EMpiRIA

EMpiRIA-technical team was started in the year 2014 with its four members.This team aimed at educating students about the existing technologies and helping them to implement their ideas.So far this team has been successful in conducting eight workshops on raspberry pi & seven academic projects.EMpiRIA club has been formed to encourage the students with interest to gain knowledge.

Projects under EMpiRIA

Final Year B.E Batch of 2013-2014

LOW-COST, LOW-POWER DISTRIBUTED NETWORK MODEL FOR AUTOMATED TRACKING SYSTEM

The objective of this project is to organize and present a tracking system for an institution or an organization helping in attendance maintenance and also include much more functionalities helping in tracking the employees of that institution at any instant. The tracking of the identity depends on the working of the sensor nodes embedded in a particular device which a person should keep with him wherever he commutes within the specified range (for e.g.: ID card) and this will be a moving/mobile sensor node. This project gives an efficient monitoring system with additional functionalities such as present status of an individual of the institution.

This project addresses the issues, disadvantages of the primitive systems for tracking and an application oriented attendance management system. This project is simulated in the first phase using the available routing protocols. With this project implemented, there will be a change in the outset of applying any technology according to its efficiency and reliability. This tracking system proves to be working efficiently, cost-effective and with low-power features. This model is scalable infinitely and can prove the extensibility of the application. Various applications of this project include

- Monitoring doctors in a hospital environment
- Monitoring officials in a government office scenario
- Monitoring students/faculty in an educational institution

This project under EMpiRIA was done by Ashwath K Maiya, Rekha G and Shreyas Ananth A under the guidance of Mr.Chetan Adhikary.

Final Year B.E Batch of 2014-2015

Automated Utility Replacement and Maintenance

The target of this project is to implement the concept of Internet of Things(IoT). IoT in simple terms is the ability of smart devices connecting to the Internet and forming a global network. Sensors located in the remote areas update their status to the distant servers. These sensors can be monitored from any corner of the world using Web-pages.

The domain of this project is Home Automation and the IoT paradigm is implemented by demonstrating the example of automatic LPG refill booking. The load sensor value is transmitted wirelessly using XBees to the server(Raspberry Pi). These values are monitored locally through the GUI display on the monitor(or Television). Further, the user is privileged to globally access these values through the User Portal on the webpages.

The project gives a paradigm of IoT. This gives the insight on interoperating protocols to realize the IoT. The features of this project are

- Wireless sensor network is formed to get the sensor values in Ad-hoc fashion.
- A “Graphical User Interface” is created for off-line data viewing.
- A client server model is created using Raspberry Pi. The Raspberry Pi forms the server for the project.
- Web pages are created in PHP for global sharing.
- Automation features is included assisting the user in utility replacement.

This project was done by Amrutha N, Karishma K, Maya Ravichandran and Meghashree K M under the guidance of Mr.Chetan Adhikary.

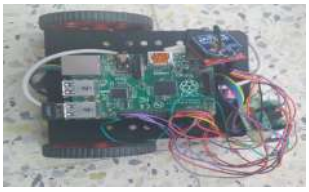
Implementation of Hamming Codes and Convolution Codes in Simulink

The purpose of this project was to reduce the errors are introduced in data, when the data is being transmitted into channel. These errors can be minimized by using effective channel coding techniques. Hamming and Convolution Codes were considered. Hamming Code is an error-correction code that can be used to detect single and double-bit errors and correct single-bit errors that can occur when binary data is transmitted from one device into another. Error-correcting convolution codes provide a proven mechanism to limit the effects of noise in digital data transmission. The project involved the implementation of Hamming and Convolution Codes in Simulink. The simulation helps in estimating the system performance. These results were plotted using BER Tool and models constructed in Simulink.

