IOT Based Smart Streetlight For Emergency Conditions

G.Praneeth [1], K.Yehezekiel [2], P.Pavan Varma [3], T.Sai Diwakar [4],

Dr.Gandi Satyanarayana [5], G.Rajasekharam [6]

Department of Computer Science and Engineering

Nadimpalli Satyanarayana Raju Institute Of Technology

Andhra Pradesh –India

ABSTRACT

 The system is chiefly applied for smart and weather adaptive lighting in street lights. The task is implemented by smart embedded system that contains the street light based on detection of sun. During the night time the street light gets automatically ON and during the day time it gets automatically OFF. In addition to this, a panic button is placed on the pole, incase of any emergency or danger, the person in danger can press this button which raises an alarm at the nearby emergency services. Whenever the panic button is pressed, an alert message at that time is sent directly to the specified mobile number. The message of the incident is sent to the particular emergency station by which they can view the incident's spot. Each area's street lights are connected to the particular area's emergency services and alternate of them has a GSM module. The manual operation using GSM technology is completely utilized. Thus the system is mainly designed to ensure safety and to prevent energy wastage.

Keywordds:- IOT

I.   INTRODUCTION

WHAT IS INTERNET OF THINGS (IoT)

The 'Thing' in it can be any device with any kind of built-in-sensors with the ability to collect and transfer data over a network without manual intervention. The embedded technology in the object helps them to interact with internal states and the external environment, which in turn helps in decisions making process.

The internet of things (IOT) refers to the ever-growing network of physical objects that feature an IP address for the internet connected, and the communication that takes place. In a nutshell, it is a concept that unites all the gimmicks to the net and have them pass with each other over the net. It is a gargantuan net of related devices – all of which gather and share data about how they are applied and the environments in which they are controlled.

By doing thus, each of your devices will be learning from the experience of other   twists, as humans make out. It is attempting to blow up the interdependence in human, i.e interact, contribute and collaborate to things. I recognize this sounds a bit complicated, let's read this with an object lesson.

A developer submits the application with a document containing the standards, logic, errors & exceptions handled by him to the quizzer. Once more, if there is any issues Tester communicates it back to the Developer. It requires multiple iterations & in this fashion a smart application is made.

Likewise, at room temperature sensor gathers the information and transmit it across the web, which is then utilized by multiple device sensors to adjust their temperatures accordingly. For instance, the refrigerator's sensor can collect the data regarding the outdoor temperature and consequently adjust the refrigerator's temperature. Likewise, your air conditioners can also set its temperature accordingly. This is how devices can interact, contribute & collaborate.

Fig 1: Connecting Multiple

II.   PHASES OF THE IOT LIFECYCLE

Five phases of IOT life cycle:

Firstly, create phase where devices or sensors collect information from the physical environment around them .the data from smart connected devices can be used to generate insights that can help business, customers and partners.

Secondly, communication phase where the data and results brought forth are transmitted through the mesh to the desired address.

Thirdly, aggregation phase is where the data collected is integrated by the twist itself.

Fourthly, analyze phase where upon further sophisticated analytics the aggregated data can be utilized to generate basic patterns, control and optimize operation.

In conclusion, active phase, where a desirable action is done based on the information produced.

III.   SYSTEM ANALYSIS

- **EXISTING SYSTEM**

The street light is one of the huge expenses in a city. The cost spent is huge that all the sodium vapor lamps consume more power. The expense spent on the street light can be employed for other development of the nation. Currently a manual system is utilized where the igniter will be induced to switch ON/OFF, i.e. the light will be induced to switch ON in the evening and switched OFF in the forenoon. Hence on that point is a great deal of energy wastage between the ON/OFF. At that place are no emergency measures that can keep a human in emergency weather.

- **DISADVANTAGES OF EXISITING SYSTEM**

- Manual switching ON/OFF is executed on the street lights
- More Energy Consumption due to the sodium vapor lamps.
- Expensive, since light is drawn to be ON the entire nighttime.
- More man power is required and periodic check is a must.

Hence the emphasis is to build a solution that works in emergency situations encountered. Also, these existing technologies are not one stop solution to the existing problem. Our project presents Smart Streetlight in emergency conditions which will aid a human in emergency conditions (like accidents or whatever other emergency case) by offering the one stop solution using it.

