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Department of
Electronics
and
Instrumentation Engineering

CONTENTS

VISION AND MISSION

DEPARTMENT VISION

To impart excellent education to provide globally competent Electronics and Instrumentation Engineers.

To establish Centre of Excellence and Research in Electronics and Instrumentation Engineering and allied fields.

DEPARTMENT MISSION

To prepare competent Electronics and Instrumentation Engineers who can pursue professional career and/ or higher studies.

To promote excellence in teaching with academically good ambiance that allows the learners to be socially responsible with professional ethics.

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From the HOD's desk

Work hard at what you like to do and try to overcome all obstacles

Laugh at your mistakes and praise yourself for learning from them

I am having immense pleasure to note that this year's edition of "**ICSARIA-VISION**" is ready to release. I would like to congratulate the team of active students and faculty leadership for their efforts to ram-up various department activities under the aegis of department association.

The department conducts many programs aimed to nurture a professional interest towards the domain of study among all members of the department and "**ICSARIA-VISION**" is one of the means to publish various creative articles and news which reflects state-of-the art.

Technology related developments are there in the field of robotics, Iot, machine learning, automotive electronics, healthcare and so on which are closely linked with the common man's life.

Plenty of opportunities as well as challenges are awaiting. Hope that "**ICSARIA-VISION**" could be a platform for both students and faculty members to conduct fruitful discussion on all these breakthrough developments. Let us strive together for a greener, technically enriched better India!

As an Instrumentation and Control Engineers, it is the need of the time to follow these changes and understand the state-of-the art technology in order to be updated in the domain.

I wish that, this endeavor is a humble beginning in this direction and wish all the success.

10 Essential Skills for Engineers in the 21st Century" - This article could explore the skills that engineers need to succeed in the modern world, including communication, leadership, and adaptability

Name : RGV Prasanna
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Class : IV- EIE

Engineering has always been a dynamic field, adapting and evolving with the times. In the 21st century, the role of engineers has become increasingly important in driving innovation and solving complex problems. However, the skills that were once considered essential for engineers have shifted in response to the changing landscape. In this article, we will discuss 10 essential skills for engineers in the 21st century.

Communication Skills

The ability to communicate effectively is critical for engineers in the 21st century. Engineers work on projects that involve cross-functional teams, stakeholders, and clients, and being able to convey technical information clearly and concisely is essential. Engineers must also be able to communicate with non-technical stakeholders to explain complex technical concepts and solutions.

Leadership Skills

Engineering projects often involve complex teams and multiple stakeholders, and strong leadership skills are critical for success. Engineers must be able to inspire, motivate and guide their teams to achieve their goals, while also effectively managing conflicts and ensuring that all parties are working towards a common objective

Adaptability

With the pace of technological change, engineers must be able to adapt to new technologies, processes, and tools. Engineers must be agile, able to pivot quickly in response to changes in the market, and willing to learn new skills to stay relevant.

Creativity

Innovation is at the heart of engineering, and engineers must be able to think creatively to develop new solutions to complex problems. Engineers must be able to approach problems from multiple angles, generate new ideas, and be willing to take risks to develop new solutions.

Critical Thinking

Engineering projects often involve complex technical challenges that require critical thinking skills. Engineers must be able to analyze complex systems, identify potential problems, and develop creative solutions to overcome these challenges.

Problem-Solving Skills

Engineers must be able to solve problems effectively and efficiently. Engineers must be able to identify the root cause of a problem, develop solutions, and implement those solutions in a timely and effective manner.

Technical Competence

Engineering is a technical field, and engineers must be competent in their specific area of expertise. Engineers must have a deep understanding of the technical principles and concepts in their field and be able to apply that knowledge effectively to solve complex problems.

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Engineering is a technical field, and engineers must be competent in their specific area of expertise. Engineers must have a deep understanding of the technical principles and concepts in their field and be able to apply that knowledge effectively to solve complex problems.

Collaboration Skills

Engineering projects often involve cross-functional teams, and engineers must be able to collaborate effectively with other engineers, designers, stakeholders, and clients. Engineers must be able to work together to achieve common goals, while also being open to new ideas and approaches.

Ethics and Professionalism

Engineers must uphold the highest standards of ethics and professionalism in their work. Engineers must be committed to ethical practices and principles, including safety, sustainability, and social responsibility.

In conclusion, the role of engineers in the 21st century is rapidly evolving, and engineers must have a diverse skill set to succeed in this dynamic field. Effective communication, leadership, adaptability, creativity, critical thinking, problem-solving, technical competence, project management, collaboration, and ethics and professionalism are all essential skills for engineers in the 21st century. By developing these skills, engineers can drive innovation, solve complex problems, and make a significant impact on the world.