Final Year B.E Batch of 2015-2016

Cognitive Approach to Autonomous Guiding System

This project aims at reducing man power and provide a self-helping environment. It creates an autonomous system which is well aware of the environment and where its service is needed. This prototype will be tailored to help people to navigate to the desired location, with minimal efforts. Cognitive robot proposed can serve the purpose of an intelligent guidance device as it not only monitors the target area,but can also respond in the case of emergency. The main features of this robot are remote navigation, connectivity to the Internet and a large variety of applications which includes sensors for advanced features.



Cognitive environment for the robot is created using Adhoc network,which makes it not only easily deployable but for minimal cost. The setting up of the network is done by the powering up few nodes easily configured to suit the environment of deployment. A Graphical User Interface (GUI) is created for maneuvering the robot manually in the deployed area. This makes it more user friendly with the absence of complex instructions. A feature where the robot being controlled remotely is added using client-sever model. Raspberry pi is configured to become the server which is remotely accessed by logging into a website. The website is created using PHP for global access. The network model designed for this project,guides the robot to reach different destinations inside the deployed area without any human interference. The need of human involvement would be in merely selecting the destination of his choice after which the robot will be guided by the cognitive network to reach the destination. The location of the robot can be monitored by logging into the website which is created using PHP.
This project was done by Shriganesh Hegde, Shubha J, Swathi R and Varsha M under the guidance of Mr.Chetan Adhikary.

Faster Real Time Data Transfer using XMPP

This projects aims to develop a faster network systems wherein the information(image, audio, video) exchange can take place in fraction of seconds. The delay in exchange of the information can be reduced by using XMPP systems. When an access for a particular information of a room is requested by the client, the Raspberry Pi camera will first

capture the image. The processing of the captured image is done using Python. The image is then compared with the database provided. Through the Raspberry Pi which is installed with XMPP server, the information is provided to the client.

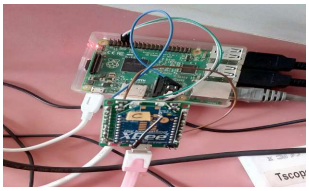
This project aims at provided a faster system for information exchange wherein no delay is involved at the time of communication. The specifications of our project is

- A Distributed system has been created wherein we have created our own XMPP Server and our own XMPP Client. Raspberry Pi is configured as an XMPP Server and also as an XMPP Client.
- Client-Server connection is established wherein client gets the necessary information from the server.
- The buffering which would be present in a traditional client-server system is completely eliminated by using XMPP communication system.
- It even allows faster multimedia file transfer between two XMPP Client.

This project was done by Pooja M Krishnapur, Shruthi M and Vasuki M R under the guidance of Mr.Chetan Adhikary.

Low Cost, Low Power Outdoor Tracking System in Heath Care Domain

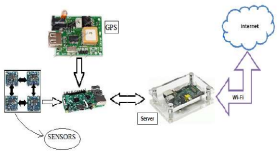
This project intends to provide relative location of the doctor at critical times with minimum time involved in tracking him/her.The ADHOC technology that we are implementing in our project provides exact position of the person even when he/she changes his position from one room to the other. This tracking system involves a microcontroller MSP430, a Raspberry-Pi module and Xbee modules that forms a remote monitoring system. This method of tracking is maintenance free. It does not involve setting up of towers for centralized network and hence the cost for setting it up is minimal.



This technology will involve the technique of locally tracking the doctor and updating the position of the doctor to the internet. With simple security attributes the patients or the helpers at hospital can look up the information and the same can be conveyed to patients. The system would be a mobile node compact enough to fit inside an ID card. The premises would be made smart enough with the help of minimum number of stationary nodes making it possible to track/locate the doctor. Hence as described earlier tracking of doctors become efficient and with increased convenience the patients can consult the doctor without any delay during emergencies. Thus an automated location aided system will be developed. The final product is a mobile node that has low cost and low power features and is a small device that is easily portable from one place to another. The global connectivity is greatly extended. It is a light weight device and hence there will not be any difficulty involved in carrying it around.
This project was done by Anirudh N Navada, Karthik S N and Shreyas H B under the guidance of Mr.Chetan Adhikary.