- **PROPOSED SYSTEM**

The building up system consisting of GSM Module, Light Depedency Resistor (LDR), Panic Button is connected to an Arduino. When the Panic button is pressed then the end product will be mailed. After the output of the GSM module is sent to the registered mobile number. In instances of exigency, when the panic button is pushed, the GSM module performs the following undertakings

✓ An alarm message is transmitted to the closest police station requesting immediate action in case of any emergency situation.
✓ Emergency message is transmitted to the nearest hospital or for an ambulance in case any accident situation.

- **ADVANTAGES OF PROPOSED SYSTEM**
 - Automated switching ON/OFF of the street lights.

- The cost significantly reduced because sodium vapor lamps are replaced by LED.
- Less energy is used up.
- The CO2 emission is concentrated.
- The light pollution is cut.
- The communication is made wireless.
- Manpower is entirely wiped out.
- At present there is no organization to safeguard the people, but our system forges a step for it.
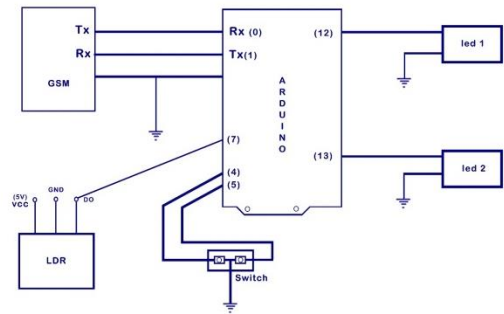
IV. SYSTEM ARCHITECTURE
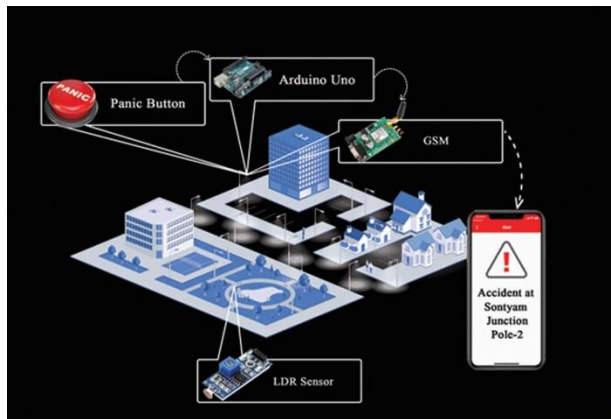
V. BLOCK DIAGRAM
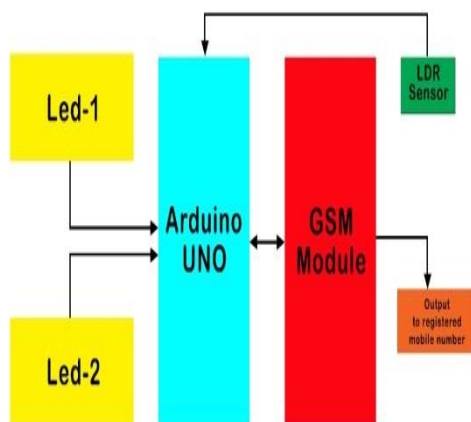
VI. CIRCUIT DIAGRAM

VII. SOFTWARE

Software tools helps in building the project as per the aim. Chase are the software tools utilized for the task.

- **ARDUINO IDE PLATFORM USING EMBEDDED C PROGRAMMING**

The Arduino Integrated Development Environment (IDE) is a crossplatform application(for Windows, macOS, Linux) that is written in functions from C and C++. It is used to write and upload programs to Arduino compatible boards, but also, with the help of 3rd party cores, other vendor development boards.

The source code for the IDE is released under the GNU General Public License, version 2.

The Arduino IDE supports the languages C and C++ using special patterns of code structuring. The Arduino IDE supplies a software library from the Wiring prRug/wiki/Software_library" \o "Software library" software library from the Wiring project, which offers many common input and production operations.he main program loop, that are compiled and linked with a program stub main() into an executable cyclic executive program with the GNU toolchain, also included with the IDE distribution.

The Arduino IDE employs the program awarded to convert the executable code into a text file in hexadecimal encoding that is loaded into the Arduino board by a loader program

in the board's firmware.

In October 2019 the Arduino organization began providing early access to a new Arduino Pro IDE with debugging and other innovative characteristics.

Arduino is an open-source hardware and software company, project And the user community that. The microcontrollers can be programmed using C and C++ programming... The Wiring platform consisted of a printed circuit board (PCB) with an. The default bootloader of the Arduino UNO is the attribute bootloader.

