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SMART DOOR LOCK SYSTEM

P AVINASH, II- EIE

Abstract:

Now a day's security is an issue of concern in our office, schools, laboratories, home, shops, etc. In order to make your data, money, premise, and personal belonging safe and secured from unauthorized person this project represent so finger print recognition system based on embedded system which will provide a complete security solution and making unable to access for further unauthorized people. The system stores the fingerprint of authorized person and only giving access to them. Fingerprint recognition is done by a sensor which can be connected to Arduino to validate for authentication. If the user's fingerprint has a positive or correct match the door will open otherwise the GSM module gets triggered and there glistered user gets a message and the buzzer connected will be indicated to alert the people or security. So, using Arduino we will implement the system with features which will increase the security level.

Introduction:

Security has become a major concern in the twenty first century; everybody wants to feel safe at his or her own home, workplace, and a safe environment as a whole. With the advancement in technology Smart door locking system has become more advanced. The android based smart door lock system here is basically designed for normal mode and multimode operations. Such system is very much required in Bank and Business organization. The system also gives functionalities for general user, where single user is authorized to operate the lock. The cost-effective implementation with advanced functionality and easy to use interface makes the system very useful. Biometrics refers to the automatic identification of a living person based on physiological or Behavioural characteristics for authentication purpose. Among the existing biometric technologies are the face recognition, fingerprint recognition, finger-geometry, hand geometry, iris recognition, vein recognition, voice recognition and signature recognition, Biometric method requires the physical presence of the person to be identified. This emphasizes its preference over the traditional method of identifying what you have such as, the use of password, a smartcard etc. Also, it potentially prevents unauthorized admittance to access control systems or fraudulent use of ATMs, Time Attendance Systems, cellular phones, smart cards, desktop PCs, Workstations, vehicles and computer networks. Biometric recognition systems offer greater security and convenience than traditional methods of personal recognition. The use of fingerprints as a personal code has a long tradition and was already used. This system focuses on the use of fingerprints for door opening and closing. The fingerprint recognition software enables fingerprints of valid users to be enrolled in a database. Before any user open the door, his/her fingerprint image is matched against the fingerprints in the database while users with no match in the database are prevented from opening door. The Arduino Uno stores the data equivalent of fingerprint of the master user. Comparison between this enrolled fingerprint and the fingerprint of the person who is about to use the open door is done by the micro controller. Fingerprint recognition is one of the most secure systems because a fingerprint of one person never matches with others. Therefore, unauthorized access can be restricted by designing a lock that stores the fingerprints of one or more authorized users and unlock the system when a match is found. Bio-metrics authorization proves to be one of the best traits because the skin on our palm sand soles exhibit s a flow like pattern of ridges on each fingertip which is unique and immutable. This makes fingerprint a unique identification for everyone. The popularity and reliability on fingerprint scanner can be easily guessed from its use in recent hand-held devices like mobile phones and laptop.

Architecture of the system:

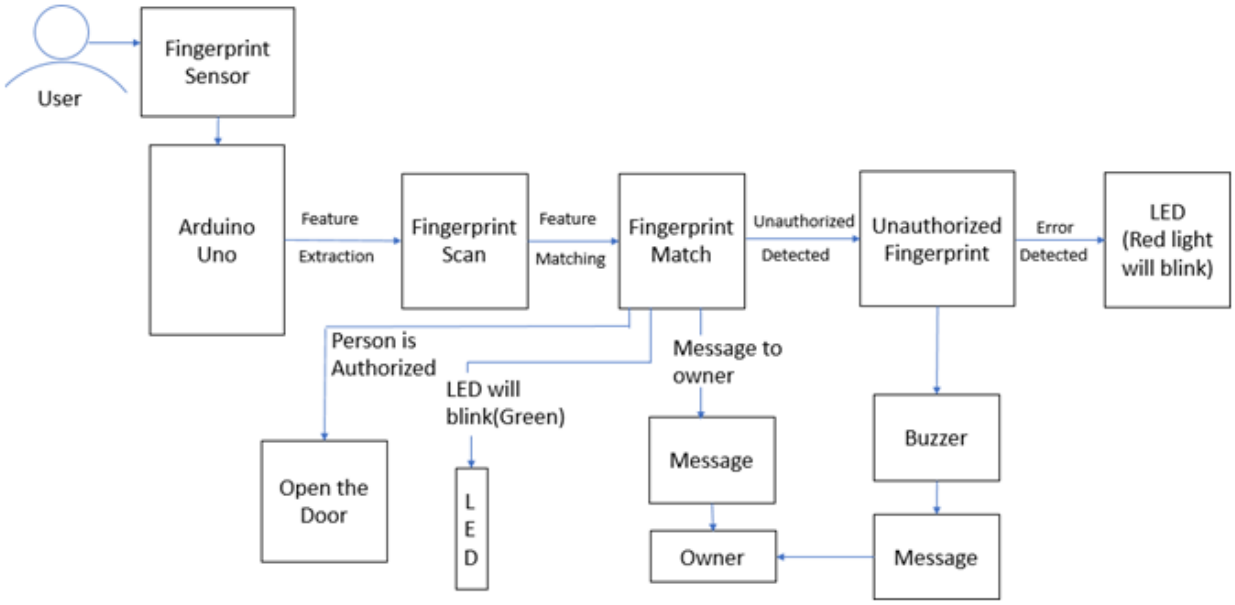

Figure: Architecture of the System

Fingerprint based door lock system. The core part of our project is the Arduino Uno. A fingerprint sensor R307 is interfaced to the Arduino. LED is interfaced for Signal. It helps to make troubleshooting easier. An alarm circuitry is provided to warn about an unauthorized use. In this system, user will enter fingerprint in the finger print scanner which is connected to the door latch through the microcontroller. After scanning the print, the system runs its database and looks for a match. If any match is found, the latch opens and thus the door gets unlocked. Same thing happens when user wants to lock the door. Correct fingerprint makes the latch to close, locking the door behind the user. If fingerprint of authorized person, then lock will open and send message to owner using GSM module. If wrong fingerprint is given, the system beeps the buzzer showing RED Signal by LED. After 3 wrong attempts, the system automatically gets locked showing RED Signal by LED i.e., if anyone tries to break in continuously, the system enters a secured mode where it rings the alarm. A message gets delivered to the owner notifying that there has been an attempt to break in.

Block Diagram for Enroll and Scan:

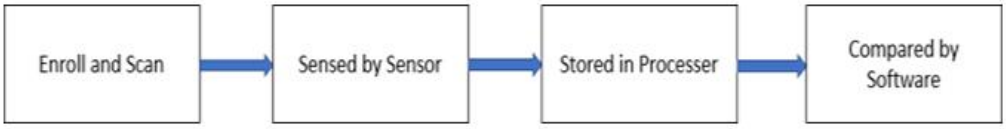

Fig: Enroll and Scanning Block Diagram

A fingerprint scanner is type of biometrics scanner. The fingerprint template consists of ridges and valleys on a fingertip and the ridges and valleys on every fingerprint structure create some unique features. Fingerprint processing includes two parts: fingerprint enrolment and fingerprint matching. While enrolling user needs to enter the finger two times. The system will process the two times finger image, generate the template of finger and compare it with template of the fingerprint library. For the matching system it will compare the live finger with specific template which is designated in the module.

The fingerprint sensor works on the matching algorithm

i.e, 1:1 and 1:Nmatching

Conclusion:

The use of the Arduino Uno in this project allows for design simplicity, hence, the project can be achieved in lesser time compared to other techniques previously employed. The design and implementation of fingerprint-based door lock system is customizable and flexible. This door locking mechanism is comparatively cost-effective than the available lock systems in the traditional market. Our fingerprint-based lock system has high accuracy rate and is also quick to recognize fingerprints which enable seamless integration with the users and provides tighter security. In our country, private and government organizations are very much concerned about security. Many companies are interested in using this type of locking mechanism but the system which is available have very high installation cost. Due to this excessive cost, many small firms cannot afford such systems. Keeping the installation cost in mind we planned to develop a system that should be

affordable to both large and small firms. This design can be improved by more intensive development and additional features such as more locks can be added to the system. Thus, we do not need to spend so much for just one lock if this can be used to control several doorways. A system to save prints without the use of a computer could have been made, but it will require more parts than the ones we used.