IoT Paradigm for Vehicle Assistance

The intention of this project is to build a prototype model of IoT paradigm in vehicle assistance. It aims on overcoming the problem faced in vehicle due to engine and the electronic circuit problem. The problems in the vehicle can be vanquished at an earlier stage. Further, the assistance from the service station for the problem in the vehicle can be obtained. The project integrates GSM and GPS module thus enabling us with real time data for monitoring the ECU.



This project gives a paradigm of IoT. The features of the project are as follows

- Integration of I2C protocol and IPv4 protocol.
- A client server model is created using Raspberry Pi. The Raspberry Pi along with the sensor network and GPS tracker forms the user-end for the project.
- Web pages are created in PHP for global remote monitoring.
- A âĂŹGraphical User InterfaceâĂŹ is created in PHP for global remote control.
- Automation features is included to assist the user for the diagnosed fault in the vehicle.

This project was done by Spoorthi Jain B N,Subashree K and Yasaswini S under the guidance of Mr.Chetan Adhikary.

Workshops conducted

The workshop was aimed at building in-house projects.The workshop included introducing the students and faculties with basic sensors interfacing using Raspberry-Pi and GUI development using python (Tkinter module). Participants further implemented a decentralized wireless network(Ad-Hoc) using XBees. The wirelessly transmitted data were accessed using Web pages that were developed using PHP. The workshop thus ensure that each participant is proficient in implementing the IoT paradigm.

- Two Day Hands-On Workshop on Raspberry-Pi held on 20-21 Feb 2015 for ECE Department, AMC Engineering College
- Two Day Hands-On Workshop on Raspberry-Pi held on 27-28 Feb 2015 for CSE Department, AMC Engineering College
- FDP on Raspberry-Pi held on 15-16 July 2015 for City Engineering College
- Two Day Hands-On Workshop on Raspberry-Pi held on 22-23 July 2015 for ECE Department Faculty, AMC Engineering College
- Two Day Hands-On Workshop on Raspberry-Pi held on 24-25 July 2015 for CSE Department Faculty, AMC Engineering College
- Two Day Hands-On Workshop on Raspberry-Pi held on 20 Sept 2015 B.M.S College of Engineering
- **EM*pi*RIA Jam Event 2016** held on 20-23 Jan 2016:The workshop was an inter college event in which students from more than 10 colleges participated. The Four Days event made each participant explore the capabilities of Raspberry Pi. Newer concepts incorporated during this workshop included LaTEX, SymPY, NS-2 and Robotics.

EMpiRIA Meet 2016

Empiria club was started with the vision of extending arms for the enthusiastic and interested students of AMC Engineering college for their urge to grab the knowledge of the existing technologies.EMpiRIA-technical team continued its endevour in training students to develop skills required for desiging their own projects.Several online courses and hands-on training on arduino and raspberry pi was taken up. Interested students number increased and more weightage was given on learing new technologies, open source softwares, discussion on emerging technologies.
In this club there are about fifty students who have registered.So far there were two meetings held for the students. Here the students learn about ***python language****, basics of* ***arduino*** *and basic* ***electronic circuits****. There are further plans of extending the topics once the students are thorough with basics.*

Objectives

Objectives of the empiria club would be making students train them in following fields

- Open source languages and softwares
- Designing and building the circuits.
- Develop programming langauge skills
- Interface sensors and *I/O* devices
- Design their projects with microcontroller boards

EMpiRIA Club

Things we take-off

Python programming: Python is a widely used high-level, general-purpose, interpreted, dynamic programming language.Its design philosophy emphasizes code readability, and its syntax allows programmers to express concepts in fewer lines of code than possible in languages such as C++ or Java.The language provides constructs intended to enable writing clear programs on both a small and large scale.
Arduino: Arduino is an open-source project that created microcontroller-based kits for building digital devices and interactive objects that can sense and control physical devices.
Analog circuits: Most of the fundamental electronic components âĂŞ resistors, capacitors, inductors, diodes, transistors, and operational amplifiers âĂŞ are all inherently analog. Circuits built with a combination of solely these components are usually analog.