VIII. Hardware

- ### LDR Sensor

A Light Dependent Resistor (LDR) is likewise called a photo-resistor or a cadmium sulfide (CDs) cell. It is likewise called a photoconductor. It is basically a photocell that works along the principle of photoconductivity. The passive part is essentially a resistor whose resistance value decreases when the strength of light falls. This optoelectronic device is largely applied in light varying sensor circuit, and brightness and dark activated switching circuits. Some of its applications include camera light meters, street lights, clock radios, light beam alarms, reflActive smoke alarms, and outdoor clocks.
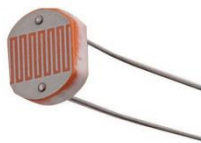

Fig 2: LDR Sensor

The snake like track shown below is the Cadmium Sulfide (CDs) film, which also runs through the sides. Along the top and bottom are metal films which are tied to the terminal leads. It is planned in such a manner as to offer the maximum possible contact area with the two metal films. The social system is housed in a clean plastic or resin case, to supply complimentary access to outside light. As explained above, the main component for the construction of LDR is cadmium sulfide (CDs), which is applied as the photoconductor and contains no or very few electrons when not cleared. In the absence of illumination it is designed to deliver a high resistance in the range of mega ohms. As presently as the light falls on the sensor, the electrons are liberated and the conductivity of the fabric gains. When the light intensity exceeds a certain frequency, the photons absorbed by the semiconductor give band electrons the energy needed to climb up into the conduction band. This makes the free electrons or holes to carry electricity and hence casting off the resistance dramatically (< 1 Kilo ohm).

The equation to express the relation between resistance and illumination can be written every bit

$R = A . E \wedge a$

where E – Illumination (lux)

R – Resistance (Ohms)

A, a – constants

The value of 'a' depends on the CdS used and on the manufacturing process. Values usually range between 0.7 and 0.9.

- ### GSM-SIM800A Module

A GSM Module is basically a GSM Modem (like SIM 900/800.) connected to a PCB with different cases of output needed from the dining table – say TTL Output (for Arduino, 8051 and other microcontrollers) and RS232 Output to interface directly with a PC (personal information processing system). The panel will also accept pins or provisions to attach much and speaker, to take out +5V or other values of power and ground connections. These cases of provisions vary with different mental faculties.

Dozens of varieties of GSM modem and GSM Modules are available in the marketplace to select from. For our project of connecting a gsm modem or module to Arduino and hence send and get SMS using Arduino – it's always right to choose an Arduino compatible GSM Module – that is a GSM module with TTL Output provisions.

Fig 3: GSM-SIM800A Module

There are two ways of connecting GSM module to arduino. In whatever instance, the communication between Arduino and GSM module is serial. And then we are supposed to use serial pins of Arduino (Rx and TX). Thus if you are running with this method, you may connect the TX pin of GSM module to the Rx pin of the Arduino and Rx pin of GSM module to TX pin of the Arduino. You're reading it every day, right? GSM Tx –> Arduino Rx and GSM Rx –> Arduino Tx. Directly join the earth pin of the Arduino to the ground pin of gem module! Ok, so that's all. You made 3 connections and the wiring is over! Nowadays you can load different programs to communicate with gsm module and make it run.

- **Arduino UNO**

The Arduino UNO is a microcontroller board based on the ATmega328 (datasheet). It holds 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz ceramic resonator, a USB connector, a power jack, an ICSP header, and a reset button. It comprises everything needed to hold up the microcontroller; simply tie it to a data processor with a USB cable or power it with an AC-to-DC adapter or battery to obtain gone. The UNO differs from all preceding boards in that it does not use the FTDI USB-to-serial driver chip. Instead, it features the Atmega16U2 (Atmega8U2 up to version R2) programmed as a USB-to-serial convertor.
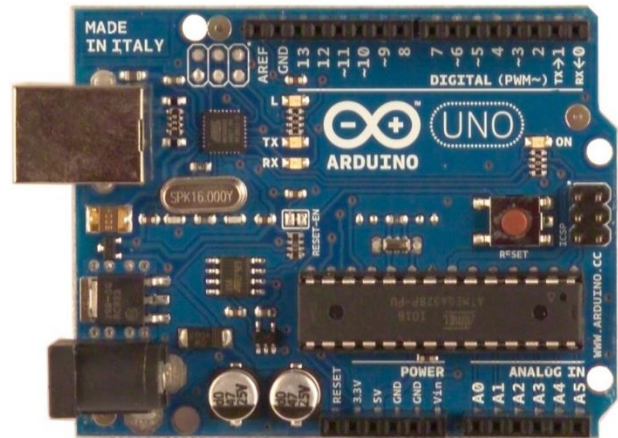