Mass Migration and its future impact

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Mass migration has become an increasingly prevalent phenomenon in recent years, as people around the world seek better economic, social, and political opportunities. While migration has been a part of human history for thousands of years, the scale and scope of contemporary migration has raised questions about its long-term impact on both the countries of origin and destination. O e of t e most significant impacts of mass migration is its effect on the economies of both the sending and receiving countries. In many cases, migrants are drawn to countries with stronger economies and higher wages, where they can earn more money and support their families. However, this can create labor shortages in the countries of origin, as skilled workers and professionals leave for other opportunities. In the receiving countries, mass migration can create competition for jobs and resources, as well as new opportunities for economic growth and diversity. Another impact of mass migration is its effect on social and cultural dynamics. When people from different cultures and backgrounds come together in a new place, they often bring with them their own traditions, customs, and beliefs. This can lead to the creation of vibrant multicultural communities, but it can also lead to tensions and conflicts between different groups. It is important for both the migrants and the receiving communities to engage in cultural exchange and understanding to promote social cohesion. Mass migration can also have political implications, particularly in the countries of origin. When large numbers of people leave a country, it can lead to a brain drain, where the most skilled and educated individuals leave, which can hamper economic growth and development. Additionally, mass migration can put pressure on the political systems of both the sending and receiving countries, leading to debates about immigration policy and national identity. Looking towards the future, it is likely that mass migration will continue to be a major global issue, particularly as climate change and political instability drive people to seek new opportunities and safety. It is important for policymakers to take a long-term, holistic approach to managing mass migration, taking into account the economic, social, and political impacts on both the sending and receiving countries. This requires cooperation and coordination between nations, as well as a commitment to promoting human rights and dignity for all individuals, regardless of their country of origin or destination. In conclusion, mass migration is a complex issue that has significant economic, social, and political impacts on both the sending and receiving countries. While migration can bring opportunities and benefits to individuals and communities, it can also create challenges and tensions. It is important for policymakers to recognize the long-term implications of mass migration and to work towards solutions that promote the well-being and dignity of all individuals involved. Another potential impact of mass migration is its effect on the environment. As more people move into urban areas, it can lead to increased demand for resources and infrastructure, including housing, energy, and transportation. This can put pressure on natural resources and contribute to pollution and environmental degradation. It is important for policymakers to consider the environmental implications of mass

migration and to work towards sustainable development strategies that balance economic growth with environmental conservation. Mass migration can also have an impact on health, particularly in the context of infectious diseases. When large numbers of people move into a new area, it can increase the risk of disease transmission and outbreaks. This can pose challenges for healthcare systems and require coordinated efforts to promote public health and prevent the spread of infectious diseases. Finally, mass migration can have an impact on the human rights of migrants and their families. Many migrants face challenges such as discrimination, exploitation, and violence, as well as difficulties accessing healthcare, education, and other basic services. It is important for policymakers to prioritize the protection of human rights for all individuals, regardless of their migration status, and to work towards policies and programs that support the integration and well-being of migrants and their families.

STEPPER MOTOR CONTROLLER USING ARDUINO

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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.

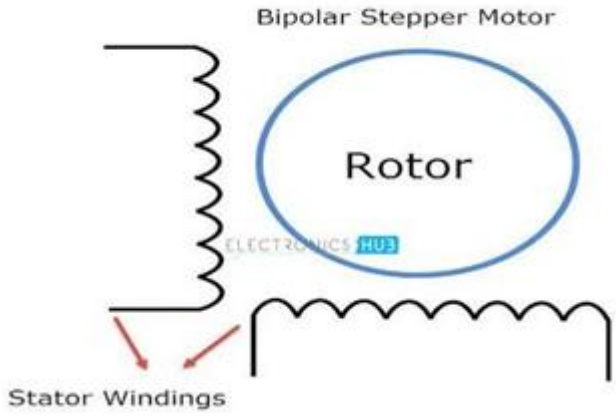

Figure3: Bipolar stepper motor(Source: https://www.electronicshub.org/)

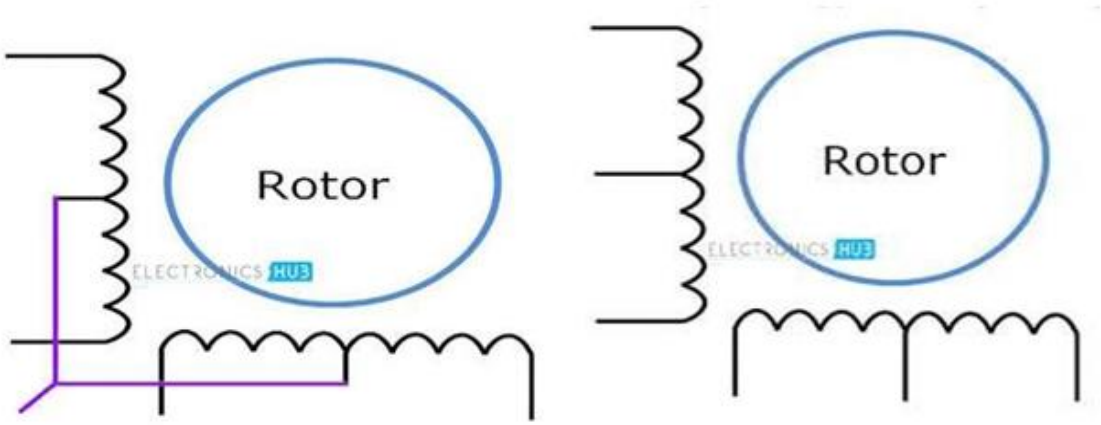

Figure4:Unipolarstepper motor(Source: https://www.electronicshub.org/)

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:

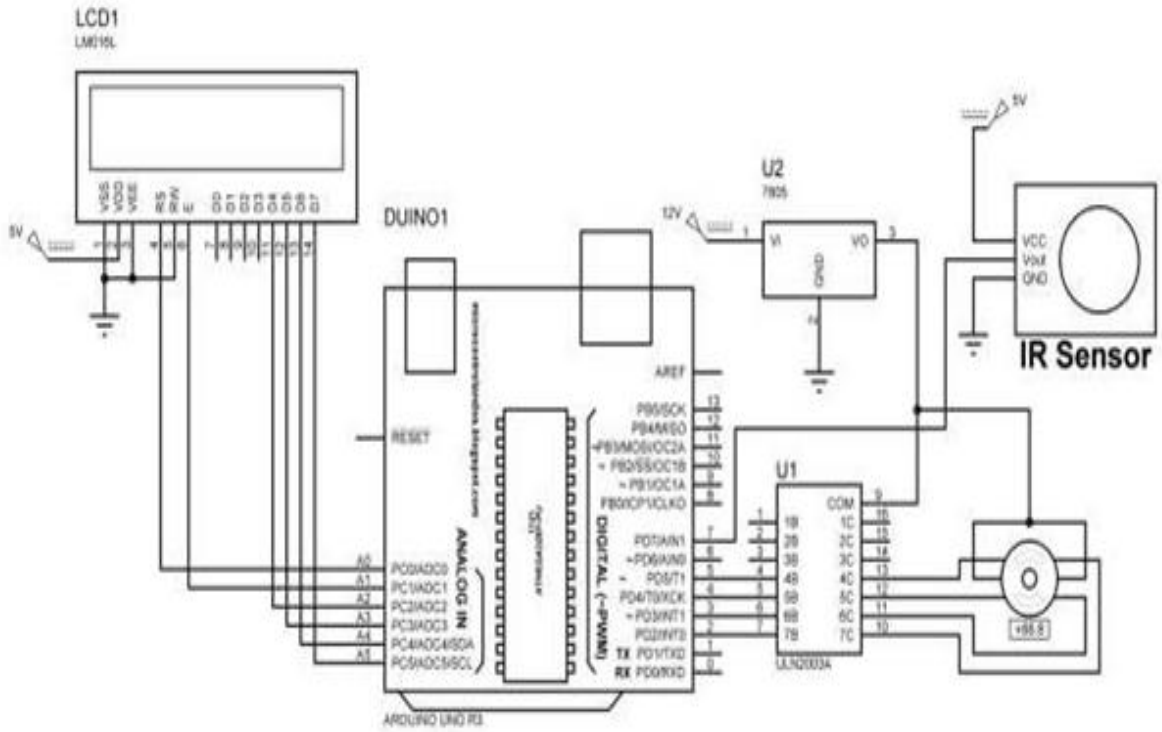

Figure5: Arduino based stepper motor control system

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

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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

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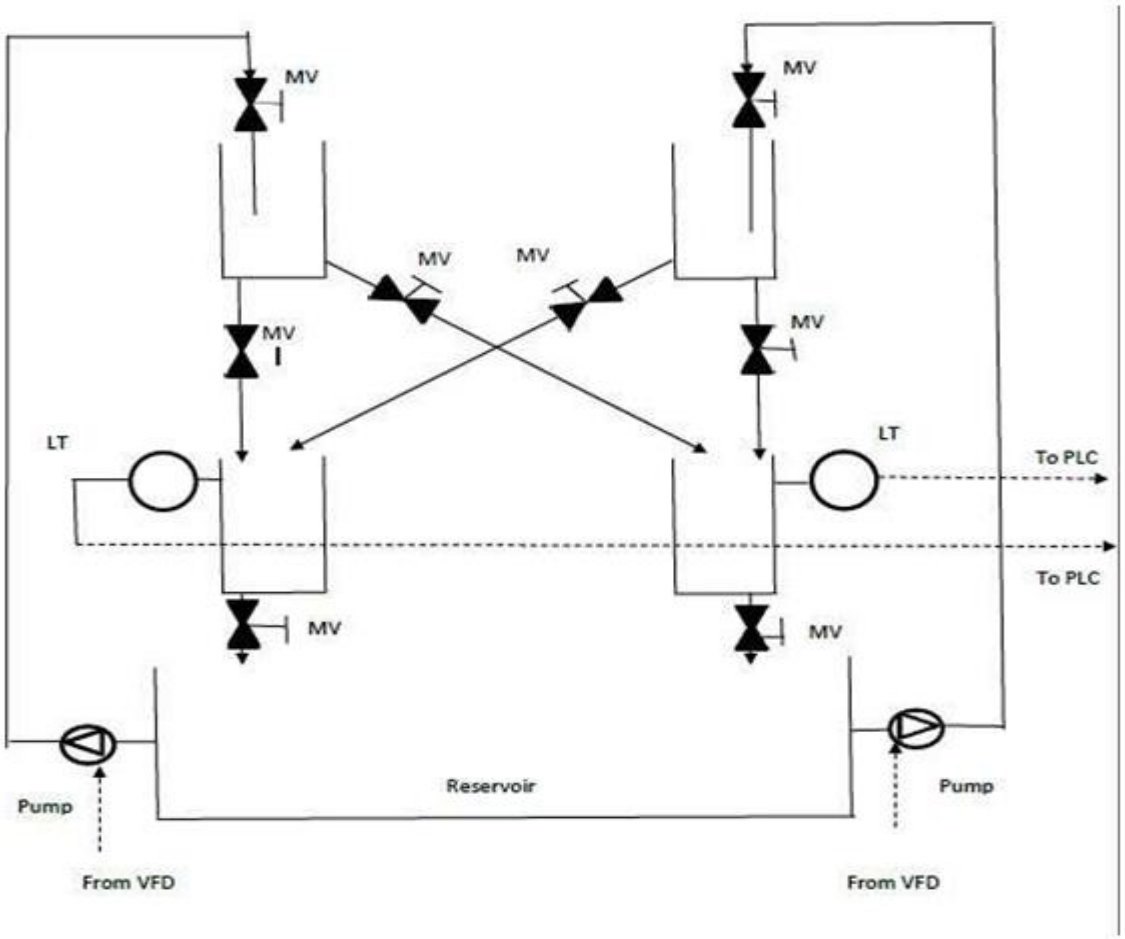
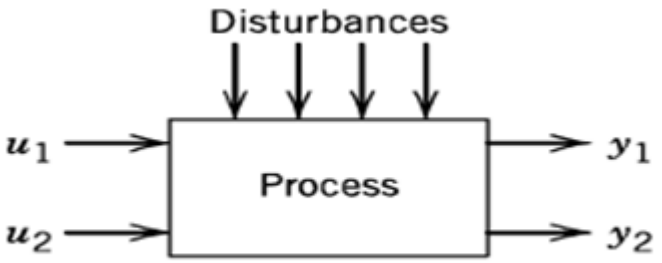
Introduction:

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)