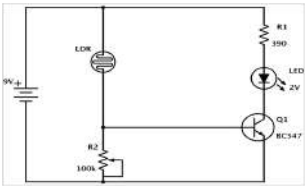
Basics of Python

Python is an optimized language for the reasons: software quality,developer productivity,program portability,component integration and packages. It is widely used i areas such as internet scripting,system programming,user interfaces,product customization and numeric programming. Python is counted among current user base;google,youtube,industrial lights and magic,ESRI,NASA'S Jet Propulsion Lab,the game eve online,National Weather Service. Python is a high level language which uses simple,readable and maintainable syntax.Further advantage of this language is that dependency on puntuation is avoided.
Python is a high level interpreted language supporting the execution of the program before compilation.It can also be processed at runtime by the interpreter. Python is a high level interpreted object-oriented scripting language.It supports technique of programming that encapsulates code within objects.Also supports functional and structured programming.Allows integration with external components coded in other languages.
IDLE GUI is the integrated development environment (IDE) used for python.An integrated development environment (IDE) is a software application that provides comprehensive facilities to computer programmers for software development.IDLE has two windows namely prompt window and editor window.The prompt window is also called as the python shell where in the program are edited.

Arduino basics

Arduino is an open-source computer hardware and software company, project and user community that designs and manufactures microcontroller-based kits for building digital devices and interactive objects that can sense and control objects in the physical world.
The open-source Arduino Software (IDE) makes it easy to write code and upload it to the board. It runs on Windows, Mac OS X, and Linux. The environment is written in Java and based on Processing and other open-source software which also supports the languages C and C++. This software can be used with any Arduino board. These systems provide sets of digital and analog input/output (I/O) pins that can interface to various expansion boards (termed shields) and other circuits. The boards feature serial communication interfaces, including Universal Serial Bus (USB) on some models, for loading programs from personal computers.

LDR Circuit

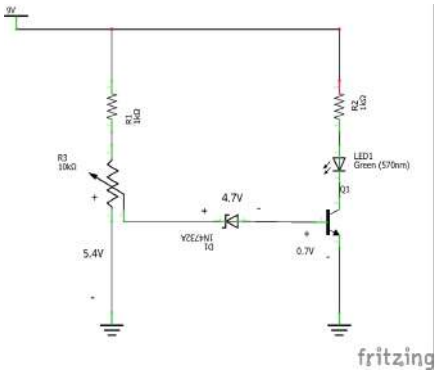


An LDR is a component that has a (variable) resistance that changes with the light intensity that falls upon it. This allows them to be used in light sensing circuits. They are also called as photo conductors, photo conductive cells or simply photocells. They are made up of semiconductor materials having high resistance.

A light dependent resistor works on the principle of photo conductivity. Photo conductivity is an optical phenomenon in which the materials conductivity is increased when light is absorbed by the material.

When light falls i.e. when the photons fall on the device, the electrons in the valence band of the semiconductor material are excited to the conduction band. These photons in the incident light should have energy greater than the band gap of the semiconductor material to make the electrons jump from the valence band to the conduction band. Hence when light having enough energy strikes on the device, more and more electrons are excited to the conduction band which results in large number of charge carriers. The result of this process is more and more current starts flowing throgh the device when the circuit is closed and hence it is said that the resistance of the device has been decreased.

