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# Making Low Cost PLC Control System

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**ABSTRACT:** It is important that during any operation, for the patient to be in an anesthetic condition. The patient won't feel any pain during the medical procedure using anesthetics and the impact of the anesthesia should be there for as long as the operation goes on. It is also important to measure biomedical parameters such as heart rate and body temperature since these parameters play a vital role. It will create serious health problems if proper dosage of anesthesia is not administered at specified time intervals and to overcome such unfavorable situations this project has been designed to develop an automatic anesthesia control system. Using this, the predefined number of doses can be administered at regular time intervals by simultaneously measuring parameters.

## I. INTRODUCTION

Industrial automation involves the use of control systems, such as Programmable Logic Controllers (PLCs), to operate and control machinery and processes in manufacturing plants, factories, and other industrial settings. With advancements in technology, the Raspberry Pi, a versatile and affordable single board computer, has gained popularity as a platform for, In conclusion, integrating industrial automation using Raspberry Pi brings forth a blend of affordability, flexibility, and community support. While addressing challenges, careful consideration of application requirements and appropriate hardware/software choices can lead to effective and innovative industrial automation solutions. Industrial automation refers to the use of control systems such as computers or robots for handling different processes and machinery in an industry to replace human intervention. The integration of automation into industrial plants has become a cornerstone of modern manufacturing, offering increased efficiency, precision, and flexibility. These devices collect data from the physical environment. Examples include temperature sensors, pressure sensors, and proximity sensors. These devices carry out the commands issued by the control system. Examples include motors, valves, and pumps. PLCs are ruggedized computers designed to control manufacturing processes and machinery. They receive input from sensors, process the data, and send commands to actuators. DCS are used in large-scale industrial processes. They consist of multiple controllers distributed throughout the system, communicating with each other for efficient control. HMI allows operators to interact with the control system. It includes graphical interfaces, touchscreens, and software that provide real-time information about the plant's operations. Industrial automation relies on communication networks to facilitate the exchange of data between different components. Ethernet, Fieldbus, and Industrial Internet of Things (IIoT) protocols are commonly used. SCADA systems provide a centralized monitoring and control interface for large-scale industrial processes. They collect, process, and present real-time data to operators for decision-making.

Automation reduces the time required to complete tasks and minimizes errors, leading to higher efficiency in production processes. Automated systems can perform tasks with a high degree of accuracy, ensuring consistent product quality.

Implementing automation systems may involve significant upfront costs for equipment, software, and training. Integrating automation into existing plants can be complex and may require careful planning to avoid disruptions in production. The shift to automation may require reskilling or upskilling of the workforce to operate and maintain the new Systems. As industrial systems become more connected, there is an increased risk of cyber security threats. Robust security measures are essential to protect against potential breaches. In conclusion, the integration of industrial automation into manufacturing plants is a transformative process that brings numerous benefits in terms of efficiency, accuracy, and safety. However, it requires careful planning, investment, and consideration of the challenges associated with the adoption of new technologies.