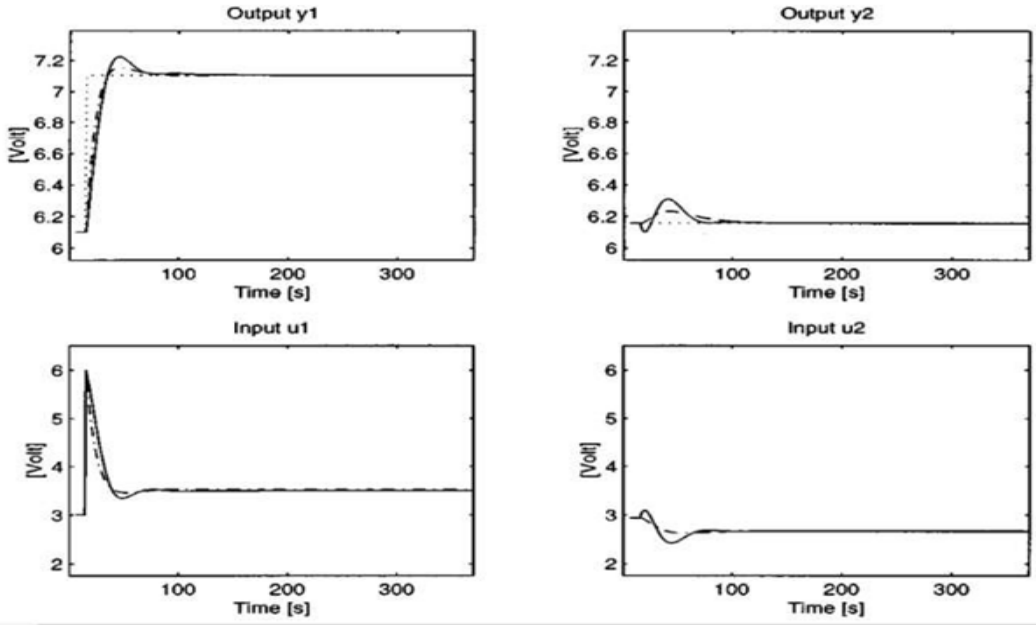
Here the inputs u1 and u2 are nothing but the 2 voltages (V1& V2) given to the pumps. And the outputs y1 and y2 are the levels (H1 & H2) of the 2 tanks. As in the diagram we can see that pipes from the tank 3 and 4 are going to tanks 1 and 2 as well. So this makes the variables interacting. There are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

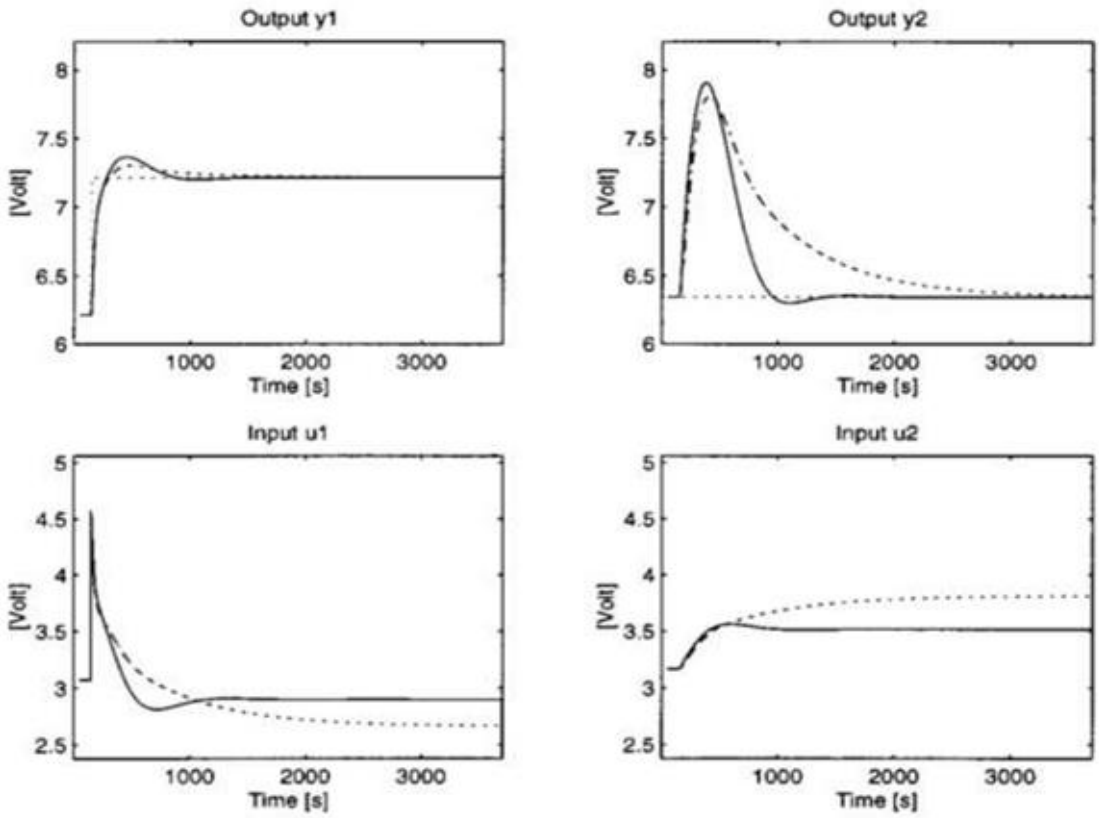
H2(s)/V1(s)= Gp21(s) H2(s)/V2(s)=Gp22(s)

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

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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.