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Bio-medical Signal Monitoring System

G Meghana, II- EIE

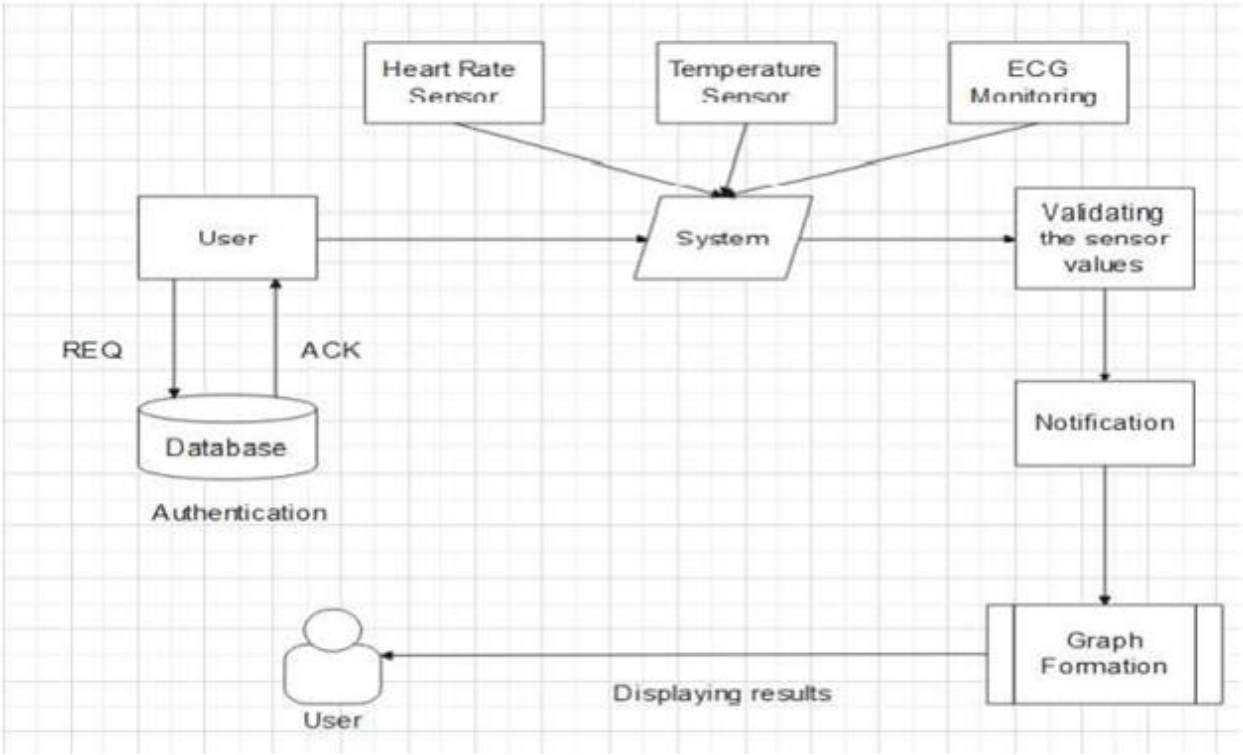
Introduction:

IOT health and ECG monitoring is depend upon the sensor. Firstone is a temperature sensor, second is Heartbeat sensor and the third one is humidity sensor. This project is very useful since the user can monitor health parameters just by visiting our application. And nowadays many IOT apps are also being developed. So now the doctor or family members can monitor or track the patient health through the Android apps. To operate To operate IOT based health ECG monitoring system project, you need a WiFi connection. The microcontroller or the Arduino board connects to the Wi-Fi network using a Wi- Fi module. This project will not work without a working WiFi network. You can create a WiFi zone using a WiFi module or you can even create a WiFi zone using Hotspot on your smart phone. The Microcontroller board continuously reads input from these 3 senses. Then it sends this data to the cloud. Ubiquitous vital signs sensing using wireless medical sensors are promising alternatives to conventional, in-hospital healthcare systems. The advent of modern age has shown a drastic shift in the way humans have worked leading into sedentary lifestyles. Change in dietary pattern where fresh food is replaced by processed and fast food along with the increase of stress has led to rise of cardio-vascular disease which is glaringly evident in developing countries. Especially, Asians are more prone to cardio-vascular diseases genetically. The ECG device is a diagnostic medical instrument which determines the electrical activity of the heart. We are providing the feature where it will give suggestion to particular ECG Situation.

A wearable ECG monitoring gadget-based system has been designed to associate with IoT and cloud service architecture for monitoring heart disease in this study. The sensors placed in the human chest records different ECG data through Arduino, and these data are transmitted to the IoT cloud without any delays. The HTTP and MQTT servers are put in the IoT cloud to provide users with quick and timely access to ECG data. The acquired data is stored in a no relational database that can continuously improve data storage velocity and flexibility. In addition, a graphical user interface, accessible via the internet, is developed for the availability of cardiovascular-based data for medical experts to analyze the patient's heart conditions. The proposed IoT cloud-related systems in this work ensure the effectiveness, reliability, and accuracy of the data collected.

Project Scope:

Sudden and unexpected death due to heart failure is a major cause of mortality among middle aged and elderly people. An efficient heart monitoring system can find out the malformation of heart conditions and that can also be helpful in diagnose at critical ambience. Sometimes the distance between patients and doctors is the main barrier that people do not have access to quality health services and thus having trouble for their regular health examine.



SDLC Models:

Planning: This is the first phase in the systems development process. It identifies whether or not there is the need for a new system to achieve a business's strategic objectives. This is a preliminary plan (or a feasibility study) for a company's business initiative to acquire the resources to build on an infrastructure to modify or improve a service. The company might be trying to meet or exceed expectations for their employees, customers and stakeholders too. The purpose of this step is to find out the scope of the problem and determine solutions. Resources, costs, time, benefits and other items should be considered at this stage.

Systems Analysis and Requirements: The second phase is where businesses will work on the source of their problem or the need for a change. In the event of a problem, possible solutions are submitted and analyzed to identify the best fit for the ultimate goal(s) of the project. This is where teams consider the functional requirements of the project or solution. It is also where system analysis takes place—or analyzing the needs of the end users to ensure the new system can meet their expectations. Systems analysis is vital in determining what a business's needs are, as well as how they can be met, who will be responsible for individual pieces of the project, and what sort of timeline should be expected. 10 KBTCOE, Nashik, Department of Instrumentation and Control Engineering - 2021-22 Bio-medical Signal Monitoring System.

Systems Design: The third phase describes, in detail, the necessary specifications, features and operations that will satisfy the functional requirements of the proposed system which will be in place. This is the step for end users to discuss

and determine their specific business information needs for the proposed system. It's during this phase that they will consider the essential components (hardware and/or software) structure (networking capabilities), processing and procedures for the system to accomplish its objectives.

Development: The fourth phase is when the real work begins—in particular, when a programmer, network engineer and/or database developer are brought on to do the major work on the project. This work includes using a flow chart to ensure that the process of the system is properly organized. The development phase marks the end of the initial section of the process. Additionally, this phase signifies the start of production. The development stage is also characterized by instillation and change. Focusing on training can be a huge benefit during this phase.

Integration and testing: The fifth phase involves systems integration and system testing (of programs and procedures)—normally carried out by a Quality Assurance (QA) professional—to determine if the proposed design meets the initial set of business goals. Testing may be repeated, specifically to check for errors, bugs and interoperability. This testing will be performed until the end user finds it acceptable. Another part of this phase is verification and validation, both of which will help ensure the program's successful completion.

Implementation: The sixth phase is when the majority of the code for the program is written. Additionally, this phase involves the actual installation of the newly developed system. This step puts the project into production by moving the data and components from the old system and placing them in the new system via a direct cutover. While this can be a risky (and complicated) move, the cutover typically happens during off- peak hours, thus minimizing the risk. Both system analysts and end-users should now see the realization of the project that has implemented changes.

Operations and Maintenance: The seventh and final phase involves maintenance and regular required updates. This step is when end users can fine-tune the system, if they wish, to boost performance, add new capabilities or meet additional user requirements.

Conclusion:

We have created and executed an ECG monitoring system that is entirely based on current IoT technologies. The IoT based ECG monitoring system is constructed based on the proposed design. IoT-based healthcare platform links with smart sensors affixed to the human body for health monitoring. We talked about IoT-based patient monitoring systems in this article. Smart phones or gadgets use intelligent technologies, and we have discussed the advantages, disadvantages, and opportunities. Continuous remote monitoring is required for observing the medical patient. Our research work provides the ability to monitor patients via web app services and mobile massage services continuously. This research also contrasted the early medical system to modern health monitoring. The work will bring

change in medical science and be a blessing for rural areas. The research work has proved its benefits already. We are planning for the further development of the project by promising that one day every people of our country will get immediate medical treatment with the help of our project.

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STEPPER MOTOR CONTROLLER USING ARDUINO

N ALESHWARI, II- EIE

Introduction:

Stepper Motor Control using Arduino is a project where a Bipolar Stepper Motor is controlled using Arduino UNO. Stepper Motor is a type of brushless DC Motor that converts electrical pulses into distinct mechanical movements i.e., the shaft of a stepper motor rotates in discrete steps. When a computer controls these steps, we can get precise position and speed control. Because of this discrete nature of step- wise rotation of a stepper motor, they are often employed in industrial automation, CNC systems, etc. where precision motion is required.

Components Required:

Arduino UNO

- ULN2003A Motor Driver IC
- Unipolar Stepper Motor
- Power Supply
- Prototyping Board
- Connecting Wires

A brief introduction to Stepper Motor:

A Stepper Motor is a type of DC Motor that rotates in discrete steps. Due to their unique design, stepper motors can be controlled for precise positioning without any feedback. A typical stepper motor has multiple coils that are divided into phases. When each phase is energized in sequence, the rotor of the stepper motor rotates in steps.

Figure1: Stepper motor (Source: https://www.electronicshub.org/)

Basically, there are three types of stepper motors: Variable Reluctance (VR) Stepper Motors, Permanent Magnet (PM) Stepper Motors and Hybrid Stepper Motors. Based on the winding of the stator, stepper motors can also be classified as Bipolar Stepper Motors and Unipolar Stepper Motors.

Figure2: Stepper motor types(Source: https://www.electronicshub.org/)

It is important to identify whether stepper motor is a bipolar or unipolar one. This is because, the driving method for each of these stepper motors is different from the other. For instance, the driver circuit of a unipolar stepper motor can be implemented with simple transistor-based circuit or a Darlington Transistor IC like ULN2003A. But in case of a bipolar stepper motor, we need to implement an H- bridge type driver like L293D Motor Driver IC.

The following Figure3 shows a bipolar stepper motor and Figure4 shows a 6 – wire unipolar stepper motor and a 5- wire unipolar stepper motor.

