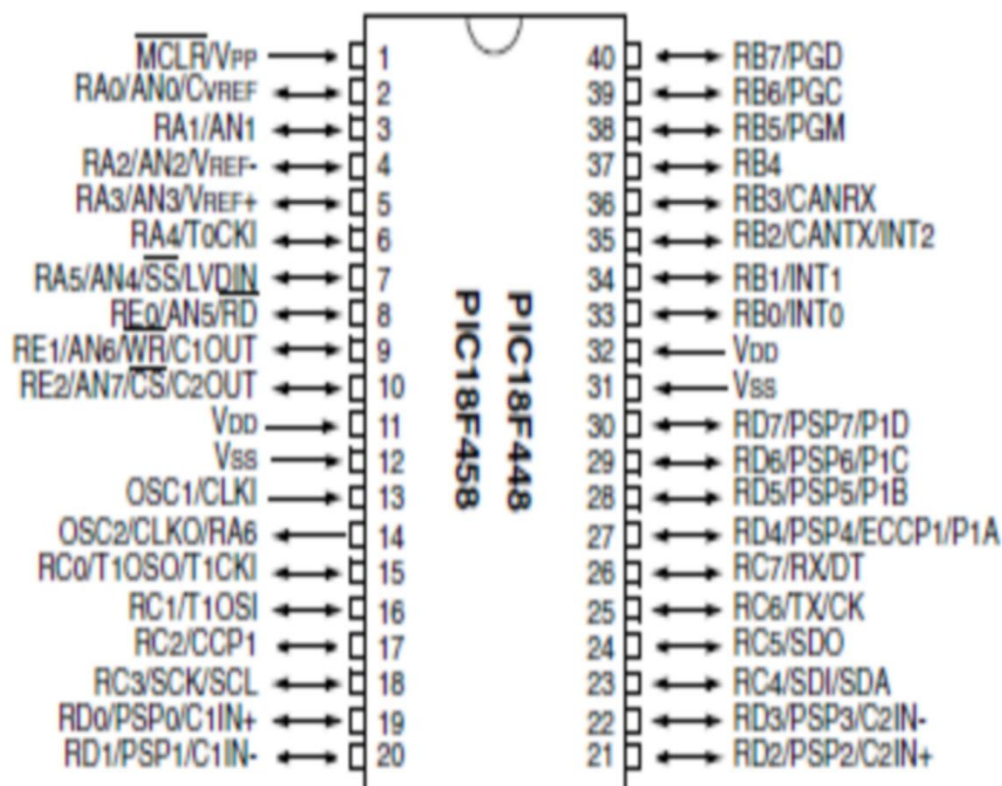
The ESP8266 is the name of a micro controller designed by Espressif Systems. The ESP8266 itself is a self-contained WiFi networking solution offering as a bridge from existing micro controller to WiFi and is also capable of running self-contained applications. This module comes with a built in USB connector and a rich assortment of pin-outs. With a micro USB cable, you can connect NodeMCU devkit to your laptop and flash it without any trouble, just like Arduino. It is also immediately breadboard friendly.

Specification:

- Voltage:3.3V.
- Wi-Fi Direct (P2P), soft-AP.
- Current consumption: 10uA~170mA.
- Flash memory attachable: 16MB max (512K normal).
- Integrated TCP/IP protocol stack.
- Processor: Tensilica L106 32-bit.
- Processor speed: 80~160MHz.
- RAM: 32K + 80K.
- GPIOs: 17 (multiplexed with other functions).
- Analog to Digital: 1 input with 1024 step resolution.
- +19.5dBm output power in 802.11b mode
- 802.11 support: b/g/n.
- Maximum concurrent TCP connections: 5.

The most basic way to use the ESP8266 module is to use serial commands, as the chip is basically a WiFi/Serial transceiver. However, this is not convenient. What we recommend is using the very cool Arduino ESP8266 project, which is a modified version of the Arduino IDE that you need to install on your computer. This makes it very convenient to use the ESP8266 chip as we will be using the well-known Arduino IDE. Following the below step to install ESP8266 library to work in Arduino IDE environment.