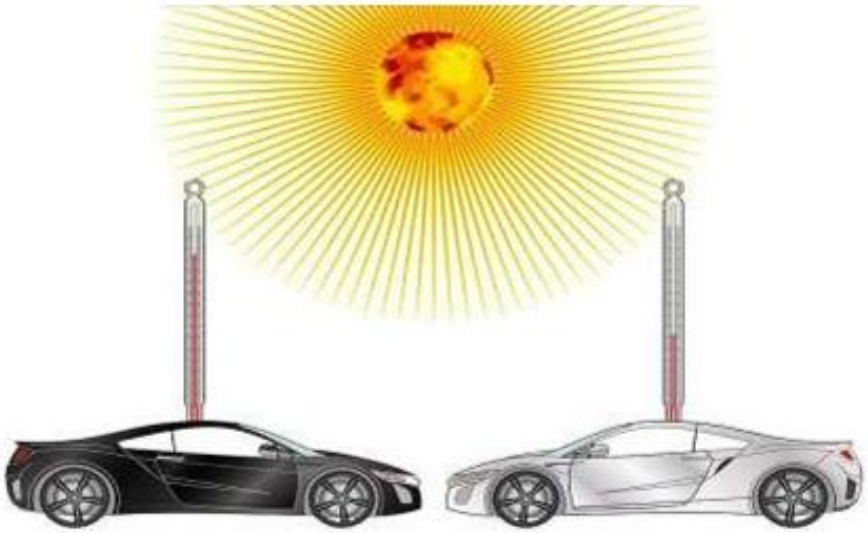

Figure: Black and white color in sunlight

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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HOME AUTOMATION USING NODE-MCU

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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:

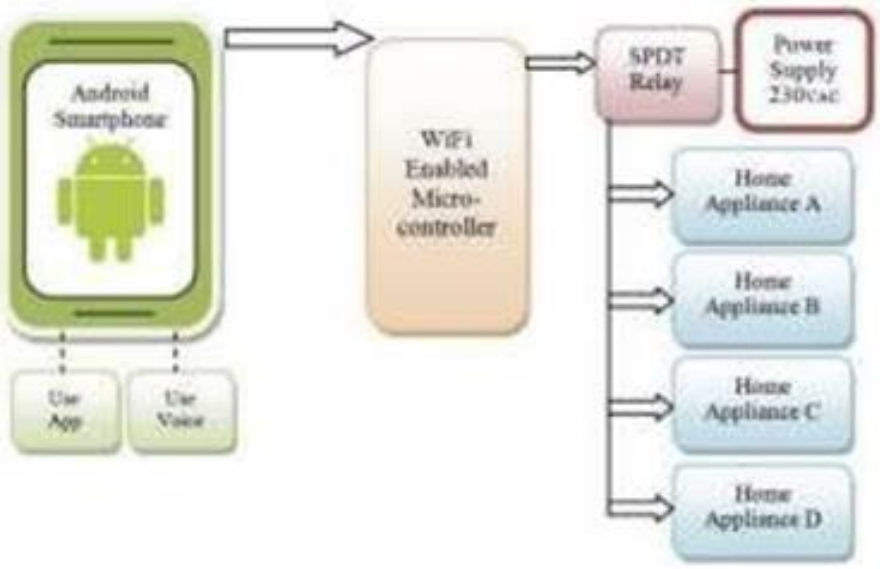

Fig. 1: Block Diagram of Home Automation Using Node-MCU

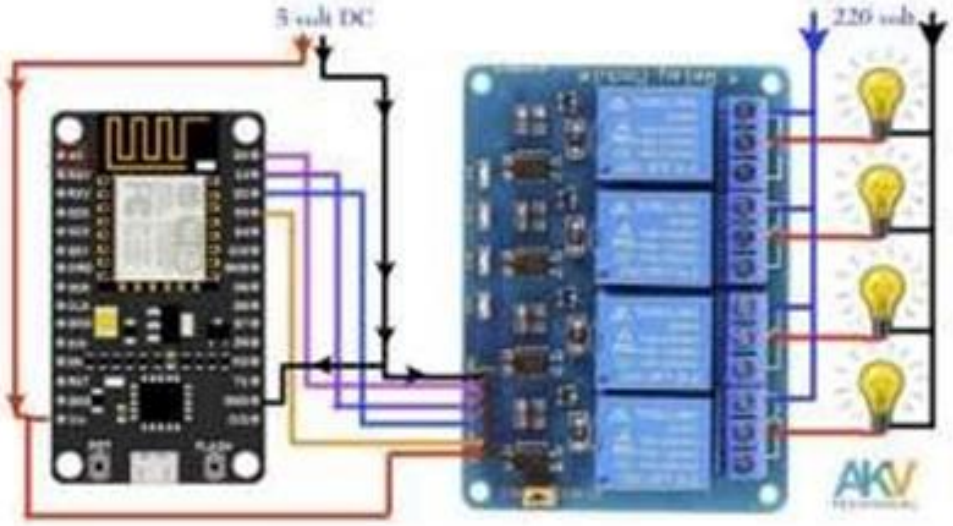

Fig. 2: Schematic Diagram of Home Automation Using Node-MCU

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:

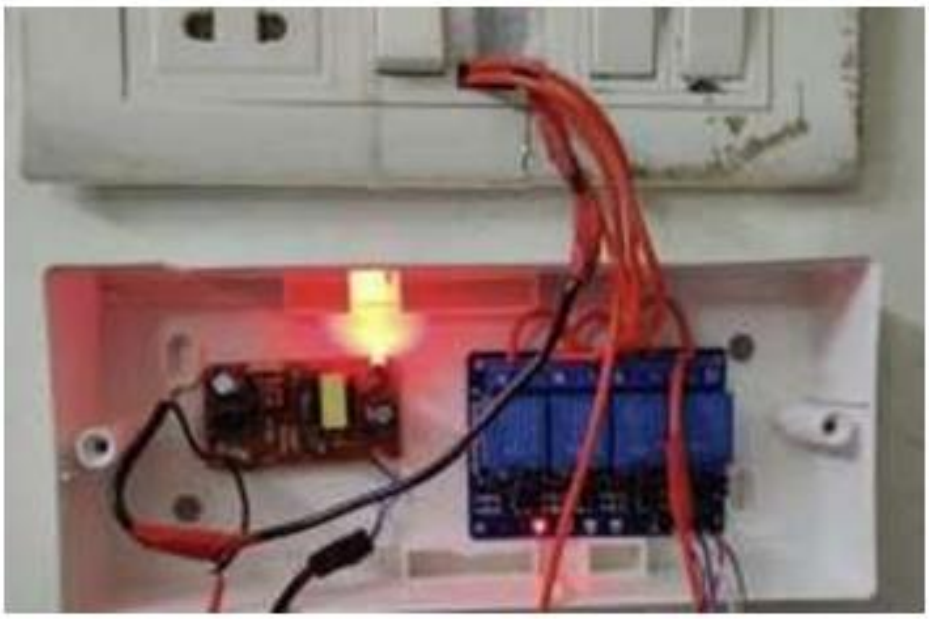

Fig. 3: Actual Image of Project

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

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Class : IV- 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:

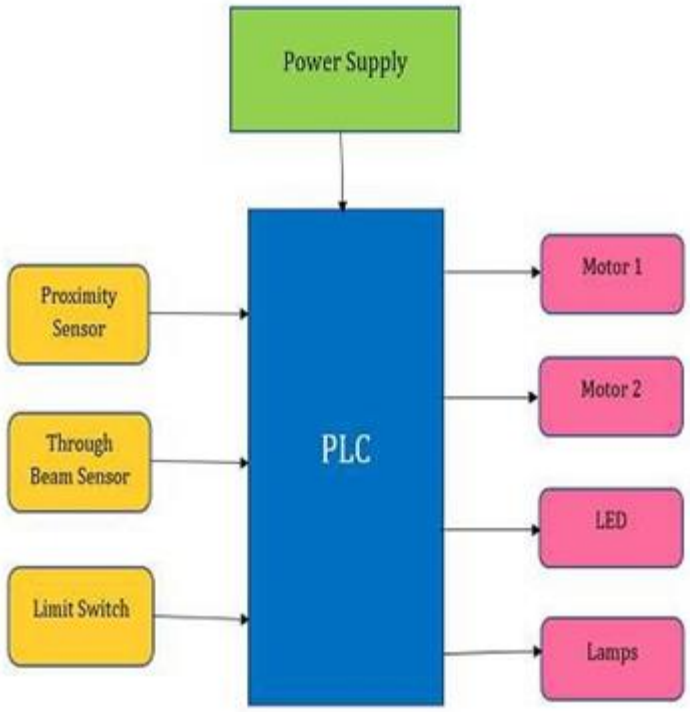
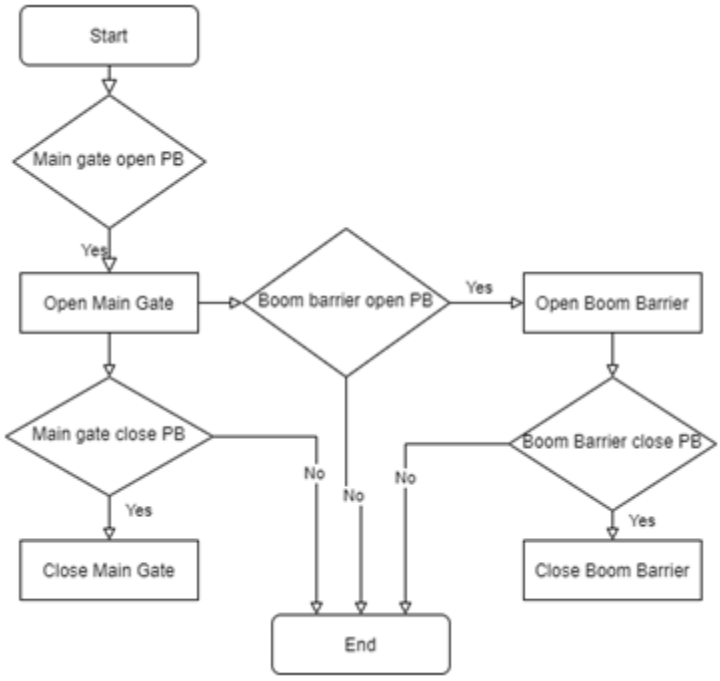


Fig 1: Block Diagram

Flowchart

There are two modes of operation:

i. Manual Mode:



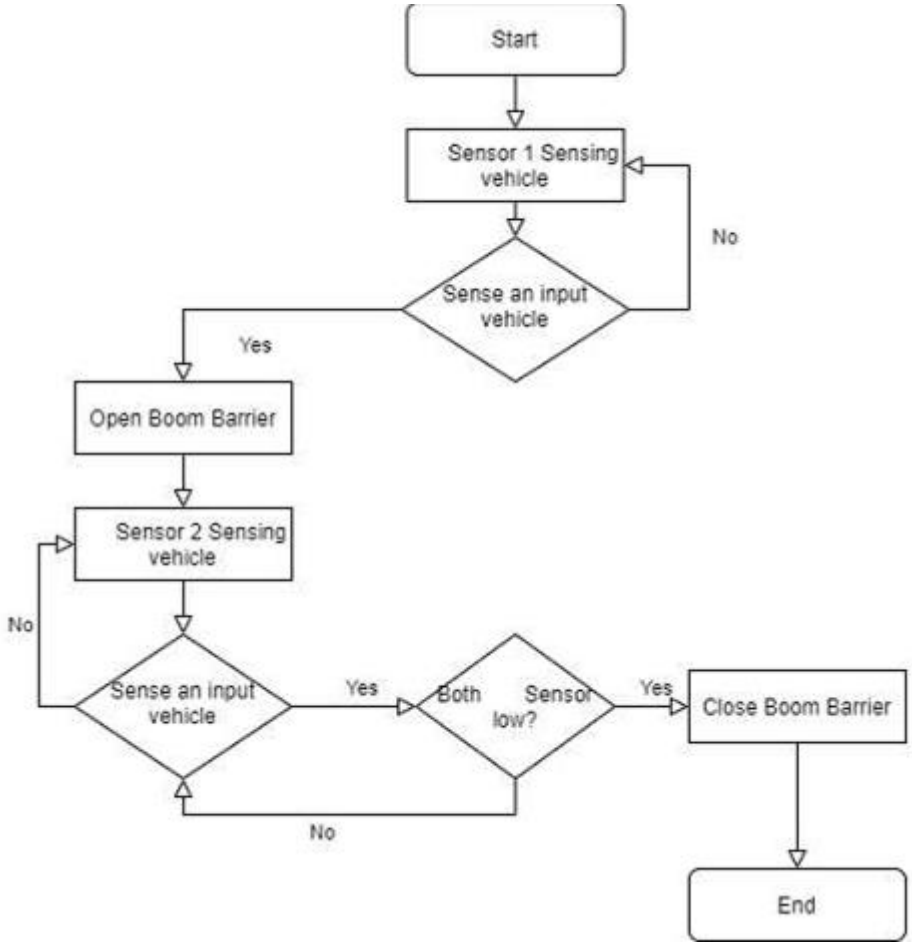


Fig 2: Flow Chart (Manual Mode)

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.

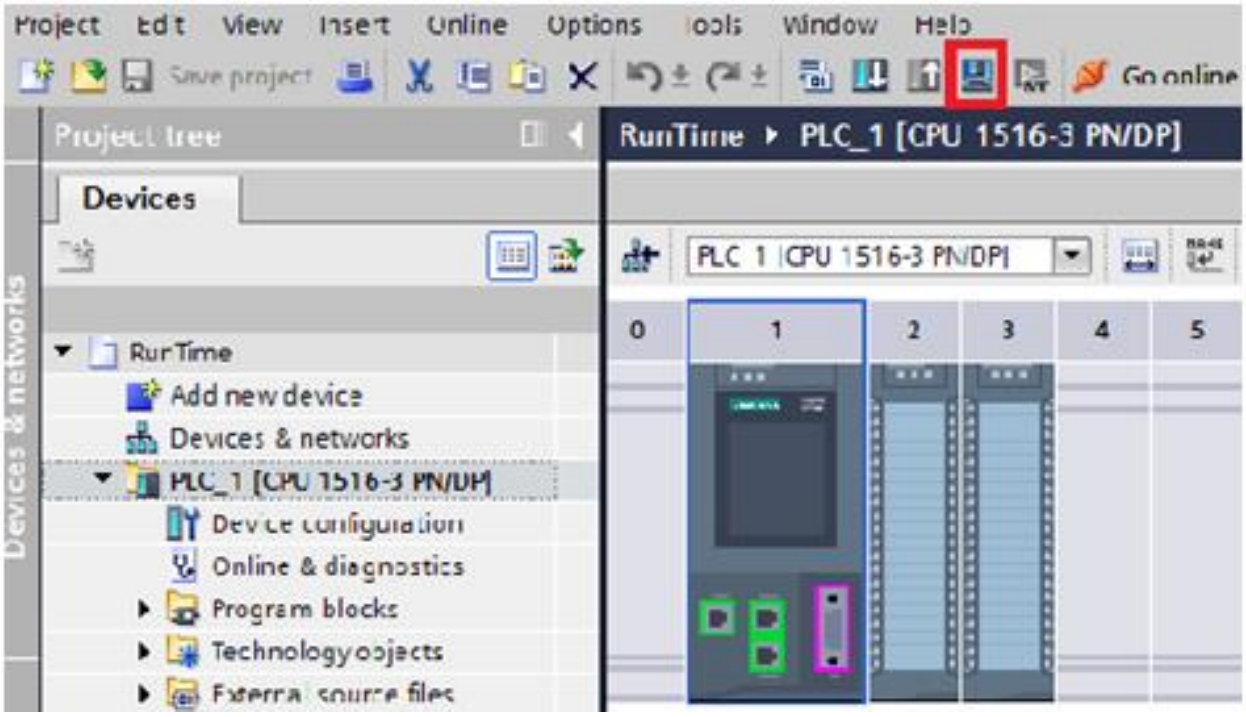


Fig 3: TIA Portal Software

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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OPEN Cv using Phython

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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.

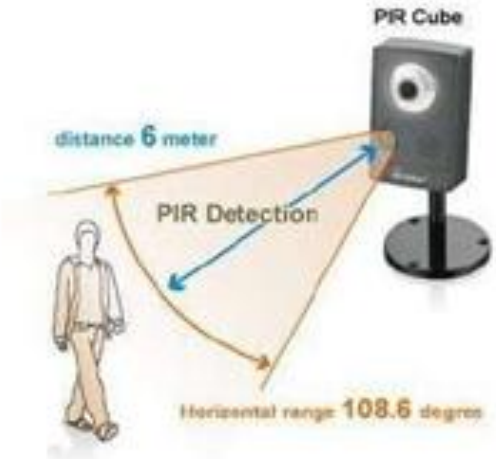
Software & hardware implementation

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.