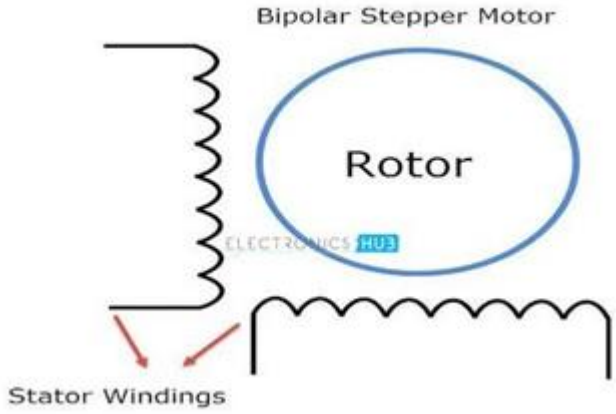

Figure3: Bipolar stepper motor(Source: https://www.electronicshub.org/)

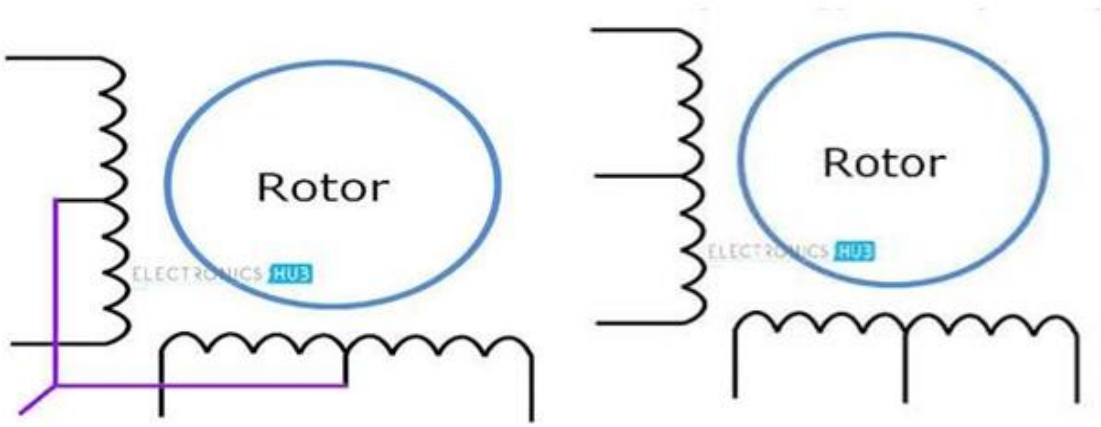

Figure4:Unipolarstepper motor(Source: https://www.electronicshub.org/)

The most common step angle or step count for stepper motors is 1.80 or 200 steps (both of them are same as 1.80x 200 = 3600).

Unipolar stepper motor has 6 pins. In these six pins, 2 pins are connected to the supply of 12V and the remaining are connected to the output of the stepper motor. Stepper rotates at a given step angle. Each step-in rotation is a fraction of full cycle. This depends on the mechanical parts and the driving method. There are different methods to drive a stepper motor. Some of these are explained below.

Full Step Drive: In this method two coils are energized at a time. Thus, here two opposite coils are excited at a time. Step Angle= 90-degree, No. of steps=04

Half Step Drive: In this method coils are energized alternatively. Thus, it rotates with half step angle. In this method, two coils can be energized at a time or single coil can be energized. Thus, it increases the number of rotations per cycle. Step Angle= 5-degree, No. of steps=08

ULN2003A:

The ULN2003A is a current driver IC. It is used to drive the current of the stepper motor as it requires more than 60mA of current. It is an array of Darlington pairs. It consists of seven pairs of Darlington arrays with common emitter. The IC consists of 16 pins in which 7 are input pins, 7 are output pins and remaining are VCC and Ground. The first four input pins are connected to the microcontroller. In the same way, four output pins are connected to the stepper motor.

System Design:

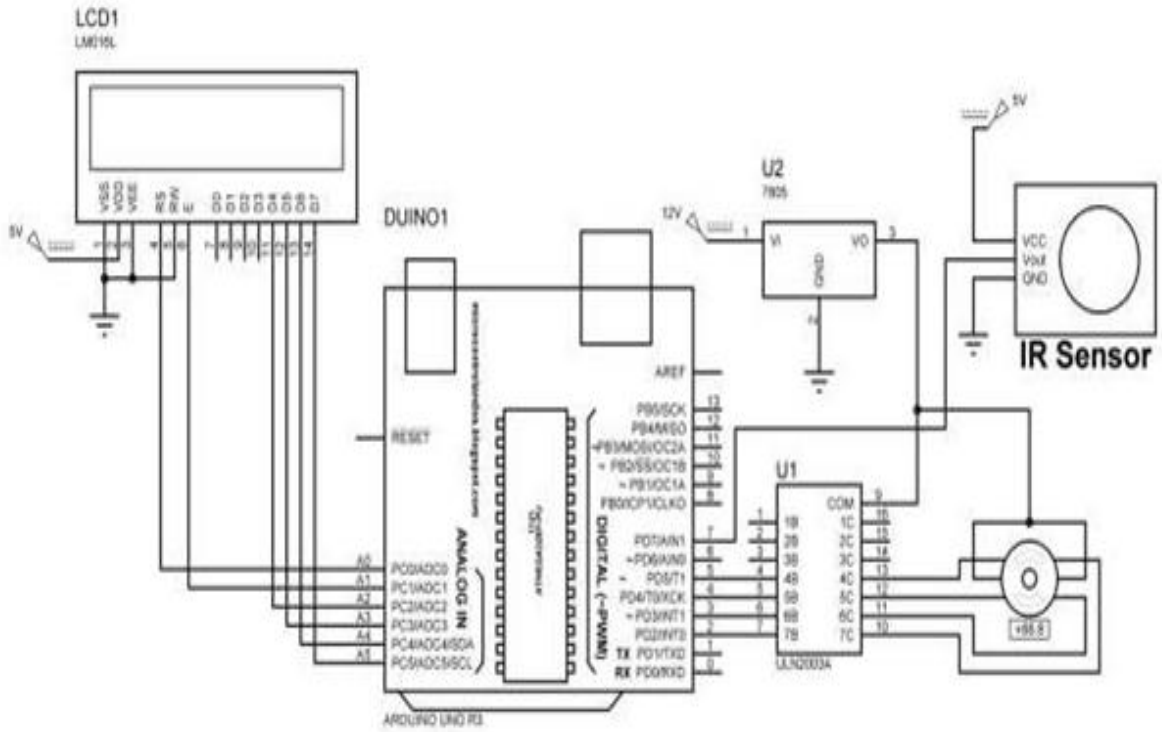

Figure5: Arduino based stepper motor control system

Applications:

The project demonstrates the working of a Stepper motor and Stepper Motor Control using Arduino. Stepper motors are commonly used in robots, CNC Machines, industrial automation, small appliances like printers etc. Due to their high accuracy and holding torque, stepper motors are used where precision positioning is essential.

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USE OF CNN IN ROTATING COMPONET HEALTH PROGNOSIS

T SRIHARIKA, II- EIE

Abstract:

Health prediction of rotating components is an important area in research. Rotating components failure may result in loss of operation, loss of energy and may cause human injuries. Some component health prediction systems may generate false alarms because of some reasons like too much reliance on expert knowledge and limited raw data from rotating component like bearing[1]. Three stages of machine health prognosis (a forecast of the likely outcome of a situation) are: Data acquisition, degradation assessment and RUL prediction (Remaining Useful Life prediction) [1]. MLP (multi layer perceptron) CNN (convolution Neural Network) based model is proposed in [1] based on HI (Health indices) construction. Global average pooling layer is added following the Mlpconv blocks. This captures features through multiple combinations of CNN. Pooling reduces dimensionality [2]. Pooling uses 2x2 windows with strides. Stride is like (shift displacement of a kernel over an input [3]. The work in [1] represents experimental results for 17 bearings at different speeds : 1500-1800 rpm at loads of about 4000N. This paper also include use of statistical terms like CI (a confidence interval (CI) is a range of estimates for an unknown parameter, defined as an interval with a lower bound and an upper bound[4]). There are simulators for bearing prognosis which can consider condition : a constant rotational speed purely oscillatory motion, and oscillatory excitation superimposed on rotation [5]. Neural Network hardware is usually FPGA (Field Programmable Gate Array) [6].