Pin Definition:



5.3.4 RELAY



Fig. 5.3 Relay

The 1 Channel 5V Relay Module provides a single relay that can be controlled by any 5V digital output from your microcontroller. The relay is accessible using screw terminals and can handle up to 2A of current. A handy LED indicates the status of the relay. This module provides a standard 3 pin Signal/Voltage/Ground male header and a 4 pin "Grove" connector.

Usage

Connect the Signal (S) pin to a digital output line on your microcontroller, the Voltage (V) pin to a 5V operating voltage and the Ground (G) pin to a common ground. Then wire onto the relay using the screw terminals. The relay works like a common SPDT Single Pole Double Throw switch and has Normally Open (NO), Normally Closed (NC) and Common (COM) screw terminals. When the digital Signal (S) pin is HIGH, the relay will be switched on (closed), otherwise it will be switch off (opened).

5.3.5 NEO-6M GPS SENSOR

Technical data sheet describing the cost effective, high-performance u-blox 6 based NEO-6 series of GPS modules, that brings the highperformance of the u-blox 6 positioning engine to the miniature.

NEO form factor.

These receivers combine a high level of integration capability with flexible connectivity options in a small package. This makes them perfectly suited for mass-market end products with strict size and cost requirements.

The NEO-6 module series is a family of stand-alone GPS receivers featuring the high performance u-blox 6 positioning engine. These flexible and cost effective receivers offer numerous connectivity options in a miniature 16 x 12.2 x 2.4 mm package. Their compact architecture and power and memory options make NEO-6 modules ideal for battery operated mobile devices with very strict cost and space constraints.

The 50-channel u-blox 6 positioning engine boasts a Time-To-First-Fix (TTFF) of under 1 second. The dedicated acquisition engine, with 2 million correlators, is capable of massive parallel time/frequency space searches, enabling it to find satellites instantly. Innovative design and technology suppresses jamming sources and mitigates multipath effects, giving NEO-6 GPS receivers excellent navigation performance even in the most challenging environments.

NEO-6 GPS performance

1 All satellites at -130 dBm

2 Without aiding

3 Dependent on aiding data connection speed and latency

4 Demonstrated with a good active antenna

5 For an outage duration 10s

6 CEP, 50%, 24 hours static, -130dBm, SEP: <3.5m

7 NEO-6M only

8 Demonstrated under following conditions: 24 hours, stationary, first 600 seconds of data discarded. HDOP < 1.5 during measurement period, strong signals. Continuous availability of valid SBAS correction data during full test period.

9 Quantization error information can be used with NEO-6T to compensate the granularity related error of the time pulse signal

10 Assuming Airborne <4g platform.

NEO-6 modules provide configuration pins for boot-time configuration. These become effective immediately after start-up. Once the module has started, the configuration settings can be modified with UBX configuration messages. The modified settings remain effective until power-down or reset. If these settings have been stored in battery-backup RAM, then the modified configuration will be retained, as long as the backup battery supply is not interrupted. NEO-6 modules include both CFG_COM0 and CFG_COM1.

5.3.6 DHT11

DHT11 Temperature & Humidity Sensor features a temperature & humidity sensor complex with a calibrated digital signal output. By using the exclusive digital-signal-acquisition technique and temperature & humidity sensing technology, it ensures high reliability and excellent long-term stability. This sensor includes a resistive-type humidity measurement component and an NTC temperature measurement component, and connects to a high-

performance 8-bit microcontroller, offering excellent quality, fast response, anti-interference ability and cost-effectiveness.

Each DHT11 element is strictly calibrated in the laboratory that is extremely accurate on humidity calibration. The calibration coefficients are stored as programmes in the OTP memory, which are used by the sensor's internal signal detecting process. The single-wire serial interface makes system integration quick and easy. Its small size, low power consumption and up-to-20 meter signal transmission making it the best choice for various applications, including those most demanding ones. The component is 4-pin single row pin package. It is convenient to connect and special packages can be provided according to users' request.

Features

- Full range temperature compensated
- Relative humidity and temperature measurement
- Calibrated digital signal
- Outstanding long-term stability
- Extra components not needed
- Long transmission distance
- Low power consumption
- 4 pins packaged and fully interchangeable

This sensor includes a resistive-type humidity measurement component and an NTC temperature measurement component, and connects to a high-performance 8-bit microcontroller, offering excellent quality, fast response, anti-interference ability and cost-effectiveness. Each DHT11 element is strictly calibrated in the laboratory that is extremely accurate on humidity calibration. The calibration coefficients are stored as programmes in the OTP memory, which are used by the sensor's internal signal detecting process. The single-wire serial interface makes system integration quick and easy. Its small size, low power consumption and up-to-20 meter signal transmission making it the best choice for various applications, including those most demanding ones. The component is 4-pin single row pin package.