Fig 4: Arduino UNO
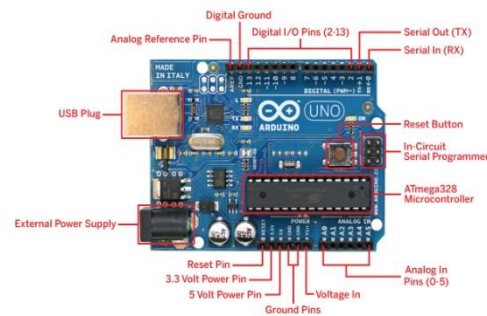
- **Pin Description**

Fig 5: Arduino Board representing all Components

- **Light Emitting Diode (LED)**

As is evident from its name, LED (Light Emitting Diode) is basically a small light emitting device that comes under "active" semiconductor electronic components. It's quite comparable to the normal general purpose diode, with the only big difference being its capacity to give off light in different colors. The two terminals (anode and cathode) of an LED when connected to a voltage source in the right polarity, may produce lights of different colors, as per the semiconductor substance used inside it.

- **Advantages of LEDs**

➢ Very low potential difference and current are enough to drive the LED. Voltage range – 1 to 2 volts. Current – 5 to 20 milliamperes.
➢ Total power output will be less than 150 milliwatts.
➢ The reaction time is very less – only around 10 nanoseconds.
➢ The device does not need any heating and warm up time.
➢ Miniature in size and so lightweight.
➢ Experience a tough construction and hence can withstand impact and vibrations.
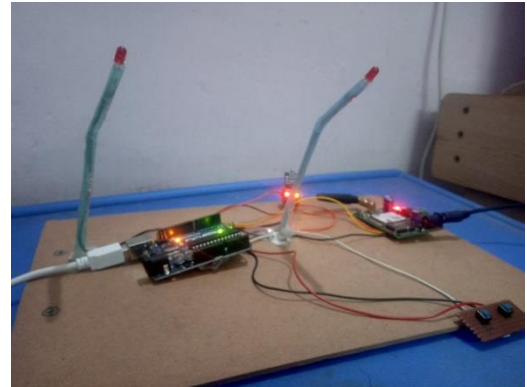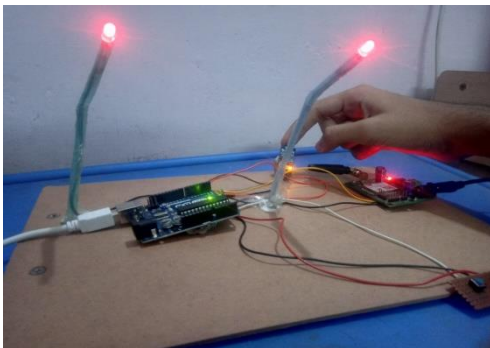➢ An LED has a lifetime of more than 20 years.

IX. SCREEN SHOTS

Fig 8: Output Of Ldr Sensor In Low Light Conditions
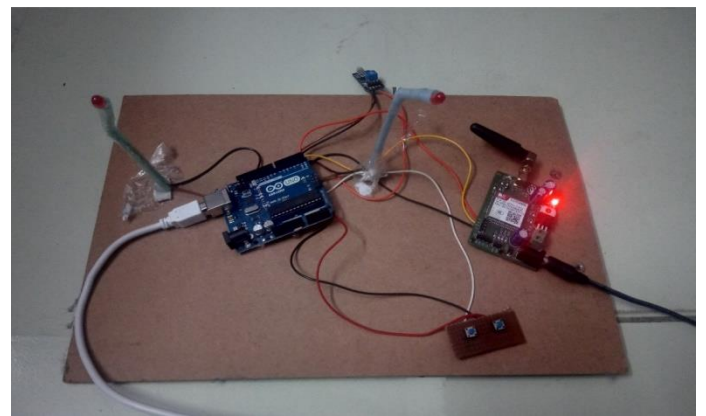