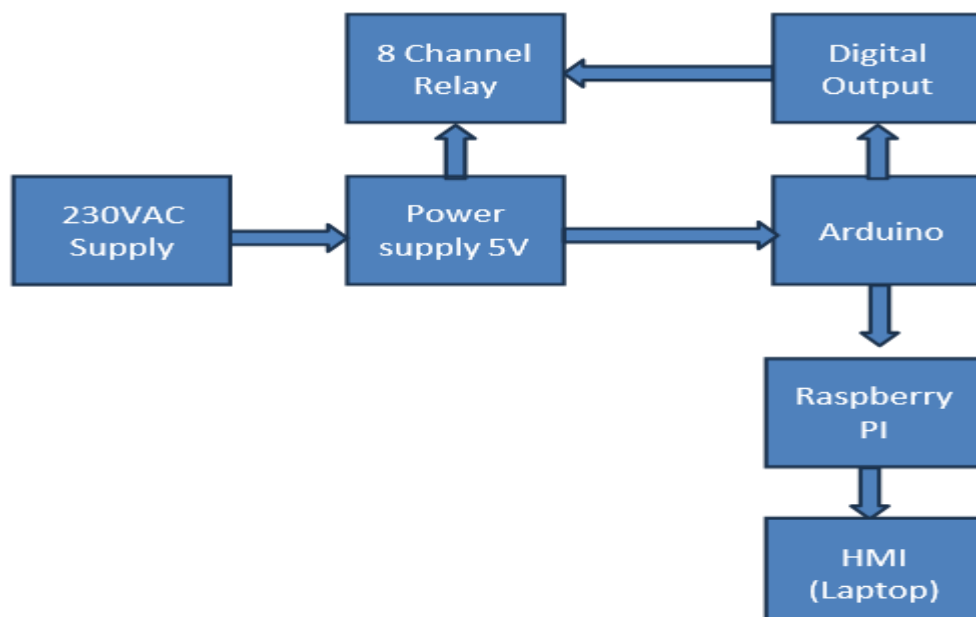
## II. LITERATURE SURVEY

When conducting a literature survey on low-cost programmable logic controllers (PLCs), you'll want to explore various sources such as academic journals, conference papers, industry reports, and relevant books. Here's a structured approach to help you in your literature survey:

- 1. Definition and Introduction to PLCs:**  
Begin with an overview of what PLCs are and their significance in industrial automation.  
Discuss the typical features and functionalities of PLCs.  
Highlight the importance of cost-effectiveness in PLC implementation.
- 2. Existing Low-Cost PLC Solutions:**  
Identify and review existing low-cost PLC solutions available in the market.  
Discuss their features, capabilities, and limitations.  
Compare the pricing and performance of these solutions.
- 3. Technological Trends and Innovations:**  
Explore recent technological advancements in PLCs that contribute to cost reduction.  
Investigate innovations such as open-source PLCs, cloud-based PLCs, and modular PLC architectures.  
Analyze how these advancements impact the overall cost of PLC systems.
- 4. Case Studies and Applications:**  
Examine case studies or real-world applications where low-cost PLCs have been successfully implemented.  
Evaluate the performance, reliability, and cost savings achieved in these applications.
- 5. Challenges and Limitations:**  
Identify the challenges associated with low-cost PLCs, such as limited scalability, compatibility issues, and reliability concerns.  
Discuss strategies to mitigate these challenges and improve the effectiveness of low-cost PLC solutions.
- 6. Future Directions and Research Opportunities:**  
Highlight potential areas for future research and development in low-cost PLC technology.  
Discuss emerging trends that could further drive down the cost of PLCs while maintaining performance and reliability.