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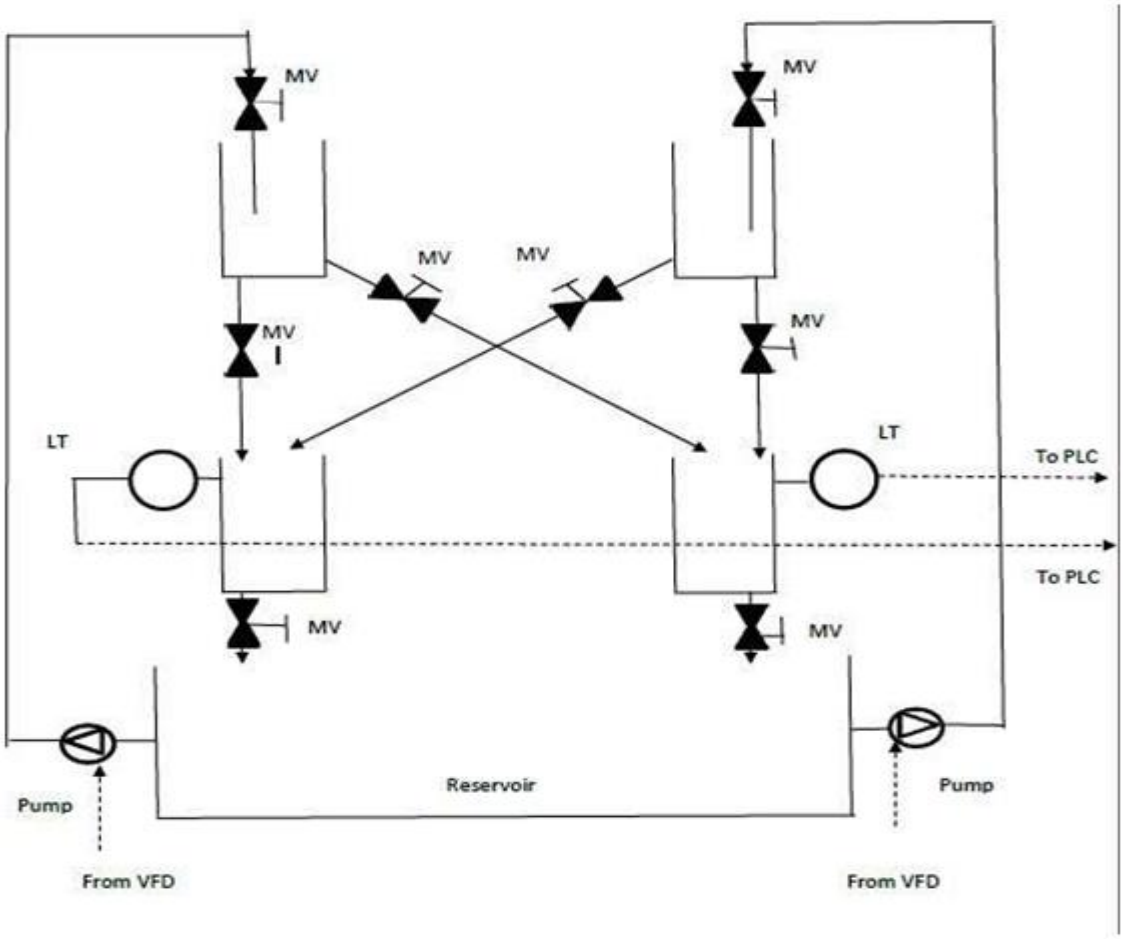
QUADRUPLE TANK LEVEL CONTROL: A MULTIVARIABLE PROCESS

CH Sai Deepthi, II- EIE

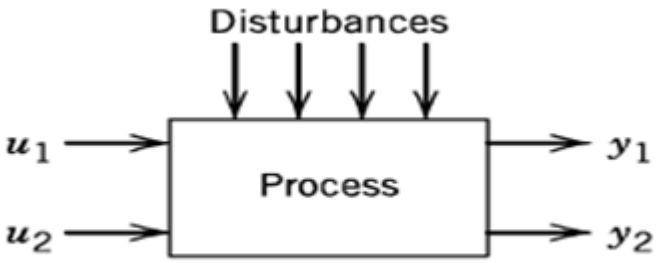
Introduction:

Now days in Industries a lot of multivariable control techniques are used. Multivariable processes are the processes consisting of multiple input variables and multiple output variables & these variables are interacting with each other that means if any of the input is changed at least one output will change. E.g.- Distillation column, Reactors etc. In a multivariable process both the location and direction of zeros are important for controller design. They have a direct physical impact on the process. However there does not exist any laboratory process that can demonstrate multivariable zero location and direction in an illustrative way. Hence our project focuses on such a multivariable system that illustrates this phenomenon.

Diagram And variables:



The Above system has 4 interconnected water tanks & 2 pumps. Here, The inputs are: Voltages to the 2 pumps (V1 & V2) The outputs are: Water levels in the lower 2 tanks(H1 & H2) This process can be termed as a multiple input multiple output (2*2) process and can be represented as below.



(b) Multiple-input, multiple-output process (2 × 2)

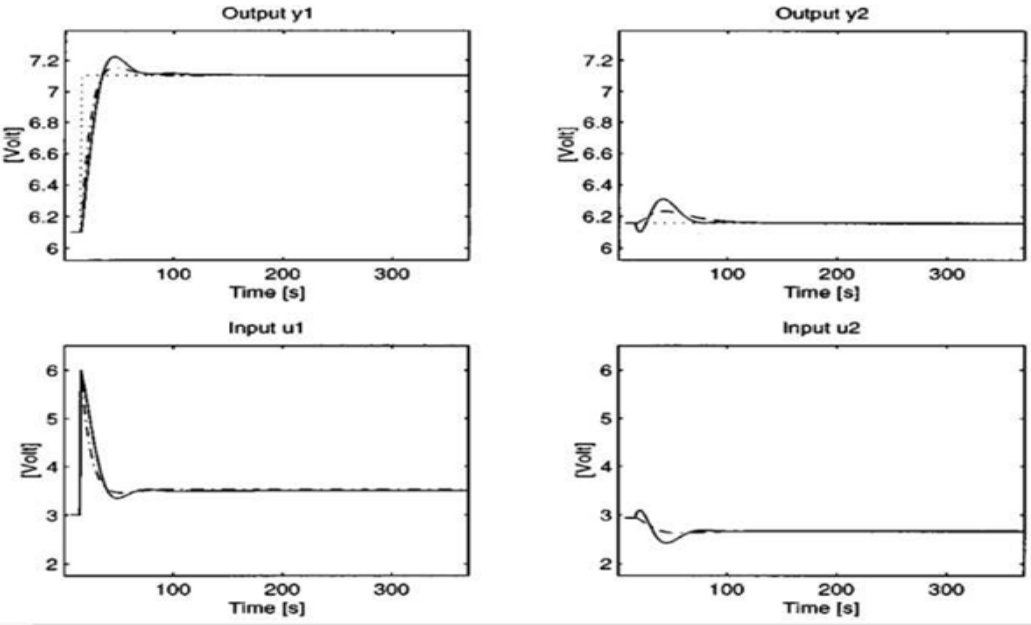
Here the inputs u1 and u2 are nothing but the 2 voltages (V1& V2) given to the pumps. And the outputs y1 and y2 are the levels (H1 & H2) of the 2 tanks. As in the diagram we can see that pipes from the tank 3 and 4 are going to tanks 1 and 2 as well. So this makes the variables interacting. There are two controlled variables and two manipulated variables, four process transfer functions are necessary to completely characterize the process dynamics.

H1(s)/V1(s)= Gp11(s) H1(s)/V2(s)= Gp12(s)

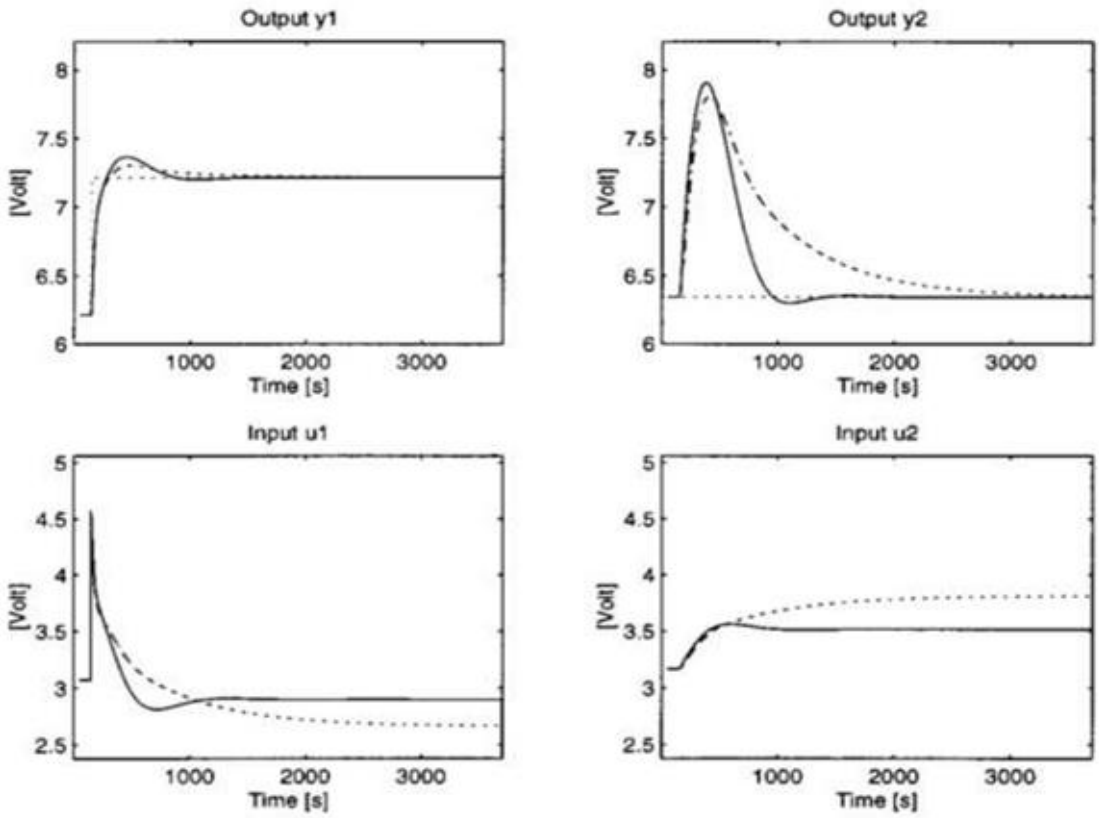
H2(s)/V1(s)= Gp21(s) H2(s)/V2(s)=Gp22(s)

In the paper that was published on this topic by Karl Henrik Johansson the RGA (Relative gain array) analysis and zero analysis is performed. The values of zeros and RGA were tested for 2 cases.