5.3.7 PIR MOTION SENSOR

PIR sensors allow you to sense motion, almost always used to detect whether a human has moved in or out of the sensors range. They are small, inexpensive, low-power, easy to use and don't wear out. For that reason they are commonly found in appliances and gadgets used in homes or businesses. They are often referred to as PIR, "Passive Infrared", "Pyroelectric", or "IR motion" sensors.

PIRs are basically made of a pyroelectric sensor (<https://adafru.it/aKh>) (which you can see below as the round metal can with a rectangular crystal in the center), which can detect levels of infrared radiation. Everything emits some low level radiation, and the

hotter something is, the more radiation is emitted. The sensor in a motion detector is actually split into two halves. The reason for that is that we are looking to detect motion (change) not average IR levels. The two halves are wired up so that they cancel each other out. If one half sees more or less IR radiation than the other, the output will swing high or low.

- Size: Rectangular
- Price: \$10.00 at the Adafruit shop (<https://adafru.it/aIH>)
- Output: Digital pulse high (3V) when triggered (motion detected) digital low when idle (no motion detected). Pulse
- lengths are determined by resistors and capacitors on the PCB and differ from sensor to sensor.
- Sensitivity range: up to 20 feet (6 meters) 110° x 70° detection range
- Power supply: 5V-12V input voltage for most modules (they have a 3.3V regulator), but 5V is ideal in case the regulator has different specs.

PIR sensors are more complicated than many of the other sensors explained in these tutorials (like photocells, FSRs and tilt switches) because there are multiple variables that affect the sensors input and output. To begin explaining how a basic sensor works, we'll use this rather nice diagram. The PIR sensor itself has two slots in it, each slot is made of a special material that is sensitive to IR. The lens used here is not really doing much and so we see that the two slots can 'see' out past some distance (basically the sensitivity of

the sensor). When the sensor is idle, both slots detect the same amount of IR, the ambient amount radiated from the room or walls or outdoors. When a warm body like a human or animal passes by, it first intercepts one half of the PIR sensor, which causes a positive differential change between the two halves. When the warm body leaves the sensing area, the reverse happens, whereby the sensor generates a negative differential change. These change pulses are what is detected.

The IR sensor itself is housed in a hermetically sealed metal can to improve noise/temperature/humidity immunity. There is a window made of IR-transmissive material (typically coated silicon since that is very easy to come by) that protects the sensing element. Behind the window are the two balanced sensors.

Advanced Analog Features:

- 10-bit, up to 8-channel Analog-to-Digital Converter module (A/D) with:
 - Conversion available during Sleep
 - Up to 8 channels available
- Analog Comparator module:
 - Programmable input and output multiplexing
- Comparator Voltage Reference module
 - Programmable Low-Voltage Detection (LVD) module:
 - Supports interrupt-on-Low-Voltage Detection
- Programmable Brown-out Reset (BOR)

CAN bus Module Features:

- Complies with ISO CAN Conformance Test
- Message bit rates up to 1 Mbps
- Conforms to CAN 2.0B Active Spec with:
 - 29-bit Identifier Fields
 - 8-byte message length
 - 3 Transmit Message Buffers with prioritization
 - 2 Receive Message Buffers
 - 6 full, 29-bit Acceptance Filters
 - Prioritization of Acceptance Filters
 - Multiple Receive Buffers for High Priority Messages to prevent loss due to overflow
 - Advanced Error Management Features

Special Microcontroller Features:

- Power-on Reset (POR), Power-up Timer (PWRT) and Oscillator Start-up Timer (OST)
- Watchdog Timer (WDT) with its own on-chip RC Oscillator
- Programmable code protection
- Power-saving Sleep mode
- Selectable oscillator options, including:
 - 4x Phase Lock Loop (PLL) of primary oscillator
 - Secondary Oscillator (32 kHz) clock input
- In-Circuit Serial Programming™ (ICSPTM) via two pins

Flash Technology:

- Low-power, high-speed Enhanced Flash technology
- Fully static design
- Wide operating voltage range (2.0V to 5.5V)
- Industrial and Extended temperature ranges.