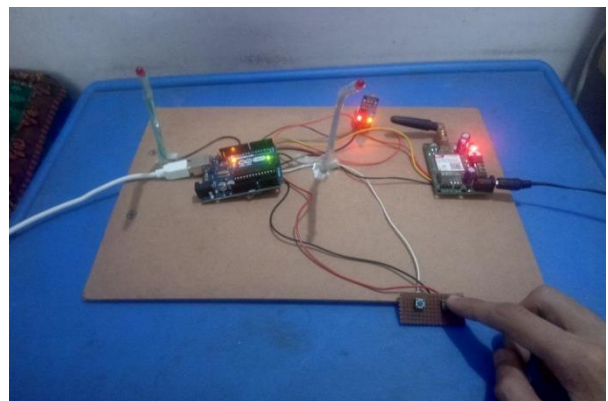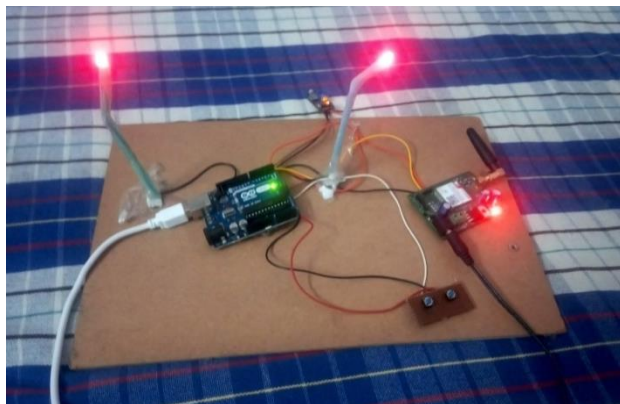Fig 9: Output Of Ldr Sensor In Good Light Conditions

Fig 10: Pressing Of Push Button For Police Assistance

Fig 7: Sensor, Modules Connected And Active
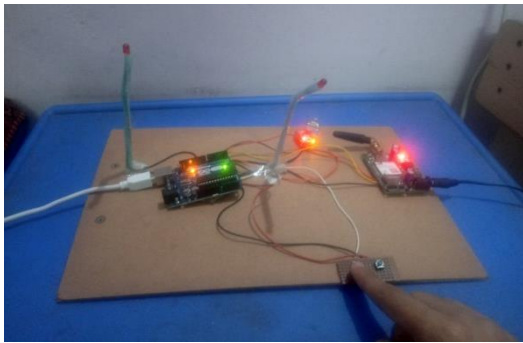
Output Of Sensor

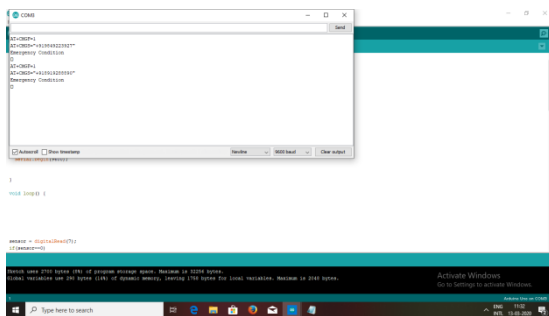Fig 11: Pressing Of Push Button For Ambulance
Assistance

Fig 12: Output For Push Button For Police
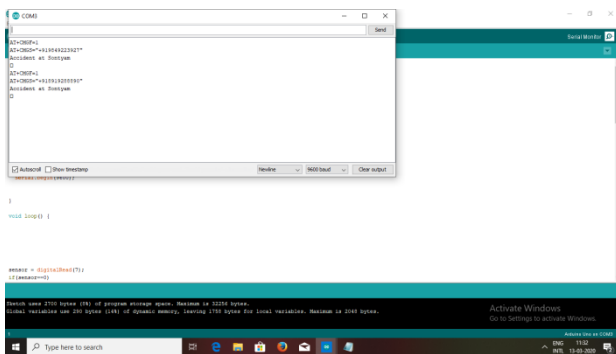Assistance

Fig: Output For Push Button For Ambulance
Assistance

X. CONCLUSION

This type of an idea being the foremost of its kind plays a crucial role towards ensuring time wastage during emergency conditions in the fastest mode. The proposed plan will deal with critical

positions that may be a person in an emergency situation can be saved or a woman in a rural area can be preserved. With further inquiry and invention, this task can be implemented in different fields of security and surveillance, emergency. The organization can perform the efficient solutions for road accidents and some emergency conditions with a good accuracy and create an alert warning message to the closest police station and even induce a call or message to the ambulance in case of any accident situation.

REFERENCES

[1] B.Abinaya, S.Gurupriya, M.Pooja "IoT based Smart and Adaptive Lighting in Street Lights" 2017 Second International Conference On Computing and Communications Technologies(ICCCT'17).