Minimum phase and Non minimum phase



Output of minimum phase



Output of non-minimum phase

These outputs show that it is more difficult to control the non minimum phase system than minimum phase system. Because of multivariable zeros at RHS

Conclusion:

A new multivariable laboratory process that consists of four interconnected water tanks has been described. A motivation for developing this process was to illustrate concepts in multivariable control Main purpose is to provide the connection between abstract control theory and the real world. Therefore it should give an indication of how control theory can be applied and also an indication of some of its limitations It was shown that the quadruple-tank process is well suited to illustrate performance limitations in multivariable control design.

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COLOR CHANGING TECHNOLOGY BY BMW

V Sai Bhargv, II- EIE

Introduction:

BMW Group wants to let you change the color of your car with the touch of a button. On Jan. 5, it debuted a concept vehicle called the BMW iX Flow, which uses electrophoretic technology to change colors from black to white or combine black and white in a kaleidoscope of graphics across the surface of its body. The iX Flow is based on the electric iX SUV that BMW debuted in 2021.

"The car dresses you, it expresses you not just from the inside but from the outside so we have tried to create a technology and adapted it to the car that allows you to do that," Christophe Grote, senior vice president of electronics at BMW Group, said during a roundtable interview during the launch. He also noted that being able to change a vehicle from dark to light while driving under hot temperatures would help with efficiency and thermal regulation inside the vehicle.

BMW worked with a company called E-Ink to develop the application for vehicles. Founded in 1997, E-Ink developed the technology used in Kindle readers and commercial displays for such brands as Sony and Amazon.com. BMW's application of e-ink works via a wrap tailored to cover the entire body of the SUV. The wrap contains different color pigments that, when stimulated by various electrical signals, will rise to the surface of the skin, causing it to change hue.

Figure: BMW iX Flow

How does BMW E Ink work?

The way BMW explains it, E Ink's electro phonetic wrap contains millions of microcapsules about the thickness of a human hair. Each microcapsule contains negatively charged white and positively charged black pigments. BMW also embeds an electrical field into the wrap, delivering the electrical signals that bring different color pigments to the surface, changing the color. Once the desired color is active, E Ink draws no further current from the car's electrical system to maintain the chosen hue.

Numerous ePaper segments compose the wrap, each precisely fitted to the applicable surface. On the BMW iX Flow, the automaker had to tailor each ePaper piece specifically

to the design of the SUV to properly reflect contours, light and shadows. Once BMW attaches all the pieces of ePaper to the surface and connects the embedded electrical field to a power supply, it warms and seals the wrap to the surface to ensure consistent color reproduction.

Advantages of BMW'S E ink color changing technology:

Not only BMW's E Ink Color Changing Technology allows you to change the color of your car, it can also bolster the efficiency of the iX Flow's air conditioning and heating systems. Black colored objects are good absorbers of heat than white cars Black surfaces are good absorbers of heat and white surfaces are better reflectors of heat. This approach has often been used in dry regions where buildings are painted in light colors to keep them cool. Similarly, you can change the color of your car to white to keep it cool during the summer and then switch to black to keep it warm during the winter.

For both the cases, the amount of energy used by the vehicle's electrical system will be reduced which will thus make the car's battery last longer on a single recharge.

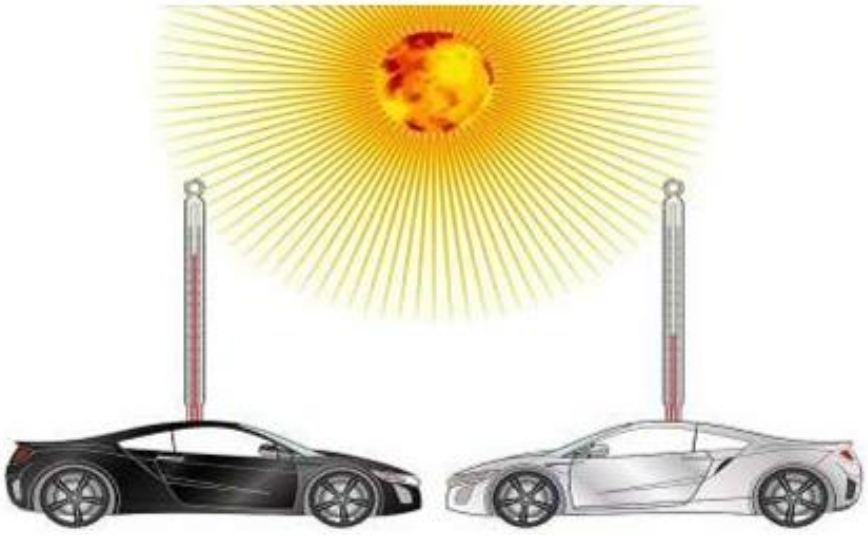

Figure: Black and white color in sunlight

Conclusion:

The E ink color changing technology will change the future of electric vehicles if is used in every EVs .As it is mentioned in advantages that the battery will last longer in single charge and will also bolster the efficiency of the air conditioning and heating systems in all the seasons.

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3. https://www.dubizzle.com/blog/cars/bmw-e-ink-colour-changing-technology/#:~:text=Advantages%20of%20BMW's%20E%20Ink,air%20conditioning%20and%20heating%20systems.

HOME AUTOMATION USING NODE-MCU

S Vamsi Vinay Nukesh, II- EIE

Introduction:

We have implemented IoT Based Home Automation Project using NodeMCU ESP8266. By Home Automation we mean controlling lighting, climate, entertainment systems, and appliances without a manual switch. It may also include home security such as access control and alarm systems. When connected with the Internet, home devices are an important constituent of the Internet of Things (IoT).

In this Home Automation System, we will control 2 home appliances as Fan and Light. The Wifi Module NodeMCU ESP8266 will receive commands from the Smartphone wirelessly through the internet using Google assistant or SinricPro. This project requires internet connectivity & can't work without Internet connection.

Block Diagram and Schematic Diagram:

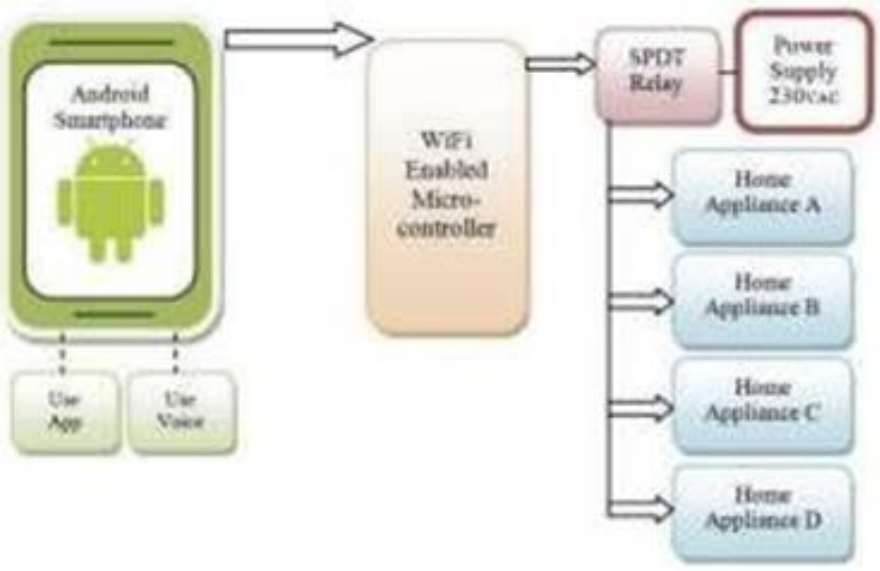


Fig. 1: Block Diagram of Home Automation Using Node-MCU

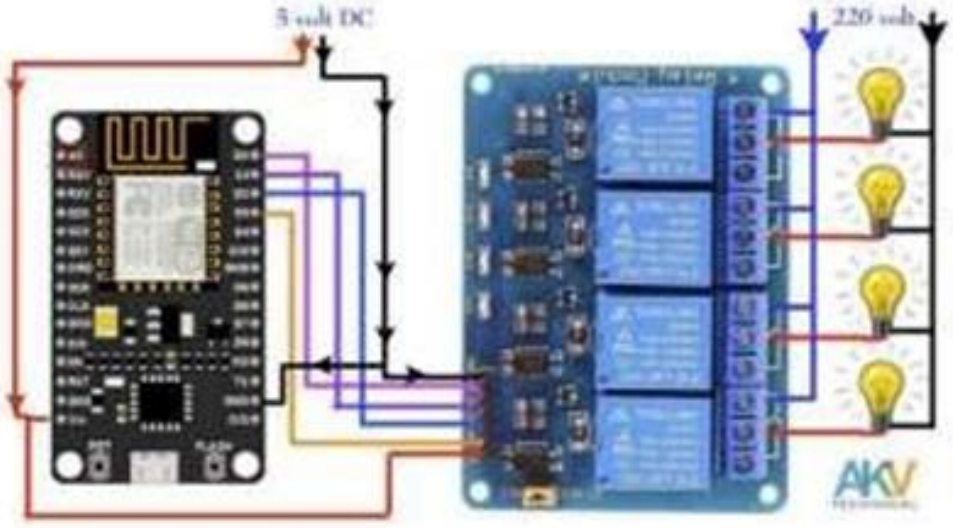


Fig. 2: Schematic Diagram of Home Automation Using Node-MCU

Working:

In this project we have used Google Assistant with Sinric pro to Control Light & fan with ESP8266. We are using IFTTT to access Google Assistant and control the appliances by using voice commands. ESP8266 has been programmed by using Arduino IDE, limiting resistor is used in the circuit to limit the current, hence preventing the circuit from getting damaged. For turning the Light on, one can open Google assistant and say ―OK Google Turn on Room Light‖ and this command will be sent to IFTTT cloud server then it will revert it to Google Assistant and it will reply with ―OK! Turning on Room Light‖ and at that time IFTTT will send this command to Sinric pro and there is Light control feed in Adafruit IO and it will turn on the button and Sinric pro will send this feed to ESP8266 by using MQTT (Message Queuing Telemetry Transport). For turning the Light off the same process is repeated. Whole process is same foe Fan also. The circuit and connections are shown in schematic diagram.