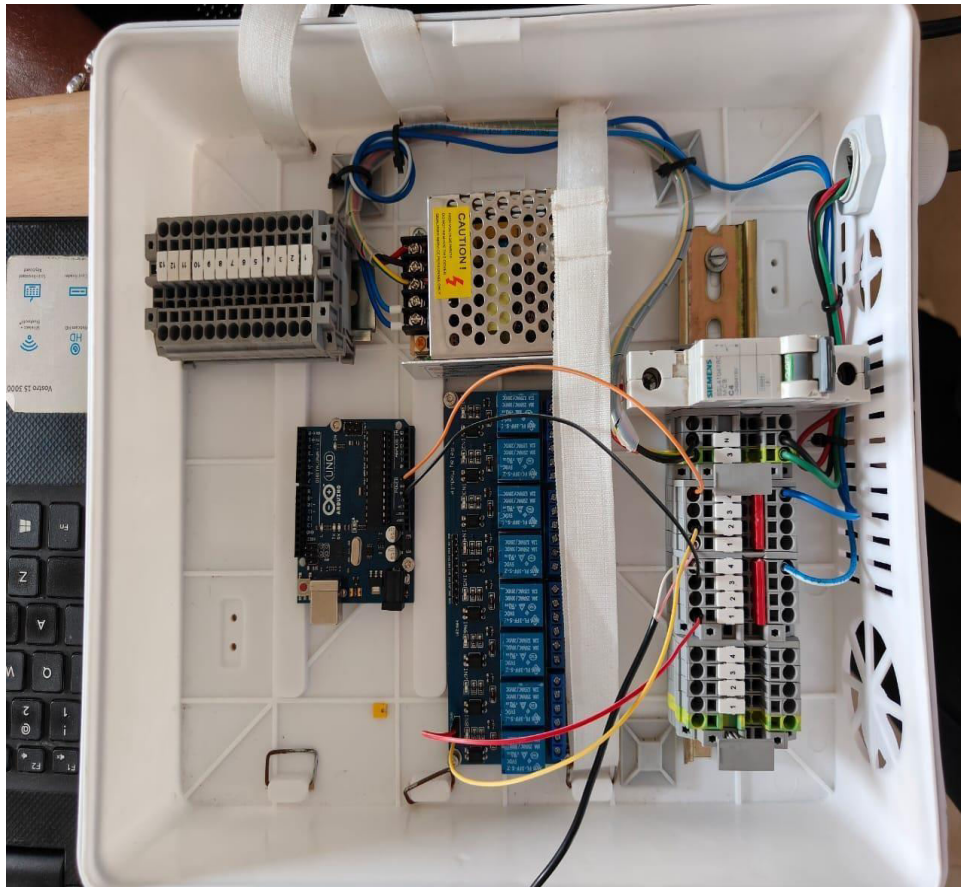
## III. METHODS AND METHODOLOGY

### 3.1 Block Diagram



- Components Required
- 1. Raspberry Pi
- 2. Arduino UNO
- 3. SMPS
- 4. Relay
- 5. Connecting Wires and Cables
- 6. Junction Box

You can buy all the component required for this project.



#### IV. RESULT

The speed of the network is measured and observed under two situations which are in line of sight (free space) and without line of sight which is in a multilevel building. Following are the result obtained from the measurement of the network: measurement is also being done with and without the antenna attached to the Raspberry Pi. Without the antenna attached, the maximum distance of the network speed is 22 meters with 65 Mbps maximum network speed. At a distance of 22 meters, the minimum network speed is 0.02 Mbps. Meanwhile, with an antenna attached to the Raspberry Pi, the coverage area is increased to 24 meters. The maximum and minimum network speed is 53 Mbps and 1.5 Mbps, respectively. The percentage drop of the network speed is increased as the distance increase. Again, this attribute to the interference and loss exist due to construction material and reflecting surface.

#### Summary

In summary, a literature survey on low-cost programmable logic controllers (PLCs) would encompass various aspects of existingsolutions, technological trends, applications, challenges, and future directions. It begins with an introduction to PLCs and their importance in industrial automation, emphasizing the significance of cost-effectiveness. The survey

explores existing low-cost PLC solutions available in the market, comparing their features, capabilities, and pricing. It also delves into recent technological advancements that contribute to cost reduction, such as open-source PLCs and cloud-based architectures. Case studies and real-world applications showcase successful implementations of low-cost PLCs, highlighting their performance, reliability, and cost savings. Challenges like scalability, compatibility, and reliability concerns are discussed, along with potential strategies to address them. Finally, the survey outlines future research opportunities and emerging trends that could further drive down the cost of PLCs while maintaining performance and reliability. Through this comprehensive review, insights into the current state and future prospects of low-cost PLCs in industrial automation are provided.

This last step finishes the complete tutorial on IoT based Smart Irrigation System Note that it is important to switch off the motor when the soil moisture has reached the required level after water sprinkle. You can make a more smart system which can contain different control for different crops. If you face any issues while doing this project then comment below or reach to our forums for more relevant questions and their answers.

## V. CONCLUSION

- ✓ This is small PLC used for small application as per available in market PLC this is low cost.
- ✓ Possible to use 14 digital input and 6 analog input.
- ✓ Our total cost of this experiment is Rs.8,000. and available in market rate of PLC like Mitsubishi, Allen Bradley, Siemens is Rs.80,000 to Rs.1,00,000

## VI. FUTURE SCOPE

- ✓ Small-scale businesses can use it to automate functions like web management or media server and database.
- ✓ improves the dark theme, adds new settings for headless resolution to the Screen Configuration, and enables EEPROM updates from raspi-config.

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