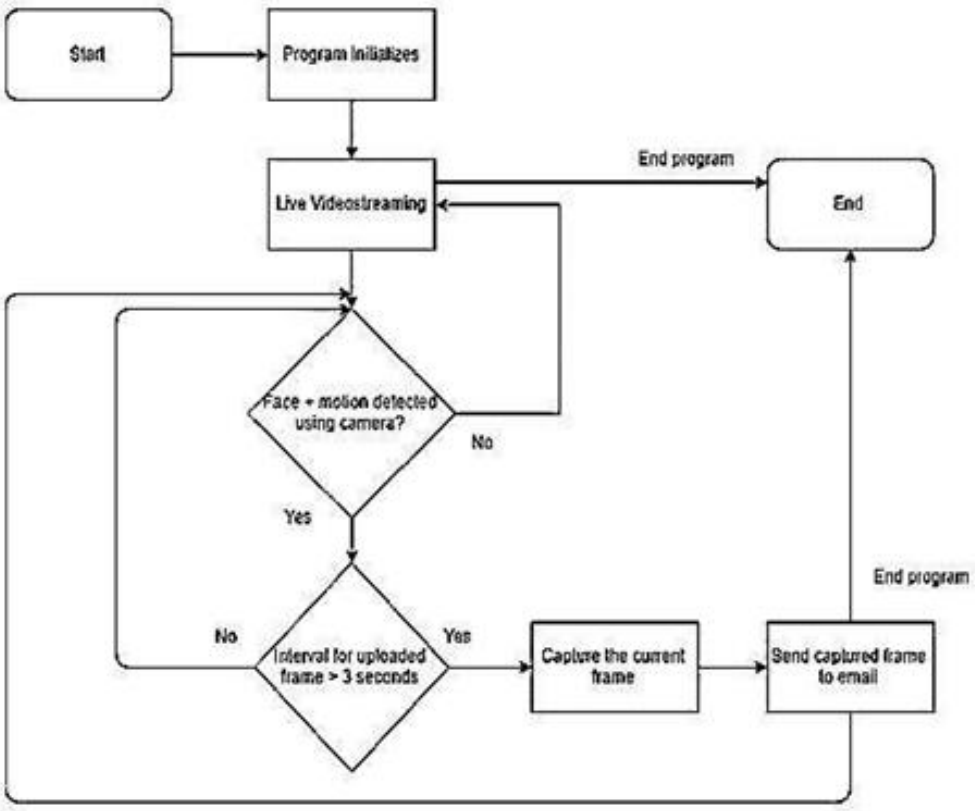


Raspberry Pi

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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INDIA SEMICONDUCTOR MISSION - FUTURE OF INDIA IN ZLECTRONICS

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The India Semiconductor Mission (ISM) is a strategic initiative launched by the Indian government in 2010 to establish India as a global hub for semiconductor design and manufacturing. The mission is aimed at fostering innovation and promoting the growth of the electronics industry in India, with a focus on developing new technologies and creating high-value jobs. The ISM has three main objectives: to build a strong semiconductor ecosystem in India, to promote innovation and R&D in the semiconductor industry, and to encourage collaboration and partnerships between industry, academia, and government. To achieve these objectives, the government has invested heavily in research and development, infrastructure, and talent development. One of the key components of the ISM is the establishment of semiconductor fabrication facilities, or fabs, in India. These fabs are state-of-the-art facilities that enable the manufacturing of complex semiconductor chips, which are used in a wide range of electronic devices, including smartphones, computers, and medical equipment. The government has partnered with several international semiconductor companies to establish fabs in India, which is expected to create thousands of high-value jobs and promote the growth of the electronics industry in the country. Another important aspect of the ISM is the promotion of innovation and R&D in the semiconductor industry. The government has established several research centers and incubators across the country to support startups and innovators working in the semiconductor industry. These centers provide funding, mentorship, and infrastructure support to help startups develop new technologies and bring them to market. The ISM has also focused on talent development, with a particular emphasis on developing the skills of young engineers and scientists. The government has launched several initiatives to promote education and training in semiconductor design and manufacturing, including the establishment of specialized training programs and partnerships with leading universities and research institutions. Looking towards the future, the ISM is expected to play a key role in driving the growth of the electronics industry in India. With the establishment of fabs, research centers, and incubators, India is poised to become a major player in the global semiconductor industry. The growth of the electronics industry is expected to create new job opportunities and stimulate economic growth, while also fostering innovation and promoting technological development. In conclusion, the India Semiconductor Mission is a strategic initiative aimed at establishing India as a global hub for economic growth, while also fostering innovation and promoting technological development.

In conclusion, the India Semiconductor Mission is a strategic initiative aimed at establishing India as a global hub for semiconductor design and manufacturing. Through investments in research and development, infrastructure, and talent development, the government is fostering innovation and promoting the growth of the electronics industry in India. The ISM is expected to play a critical role in driving the future of India in electronics, creating new job opportunities, promoting economic growth, and positioning India as a leader in the

global semiconductor industry. One of the key benefits of the ISM is the potential for India to become self-sufficient in semiconductor manufacturing. Currently, India imports the vast majority of its semiconductor chips from other countries, which can be costly and limit the country's technological capabilities. With the establishment of fabs in India, the country will be able to manufacture its own semiconductor chips, reducing its reliance on imports and strengthening its position in the global market. The ISM is also expected to have a ripple effect on other industries in India. The growth of the electronics industry is likely to stimulate demand for other products and services, including software development, IT services, and telecommunications. This can create new business opportunities and drive economic growth across a range of sectors. Moreover, the ISM is expected to play a critical role in addressing some of the key challenges facing India, including job creation, poverty reduction, and social inequality. The growth of the electronics industry is likely to create new job opportunities and stimulate economic growth, particularly in rural areas where job opportunities are limited. This can help to reduce poverty and promote social mobility, enabling individuals and families to achieve a better quality of life. Finally, the ISM is expected to have a positive impact on India's international standing. By establishing itself as a global hub for semiconductor design and manufacturing, India can enhance its reputation as a leader in technological innovation and drive further investment and collaboration with other countries. This can help to position India as a key player in the global economy, with the potential to drive further growth and development in the years to come. In conclusion, the India Semiconductor Mission is a strategic initiative that has the potential to transform India's electronics industry and position the country as a global leader in semiconductor design and manufacturing. With its focus on innovation, collaboration, and talent development, the ISM is expected to drive economic growth, create new job opportunities, and promote technological development in India. The future of India in electronics looks bright, thanks to the vision and commitment of the ISM.