Voltage Level Indicator Circuit

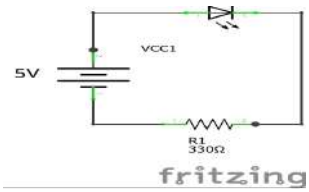


Voltage Level Indicator is one of the applications of BJTs.This includes three elements : the transistor, the Zener diode, and the LED.The voltage level indicator is a relatively simple network using a LED to indicate when the source voltage is close to its monitoring level of 9V.The potentiometer is set to establish 5.4V at the point indicated. The result is sufficient voltage to turn on both the 4.7-V Zener and transistor and establish a collector current through the LED sufficient in magnitude to turn on the LED.

The Zener effect is a type of electrical breakdown. It occurs in a reverse biased p-n diode when the electric field enables tunneling of electrons from the valence to the conduction band of a semiconductor, leading to a large number of free minority carriers which suddenly increase the reverse current.

Once the potentiometer is set, the LED will emit the light as long as the supply voltage is near 9V. However, if the terminal voltage of the 9V battery should decrease, the voltage set up by the voltage-divider network may drop to 5V from 5.4V.At 5V there is insufficient voltage to turn on both the Zener and the transistor will be in the "off" state. The LED will immediately turn off, revealing that the supply voltage has dropped below 9V or that the power source has been disconnected.

LED Circuit



The circuit must provide sufficient current to light the LED at the required brightness, but must limit the current to prevent damaging the LED. The voltage drop across an LED is approximately constant over a wide range of operating current; therefore, a small increase in applied voltage greatly increases the current.

An LED has a voltage drop specified at the intended operating current. Ohm's law and Kirchhoff's circuit laws are used to calculate the appropriate resistor value to obtain the desired current. The value is computed by subtracting the LED voltage drop from the supply voltage, and dividing by the desired operating current. If the supply voltage is equal to the LED's voltage drop, no resistor is needed.

This basic circuit is used in a wide range of applications, including many consumer appliances such as mobile phone chargers.

Low Cost, Low Power, Distributed Network Model For The Automated Tracking System

Year of Completion : 2014
No.of Students :3
Student Name :Ashwath K Maiya, Rekha G, Shreyas Ananth A.

This project addresses the issues, disadvantages of the primitive systems for tracking and an application oriented attendance management system. This project is simulated in the first phase using the available routing protocols. With this project implemented, there will be a change in the outset of applying any technology according to its efficiency and reliability. This tracking system proves to be working efficiently, cost-effective and with low-power features. This model is scalable infinitely and can prove the extensibility of the application. Various applications of this project include

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The target of this project is to implement the concept of Internet of Things(IoT). IoT in simple terms is the ability of smart devices connecting to the Internet and forming a global network. Sensors located in the remote areas update their status to the distant servers. These sensors can be monitored from any corner of the world using Web-pages. The domain of this project is Home Automation and the IoT paradigm is implemented by demonstrating the example of automatic LPG refill booking. The load sensor value is transmitted wirelessly using XBees to the server(Raspberry Pi). These values are monitored locally through the GUI display on the monitor(or Television). Further, the user is privileged to globally access these values through the User Portal on the web-pages.

Year of Completion : 2015
No.of Students :4
Student Name :Amrutha N, Karishma K, Maya Ravichandran, Meghashree K M.

The project gives a paradigm of IoT. This gives the insight on inter-operating protocols to realize the IoT. The features of this project are

- Wireless sensor network is formed to get the sensor values in Ad-hoc fashion.
- A “Graphical User Interface” is created for off-line data viewing.
- A client server model is created using Raspberry Pi. The Raspberry Pi forms the server for the project.
- Web pages are created in PHP for global sharing.
- Automation features is included assisting the user in utility replacement.

Implementation of Hamming Codes and Convolution Codes in Simulink

The purpose of this project was to reduce the errors are introduced in data, when the data is being transmitted into channel. These errors can be minimized by using effective channel coding techniques. Hamming and Convolution Codes were considered.

Year of Completion : 2014
No.of Students :3
Student Name :Manoj, Shreedhar Sai E V, Tushara.