ELEMENTS

- **Space segment**
 - 24 Satellites orbits around the earth twice a day at 7000 miles/hr
About 12000 miles above earth surface
 - transmits signals to the receivers in the ground station

➤ **User segment**

- receives and process the signals to determine the location on earth, speed and time

➤ **Control segment**

- monitors Satellites health
- Signal Integrity
- Orbital Configuration

CHAPTER 6

CODING

```
#include <Adafruit_Sensor.h>

/* Blynk EMAIL and NOTIFICATION
 * ESP8266 example
 * www.geekstips.com
 */
#define BLYNK_PRINT Serial
#include <ESP8266WiFi.h>
#include <BlynkSimpleEsp8266.h>
#include <SimpleTimer.h>
#include <DHT.h>

// You should get Auth Token in the Blynk App.
// Go to the Project Settings (nut icon).
char auth[] = "YdbgKGGX32yOEgfO8EwIXY6A5RRxkFzQ";

// Your WiFi credentials.
// Set password to "" for open networks.
char ssid[] = "jagadeesh";
char pass[] = "ssrama99";

#define DHTPIN 4
#define DHTTYPE DHT11
int alarmPin = 16;

DHT dht(DHTPIN, DHTTYPE);
SimpleTimer timer;
```

```

        // the pin that the alarmPin is attached to
int sensor = 14;          // the pin that the sensor is attached to
int state = 0;           // by default, no motion detected
int val = 0;
void sendSensor1(){

    val = digitalRead(sensor);
    Serial.println(val);
    Blynk.virtualWrite(V0,val);// read sensor value
    if (val == 0) {       // check if the sensor is HIGH

        digitalWrite(alarmPin, 0);
        Blynk.notify("some one is intruding in home");// turn alarmPin ON
        delay(5000);
        digitalWrite(alarmPin, 1);
        // delay 100 milliseconds

        if (state == 0) {
            Serial.println("Motion detected!");
            state = 0;
            delay(5000);

        }

    }

    else {
        digitalWrite(alarmPin, 1); // turn alarmPin OFF
        delay(200);           // delay 200 milliseconds

        if (state == 1){
            Serial.println("Motion stopped!");
            state = 0;      // update variable state to LOW

        }

    }

}

```

```

void sendSensor(){

  float h = dht.readHumidity();
  float t = dht.readTemperature(); // or dht.readTemperature(true) for Fahrenheit

  if (isnan(h) || isnan(t)) {
    Serial.println("Failed to read from DHT sensor!");
    return;
  }

  Serial.println(t);
  Blynk.virtualWrite(V5, h);
  Blynk.virtualWrite(V6, t);

  // SETUP the ALARM Trigger and Send EMAIL
  // and PUSH Notification

  if(t > 30){
    Blynk.email("vaduva.ionut.lucian@gmail.com", "ESP8266 Alert", "Temperature over 28C!");
    Blynk.notify("ESP8266 Alert - Temperature over 30C!");
    delay(5000);
  }
}

```

```
void setup(){  
    pinMode(sensor, INPUT);  
    pinMode(alarmPin, OUTPUT);  
    Serial.begin(9600);  
    Blynk.begin(auth, ssid, pass);  
    dht.begin();  
    timer.setInterval(2500L, sendSensor);  
    timer.setInterval(2500L, sendSensor1);  
}
```