Hardware Used:

NodeMCU / ESP 8266: It is an open source IoT platform which includes firmware and hardware. The software runs on the ESP8266 Wi-Fi SoC (System-on-Chip) by Espressif systems. Hardware is based on the ESP12 module. ESP8266 is a SoC that integrates a 32-bit microcontroller, antenna, switches, filters, power amplifier, modules which manage power, and standard digital peripheral interfaces into a simple and small package.

Relay module: A relay is an electrically operated device. It is an automatic switch for controlling a high-current circuit with a low-current signal. It contains an induction part which can reflect input variable like current, voltage, power, resistance, frequency, temperature, pressure, speed and light etc. It also contains an actuator module (output) which can energize or de- energize the connection of controlled circuit.

Resistors: A resistor is a passive two-terminal electrical component that implements electrical resistance as a circuit element. In electronic circuits, resistors are used to reduce current flow, adjust signal levels, to divide voltages, bias active elements, and terminate transmission lines, among other uses.

Jumper Wires: A jumper wire is an electrical wire with a connector or pin at each end, which is normally used to interconnect the components of a bread board or other prototype or test circuit, internally or with other equipment or components, without soldering.

Software Used:

Sinric Pro: Sinric Pro enables developers to integrate IoT development boards (such as the RaspberryPi) with third-party applications or with Amazon Alexa and Google Home. This website can be used to retrieve device logs, find devices, update devices, etc.

ALEXA: With the coming of voice assistants comes the voice user interface (VUI) and the VUI introduces new ways of transferring information that aren't secure or well monitored. Basically, the voice command is given to the alexa and that command is passed to ESP through wi-fi connection between them and the ESP actuates the relay according to the required condition and the main operation takes place.

GOOGLE ASSISTANT: Same as above. Here the load that is connected is the home amenities like fan and light. The home appliances like fan, light are controlled, without any physical contact with the appliances.

Actual Image of Project:

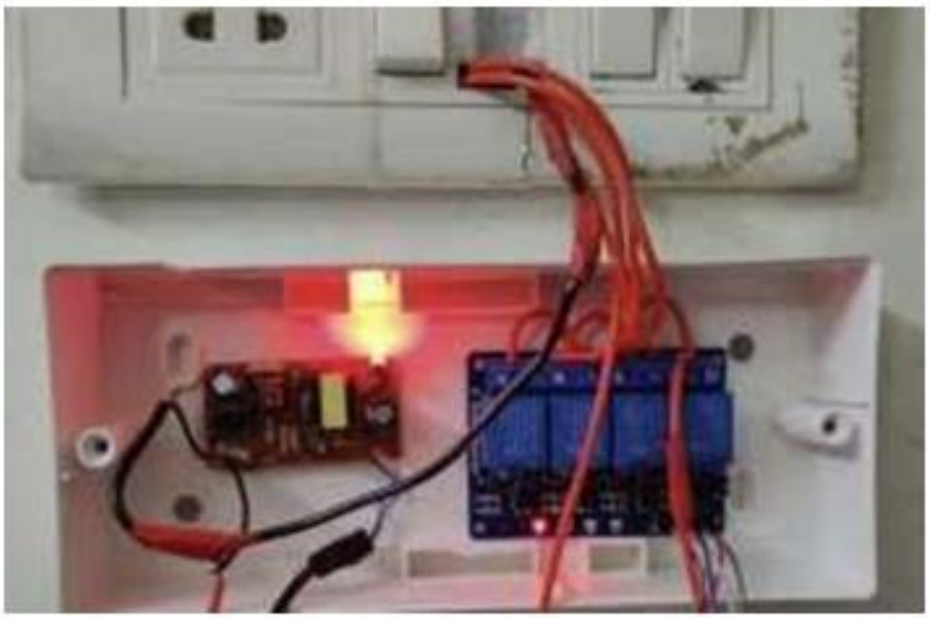


Fig. 3: Actual Image of Project

Conclusion:

The total cost of project comes around Rs. 1,000. This project gives insights about NodeMCU, its operation using Wi-Fi and its usage in Home Automation.

It reduces maintenance cost, enables wireless communication, saves energy & reduces manpower. Speed calibration is further possible in this process. Also, an upgraded version of NodeMCU can be used in future. This kind of automation generally used in small scale application but it can be used in large scale also.

PLC based Gate Automation

J Priyanka, II- EIE

Abstract:

Automated Gate is an automated movable barrier installed in entrance of any infrastructure for restricted access. At present, main gate of MVP's KBT College of Engineering is being operated manually thus it is hectic for the guards to open and close for every entry and exit of a vehicle, also it is time consuming. So, it needs to be automated to reduce human efforts, to save time and avoid traffic. The project consists of a Rack and Pinion and a Boom Barrier assembly, whole system is controlled using PLC controller. Both the assemblies i.e., rack and pinion and boom barrier are operated using AC motors with gear box. Also, the lamps at the entrance of the college are controlled using same PLC.

Introduction:

Programmable Logic controller (PLC) is the most powerful tool, which bought change in the electronics world in automation sector. PLC is well suited to the cyclic and repetitive operations. Unless a system reconfiguration is required the functions executed by a PLC are fixed, the programs need not be changed. Automotive technologies are gaining importance in modern days' traffic, safety and security control systems. The manually operated gates of schools and colleges are hectic to operate, time consuming and may lead to unforeseen accidents. Hence there is a perpetual need for safety critical gate control automation to avoid traffic jams, considering human life safety, and to reduce human efforts.

Therefore, in this work we have developed a PLC based Gate Automation System, in which PLC is going to control two sub gate systems i.e., Rack and Pinion and Boom Barrier assembly. The system is developed for main gate of MVP's KBT College of Engineering. Both the assemblies are operated using AC motors and gear trains. Besides sensors and limit switches are used to ensure proper operation of the gate. It is found that the implemented system works efficiently.

Proposed system:

Block Diagram:

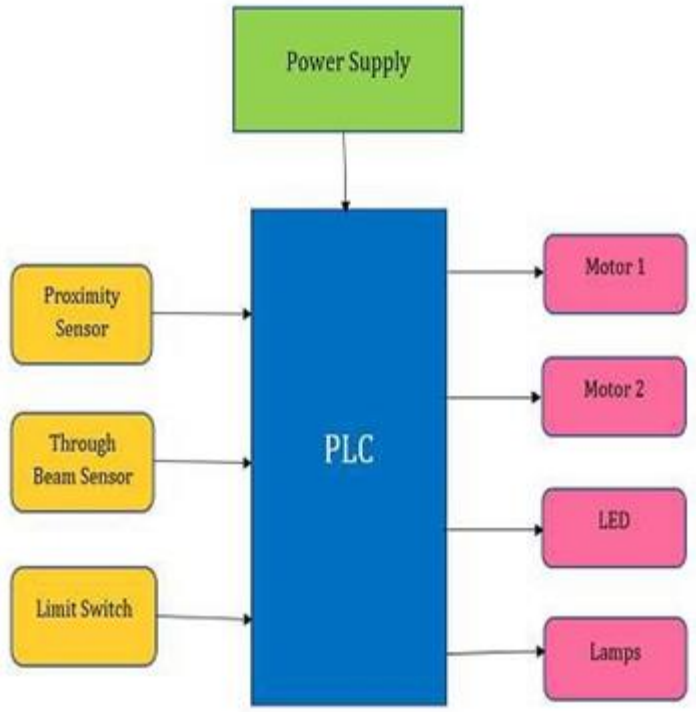
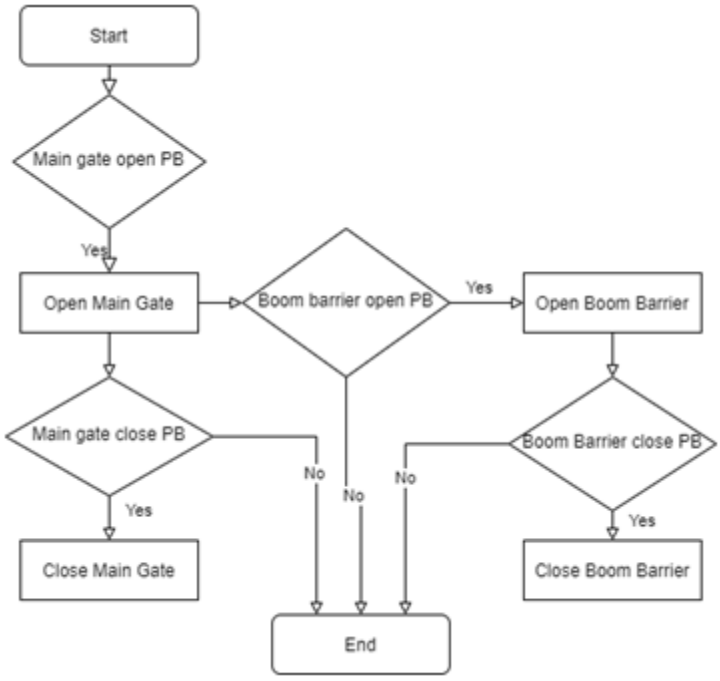