[2] Archana. G, Aishwarya N, Anitha J "Intelligent Street Light System" International Journal of Recent Advances in Engineering & Technology, Vol-3, Issue-4, 2015.

[3] AkshayBalachandran, Murali Siva, V.Parthasarathi, Surya and Shriram K. Vasudevan "An Innovation in the Field of Street Lighting System with Cost and Energy Efficiency"Indian Journal of Science and Technology,Vol-8, August 2015.

[4] DeepanshuKhandelwal, Bijo M Thomas, KritikaMehndiratta, Nitin Kumar "Sensor Based Automatic Street Lighting system" International Journal of Education and Science Research Review Volume-2, Issue-2 April- 2015 .

[5] IsahAbdulazeez Watson, OshomahAbdulaiBraimah, Alexander Omoregie "Design and Implementation of an Automatic Street Light Control System" International Journal of Emerging Technology and Advanced Engineering, Volume 5, Issue 3, March 2015

[6] KapseSagar Sudhakar1, AbhaleAmol Anil2, Kudakechetan Ashok3, ShirsathShravan Bhaskar4 "Automatic Street Light Control

System"International Journal of Emerging Technology and Advanced Engineering"Volume 3, Issue 5, May 2013

[7] Mustafsaad, AbdalhalimFarij, Ahamed Salah "Automatic Street Light Control System Using Microcontroller" Mathematical method and Optimization Technique in Engineering ISBN: 978-960-474-339-1.

[8] SaksheeSrivastava, "Electronics And Communication Engineering, Institute Of Technology And Management AL-1, Sector-7,GIDA, Gorakhpur, U.P., INDIA" Advance in Electronic and Electric Engineering. ISSN 2231-1297, Volume 3, Number 5, 2013..

[9] Prof. K.Y.Rajput, GargeyeeKhatav, Monica Pujari, PriyankaYadav, "International Journal of Engineering Science Invention" www.ijesi.org. Volume 2 Issue 3 □ March. 2013 PP.60-69".Volume 2, Issue 3,March. 2013.

[10] L. Jasio, T. Wilmshurst, D. Ibrahim, J. Morton,M. Bates, J. Smith D. Smith and C. Hellebuyck,PIC Microcontrollers: know it all, Publishing Elsevier Science, 2008.

[11] K. S. Sudhakar, A. A. Anil, K. C. Ashok and S.S. Bhaskar, Automatic Street Light Control System, International Journal of Emerging Technology and Advanced Engineering, Vol.3,May 2013.

[12] Soledad Escolar, JesúsCarretero, Maria-Cristina Marinescu and Stefano Chessa "Estimating Energy Savings in Smart Street Lighting byUsing an Adaptive Control System" International Journal of Distributed Sensor NetworksVolume 2014, Article ID 971587

[13] Samir A. ElsagheerMohamed "Smart Street Lighting Control and Monitoring System for Electrical Power Saving by Using VANET",Int. J. Communications, Network and System Sciences, 2013, 6, 351-360.

[14] Andrea Zanella, Senior Member, IEEE, Nicola Bui, Angelo Castellani "Internet of Things for Smart Cities" IEEE Internet Of Things Journal, vol. 1, no. 1, Feb. 2014.

[15] J.Sherly1,D.Somasundareswari "INTERNET OF THINGS BASED SMART TRANSPORTATION SYSTEMS" International Research Journal of Engineering and Technology Volume: 02 Issue: 07 Oct-2015

AUTHOR DETAILS

I'm G.Praneeth Is Presently Pursuing B.Tech (Cse) From Department Of Computer Science And Engineering In N S Raju Institute Of Technology, Visakhapatnam.

I'm K.Yehezekiel Is Presently Pursuing B.Tech (Cse) From Department Of Computer Science And Engineering In N S Raju Institute Of Technology, Visakhapatnam.

I'm P.Pavan Varma Is Presently Pursuing B.Tech (Cse) From Department Of Computer Science And Engineering In N S Raju Institute Of Technology, Visakhapatnam

I'm T.Sai Diwakar Is Presently Pursuing B.Tech (Cse) From Department Of Computer Science And Engineering In N S Raju Institute Of Technology, Visakhapatnam

I'm Dr.Gandi Satyanarayana (Ph.D) Is Working As Professor In Department Of Computer Science And Engineering In N S Raju Institute Of Technology, Visakhapatnam.

I'm G.Rajasekharam (M.Tech,Ph.D) Is Working As Hod In Department Of Computer Science And Engineering In N S Raju Institute Of Technology , Visakhapatnam