Hamming Code is an error-correction code that can be used to detect single and double-bit errors and correct single-bit errors that can occur when binary data is transmitted from one device into another. Error-correcting convolution codes provide a proven mechanism to limit the effects of noise in digital data transmission. The project involved the implementation of Hamming and Convolution Codes in Simulink. The simulation helps in estimating the system performance. These results were plotted using BER Tool and models constructed in Simulink.

Fast Real Time Data Transfer using XMPP

This projects aims to develop a faster network systems wherein the information(image, audio, video) exchange can take place in fraction of seconds. The delay in exchange of the information can be reduced by using XMPP systems. When an access for a particular information of a room is requested by the client, the Raspberry Pi camera will first capture the image. The processing of the captured image is done using Python. The image is then compared with the database provided. Through the Raspberry Pi which is installed with XMPP server, the information is provided to the client.

Year of Completion : 2016
No.of Students :3
Student Name :Pooja M Krishnnapur, Shruthi M, Vasuki M R.

This project aims at provided a faster system for information exchange wherein no delay is involved at the time of communication. The specifications of our project is

- A Distributed system has been created wherein we have created our own XMPP Server and our own XMPP Client. Raspberry Pi is configured as an XMPP Server and also as an XMPP Client.
- Client-Server connection is established wherein client gets the necessary information from the server.

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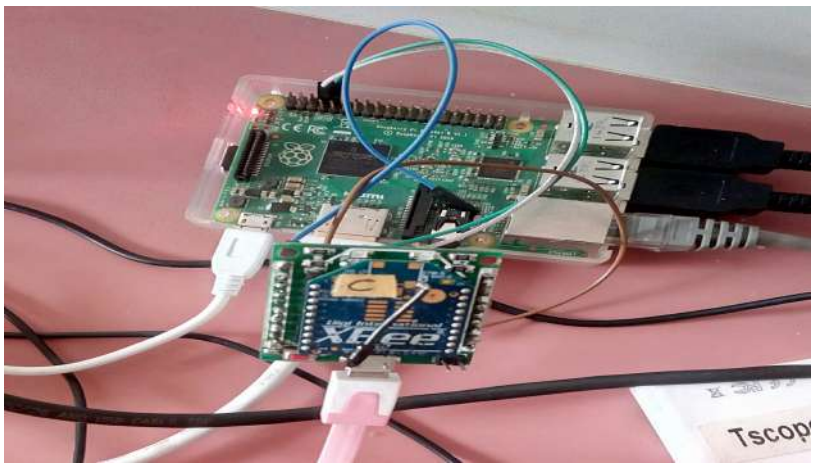
Year of Completion : 2016
No.of Students :3
Student Name :Anirudh N Navada, Karthik S N, Shreyas H B.



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IoT Paradigm for Vehicle Assistance

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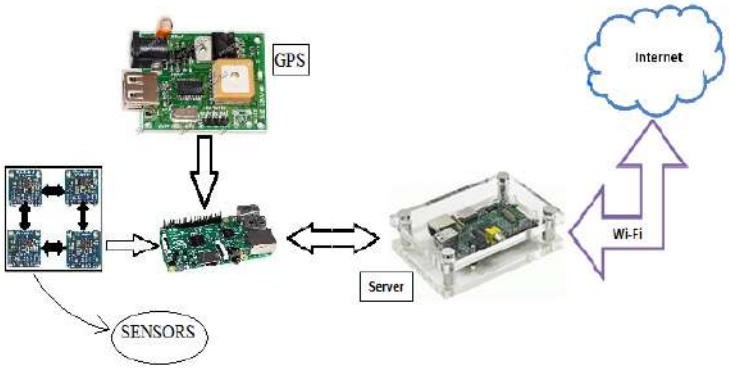
Year of Completion : 2016
No.of Students :3
Student Name :Spoorthi Jain B N, Subashree K, Yasaswini S.



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- Automation features is included to assist the user for the diagnosed fault in the vehicle.