Fig 1: Block Diagram

Flowchart

There are two modes of operation:

i. Manual Mode:



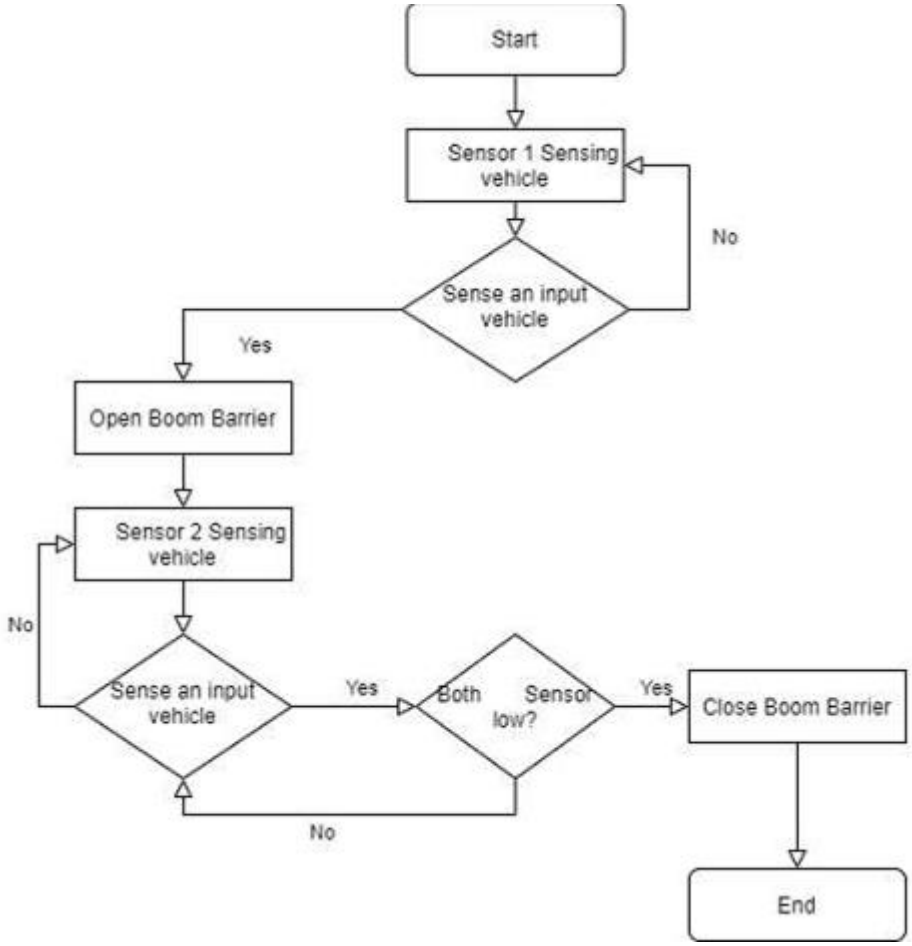


Fig 2: Flow Chart (Manual Mode)

Manual Mode:

When system is in manual mode all operations will be done manually.

In this project we have two basic motors

1. **Motor 1 –** Main gate motor
2. **Motor 2 –** Boom barrier motor

The task to be achieved is that when vehicle comes in front of the main gate the boom barrier should go up and as the vehicle leaves the second sensor the barrier should go down.

To achieve this, we have at present four sensors

1. **Sensor 1 –** Main Gate full open position
2. **Sensor 2 –** Main Gate full close position
3. **Sensor 3 –** Boom Barrier full up position
4. **Sensor 4 –** Boom Barrier full down position

- When the operator press the main gate open push button (PB).

- As soon as the button is pressed the main gate will open and remain in the open state till someone press main gate close PB.

- The extreme open and close position will be sensed by limit switches. When the main gate is open then if the operator press up PB the boom barrier will go up and remain up until someone presses down PB.

- The extreme up and down position will be sensed by the inductive proximity sensors.

Software development:

The software used for programming Siemens PLC's is Totally Integrated Automation Portal (TIA Portal) this Innovative simulation tool is highly flexible, secure, and easy to operate. It has advanced options like smart selection wizard for error-free configuration and ordering, Configuration options can be tested and simulated in advance, we have used student version of TIA V13.

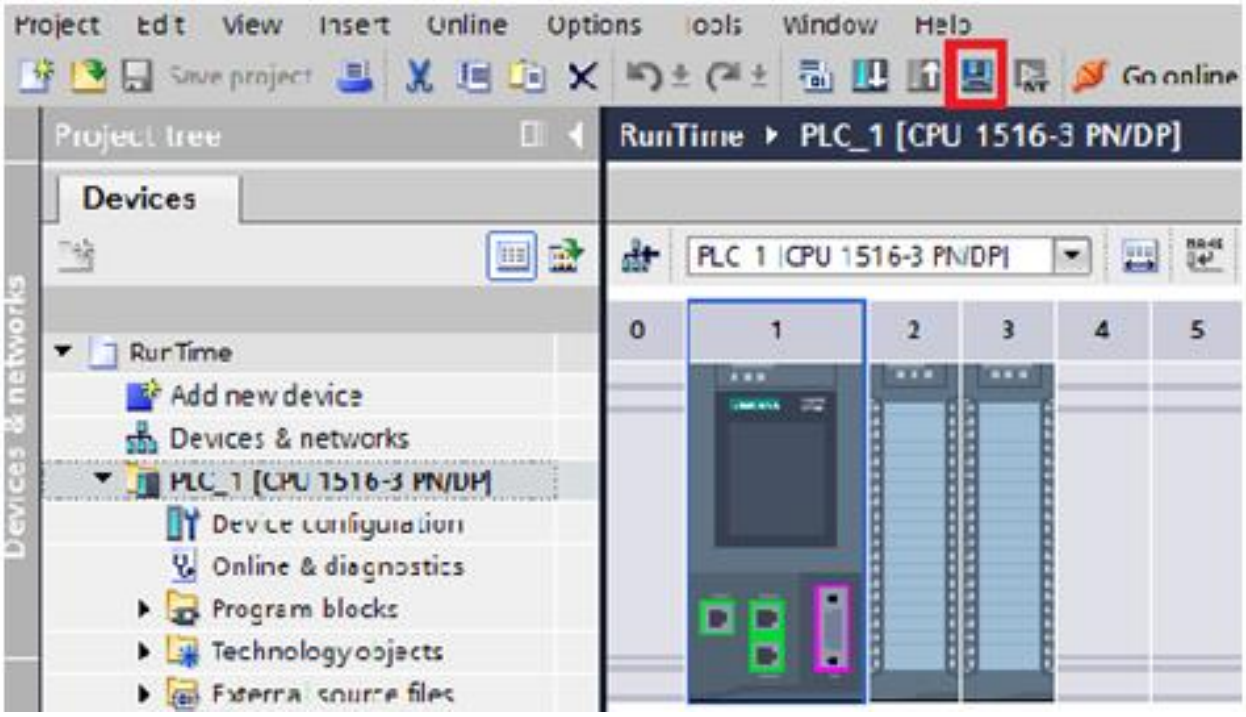


Fig 3: TIA Portal Software

Conclusions

Now a days, PLC's are being used to reduce maintenance and labour cost of many control systems. Therefore, it is highly recommended that operations like gate controlling will be based on such advanced controllers by considering risk factors, we have developed such a control system. The proposed system is designed to control a Institution gate with the help of PLC controller, Proximity sensors, Through beam sensors, Limit switches and Motors. The auto control of this system will reduce human efforts, labour cost, wastage of time and traffic. Also, the project contributes to a smart campus of a engineering institution. After on field implementation and successful testing of the whole system, it was found that the developed system operates very well.

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Intruder Detection System for Home Security using Open CV on Raspberry Pi 3

M Parthive, III- EIE

Abstract:

Home security system has established its importance and benefits numerous times by providing immediate monitoring of the house. This is because of the increasing home theft and burglary incidents that create an awareness among most of the house owners. CCTV-based security systems are not real-time because the alert comes to the owner after the incident occurred unless they are at home during the incident. To overcome this problem, many researchers are developing cost-effective custom-based security systems, which are affordable for everyone. Most of these systems use a Passive Infrared (PIR) motion sensor for motion detection. Although affordable, such a system still has many limitations. For example, false alarms triggered due to an abnormal condition such as rapid heating from sunlight exposure. In this work, a vision-based home security system using OpenCV on Raspberry Pi 3 model B was developed to improve the effectiveness of motion detection. This system applied the Hear-Cascade algorithm coupled with background subtraction as well as considered the Histogram of Oriented Gradients (HOG) during the development stage. The developed prototype was tested under a few conditions to determine the accuracy of motion detection and compare the results with a system that uses a PIR motion sensor for motion detection. From the results obtained, the developed vision based home security system using OpenCV has 100% of detection rate compared to the PIR motion sensor- based security system with 76% of the detection rate.