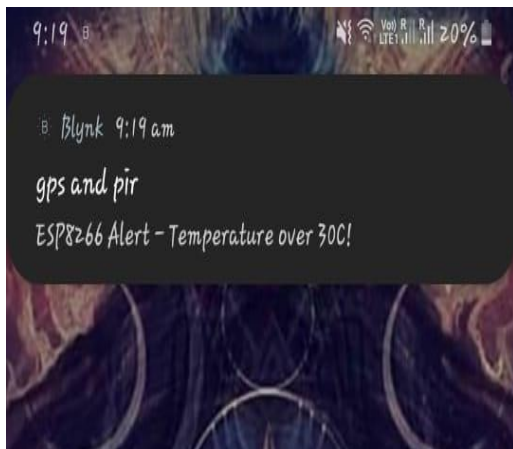
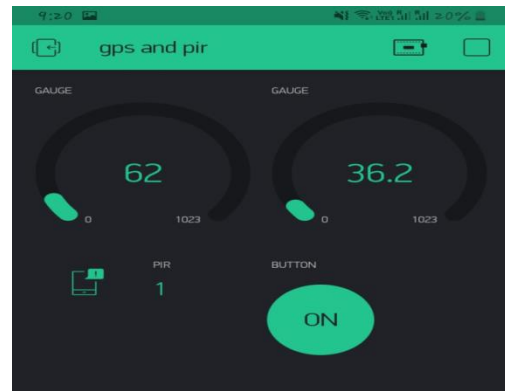
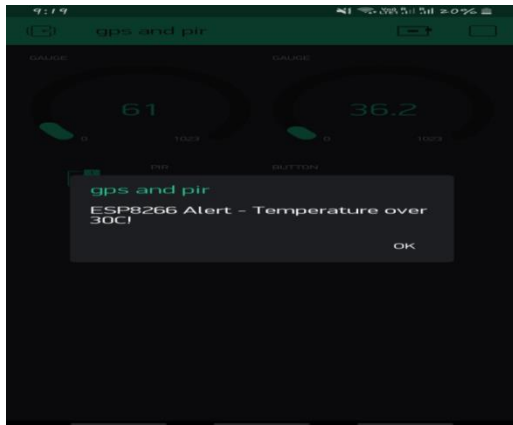
```
void loop(){  
    Blynk.run();  
    timer.run();  
    sendSensor1();  
}
```

CHAPTER 7

Result and Discussion

At first the individual logs into our Android application by method for entering default accreditations. There is office for administrator get right of passage to include/evacuate clients and exchange the default username and secret key. The customer taps on the login a purchaser attachment is made in android application and association starts between Node MCU ESP8266 and the Android gadget. The encoded realities is gone through this attachment to Node MCU. At Node MCU feature unscrambling of the data happens. This unscrambled information are demonstrated with the sections existing in Node MCU memory itself. In the event that correct little print is outfitted a reaction is sent back to the machine which starts another movement. This new movement would then be able to be utilized to deal with any local home furnished with a simple on/off catch UI. The solicitations are managed on the server side through Node MCU.

The GPIO pins of Node MCU are associated with apparatuses and in agreement to demand any machine can be overseen no problem at all. The Node MCU is likewise arranged to allow programmed reaction if there should be an occurrence of smoke discovery or trespasser. A reaction is dispatched to Android machine and the individual can make fantastic move. An advanced camera module is utilized to hold onto the picture continuously, so clients can decisively research the circumstance. The picture is dispatched over the mail to the client's enrolled email handle by utilizing the utilization of SMTP. An instant message or a mail and warning is likewise sent to buyers by method for Blynk API with the goal that purchasers can get signals banishing net get section to from the Android gadget.



CHAPTER 8

SUMMARY AND CONCLUSION

8.1 SUMMARY

Internet of Things (IoT) conceptualizes the idea of remotely connecting and monitoring real world objects (things) through the Internet [1]. When it comes to our house, this concept can be aptly incorporated to make it smarter, safer and automated. This IoT project focuses on building a smart wireless home security system which sends alerts to the owner by using Internet in case of any trespass and raises an alarm optionally. Besides, the same can also be utilized for home automation by making use of the same set of sensors. The leverage obtained by preferring this system over the similar kinds of existing systems is that the alerts and the status sent by the wifi connected microcontroller managed system can be received by the user on his phone from any distance irrespective of whether his mobile phone is connected to the internet. The microcontroller used in the current prototype is Launchpad board which comes with an embedded micro-controller and an onboard Wi-Fi shield making use of which all the electrical appliances inside the home can be controlled and managed.

8.2 CONCLUSION

The chief motivation behind our venture is to present a minimal effort and responsive, brilliant home computerization framework utilizing Node MCU Board with a remote android versatile through web. Right now, security and wellbeing measures are displayed basically to the matured individuals. It is planned and associated with a few parts as indicated by the prerequisites. A Blynk cloud server application sets up a contact between the framework and the android application utilized by the client. Warnings are sent to the client through Blynk Application by method for SMS, Email and so on. All these joined structures a total and adaptable, keen home computerization framework grounded in IOT innovation.

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