Introduction

Nowadays, the evolution of technology-based systems has drastically increased over the past few years. As the technology grows, it is no surprise that most of the work that was done by human will be taken over by machines. Although many people believe that this will make everyone to be lazy, it is an undeniable fact that this is for the betterment of humankind. Consequently, they have to confront this technology every day, which undoubtedly affects their lifestyle from the way they live until the way they work or relax. The convenience that technology provides them is the most common reason for their willingness to get it to affect their daily lifestyle to such extent Security has always been a major issue everywhere around the globe and the importance of security cannot be denied in today's society because of the increasing crime rate. For instance, in Malaysia, the high crime rate can make it a less safe place to stay. Home theft rate in Malaysia is the second highest crime [1] and this creates awareness in the society. Home security systems development using IoT infrastructure has become ubiquitous because of the high home theft rate. The most common features of the home security system are motion detection, live monitoring, and alert notification. Systems relying only on a Passive Infrared (PIR) sensor to accommodate for motion detection have unreliable detection rate because it could trigger a false alarm due to abnormal conditions such as pet intrusion or rapid heating [2] e.g., from sunlight exposure. False alarms can have significant impacts such as in security systems that trigger calls to the police [3] or other emergency agencies.

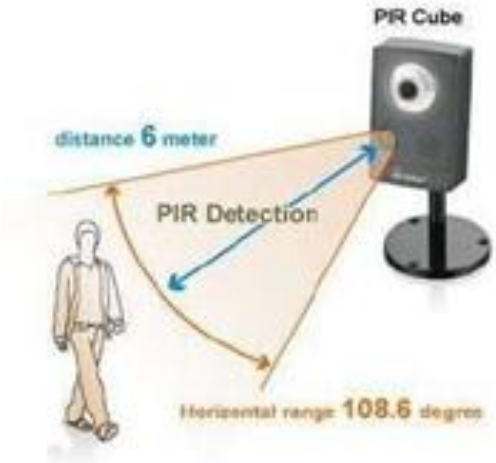
Software & hardware implementation

OpenCV

OpenCV (Open-Source Computer Vision Library) is an open-source computer vision and machine learning software library. OpenCV was built to provide a common infrastructure for computer vision applications and to accelerate the use of machine perception in the commercial products. Being a BSD-licensed product, OpenCV makes it easy for businesses to utilize and modify the code.

Passive Infrared (PIR) Sensor

PIR is a type of motion sensor. Fresnel lens, comparator, amplifier circuitry and time delayer circuitry are combined to form the basic Passive Infrared Device (PID) structure. The Fresnel lens in the PIR motion sensor has a special filter that allows the infrared signal to be focused onto the component. The Fresnel lens in a PIR motion sensor captures the incoming infrared (IR) radiation and direct its focus to the Centre point. The IR source moves and exposes one element at a time. The Fresnel lens detection range can go up to 30m and thus suitable for applications like PIR sensors. PIR sensor is one of the important mechanisms for motion detection in a security system. The sensor's functionality is to detect heat emitted from a human or a living body. The change in the radiation of infrared signal produced by moving warm- blooded living things is how the sensor detects. It is indeed the foundation tool for motion detection but using only PIR motion sensor to evaluate a movement will be insufficient.

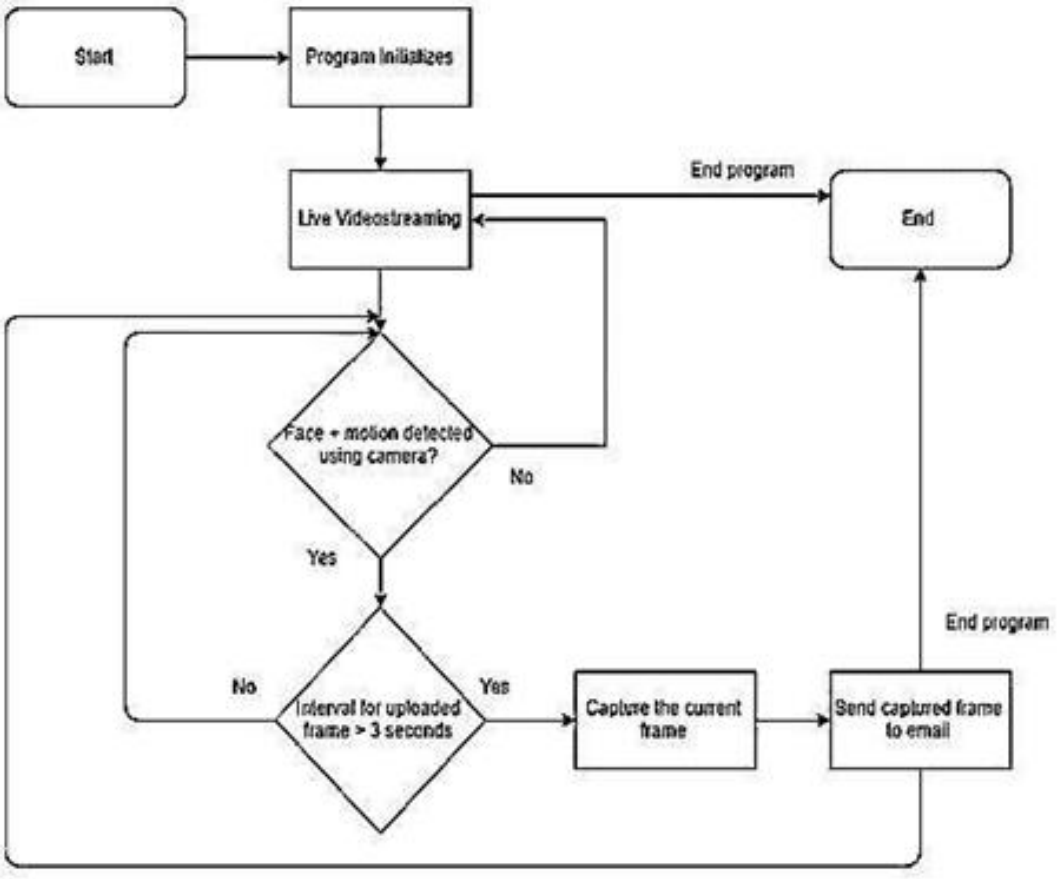


Raspberry Pi

The Raspberry Pi is a low cost, credit-card sized computer that plugs into a computer monitor or TV, and uses a standard keyboard and mouse. It is a capable little device that enables people of all ages to explore computing, and to learn how to program in languages like Scratch and Python. It's capable of doing everything you'd expect a desktop computer to do, from browsing the internet and playing high- definition video, to making spreadsheets, word-processing, and playing games.

System implementation:

System Flowchart



Video Streaming Demonstration:

Conclusion:

In this work, a home security system using a camera with OpenCV implementation has been successfully developed on Raspberry Pi 3 Model B. The system composed of both hardware and software implementations, where both parts collaborate to form an effective motion detection mechanism. The Haar-Cascade algorithm coupled with a background subtraction method was applied in the OpenCV implementation. The results obtained from the three conducted experiments suggest the high-accuracy of a vision-based motion detection system, eliminating false 020013-9 alarms. This OpenCV motion detection system was shown to be more effective than the developed PIR motion detection system, with a passing rate average of 100% against 76% based on the three experiments conducted

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Bio-Medical Signal Interface with DICOM Standard

V Chinmai, II- EIE

Abstract:

In this project we proposed to inteface biomedical signal (ECG,EEG,EMG)with DICOM standard using IOT.DICOM stands for the Digital Imaging & Communication in medicine .DICOM defines the formats for medical images that can be exchanged with the data & quality necessary for clinical use. DICOM is implemented in almost every radiology, cardiology imaging & radiotherapy device (X-ray,CT scan,MRI,Ultrasound etc).

The DICOM Network Protocol architecture:

Looks something like this Network ⇒ TCP/IP ⇒ DICOM ULP for TCP/IP ⇒ UL Service boundary ⇒ DICOM Message Exchange ⇒ Medical Imaging Application. To interface biomedical signals with DICOM we need software and hardware parts. In hardware side we need AD8232 sensor which used as signal conditioner in ECG signal, microcontroller 8051 to control all the activities and wifi module for connectivity. In software side we need any website which will work as server, mobile application to monitor the ECG signal

AD8232:

The AD8232 is an integrated signal conditioning block for ECG and other biopotential quantification applications. The supply current is typically 170µA and the operating voltage and temperature range is 2.0 to 3.6 V and −40°C to +85°C respectively. This withal contains the 2-pole adjustable high pass filter and it can accept up to ±300 mV of half cell potential. It has a high signal gain of 100. It may contain two electrode configuration or three electrode configurations and the sensor contains five pins namely L0-, L0+, Output Vcc, GND, and SND.

NODE MCU:

This board contains a microcontroller and WiFi module. The operating voltage of ESP 8266 is 3.3 V. The single board microcontroller utilized in this board contains 12 GPIO pins and D0.

Working:

The three lead ECG pins are connected to AD8232 sensor through which it senses by placing its sensing tips on three different places of patient body, at right arm, left arm and right leg AD8232 amplifies the signal engendered at the sensing tips of the pins and convert this physical quantity which is in analog nature into electrical quantity in terms of volts.These engendered signals in terms of voltage are supplied to Node MCU which accumulates the data from the sensor by processing and send this data to the cloud. A cloud IoT predicated platform application is utilized to post and visualize data on the cloud.Here we used such type of platform called ThingSpeak to post and visualize the data on cloud which updates perpetually predicated on the data given by the Node MCU.The Node MCU provides the authenticate ID through which the target end users can authenticate for access and can avail the accommodations.

Advantages:

- It can store the patient data every day. It is more secure.
- Less power consumption.
- The visualization of the patient heart rate is good.
- Less cost.

Conclusion:

The enhanced features of the smartphone, such as ro-bust sensors, wireless communication technologies high-speed processors, and a growing number of usage,made use of smartphones very vital in cardiac health monitoring. A categorical review of smartphone-based systems for real-time cardiac monitoring and abnormal-ity detection is presente in this paper. The primaryfocal point was the analysis of ECG for heart abnormal-ity detection using wearable sensors and smartphones.

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