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A Literature Review on Automation of Instrument AirDistribution System using Arduino and Integrate Industry 4.0

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Abstract: ***This article is primarily concerned with developing a totally upgraded IA distribution controlling system, which includes the Arduino program and Industry 4.0 is further extended by employing IOT and wireless sensor interfaces, simulating the Arduino IAD plant and putting it online for remote access. Air conditioners have become an integral component of everyday life, particularly in tropical regions such as India. One of the most significant control variables in an infrastructure is considered to be an air conditioner. This project is all about controlling an air conditioner with voice commands. Here, voice commands are recognized and utilised to activate/deactivate an air conditioner using the Michel C. JARVIS application. Using voice sensors in ARDUINO, the air conditioner will be able to understand spoken instructions and regulate the compressor.***
Keywords: Internet of things (IoT), Industry 4.0 , Instrument air (IA)compressor, IA Distribution system, and Arduino
Acronym: IAC-Instrument Air Compressor, CSC - Constant Speed Control , ASSC - Automatic Start Stop Control , IAD - Instrument Air Distribution , IA -Instrument Air

I. INTRODUCTION

In general, any plant comprises a high number pneumatic power supply is necessary for pneumatic components to operate. A different system known as the Instrument air distribution system produces and distributes these pneumatic supplies. Air is required by the pneumatic control valves, which is provided by instrument air. An Instrument Air Distribution system in a thermal power plant is made up of three Instrument Air Compressors (IAC) that are activated based on the demand for instrument air. The compressor is currently controlled using relay logic. Relays are electromechanical devices that use an electrical signal to flip a mechanical switch. Complex wiring is required in order to apply control logic in relays. This makes it harder to implement future adjustments. Maintenance is time-consuming and difficult; incorrect wiring might result in incorrect results and even accidents. It is also tough to recognize and troubleshoot.

II. REVIEW ON AUTOMATION OF INSTRUMENT AIRDISTRIBUTION SYSTEM USING ARDUINO AND INTEGRATE INDUSTRY 4.0

The following literature review is conducted in relation to the systematic examination of Automation of Instrument Air Distribution System Using Arduino.

A. Yashika.B L, et al. "Compressor Air Pressure Monitoring Through Wireless Communication System". [1]

This study focuses on the development of a straightforward microcontroller-based compressor air pressure monitoring device with wireless connectivity and an LED display. The Arduino is linked to the sensor's relay, which produces referenced voltages of 0 volts and 5 volts depending on whether the pressure is above or below the threshold set at 0 volts. The GSM transmits orders to the Arduino board, which triggers the board's Buzzer, and the LED in the receiving area begins scrolling the message. An Ethernet-based method of linking Arduino boards to a LabVIEW-based SCADA system. The Open Platform Communications standard's open connection facilitates such integration. To demonstrate the feasibility of the proposal, the system's development is presented, along with some preliminary observations.

B. Eddy Erham, et al. "Design of a new PID controller based on Arduino Uno R3 with application to household Refrigerator".[2]

A thermostat is often used as an on-off controller in a refrigeration system to keep the compartment temperature stable The Arduino Uno was programmed with the PID controller algorithm. To identify controller parameter values for implementation.

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Based on trial results, new performance criteria have been developed. were also suggested in order to get the optimum refrigeration system performance. In order to integrate the Internet of Things with an air compressor that has automated valve regulation managed by a solenoid valve for various operational pressures, a framework must be provided. The air compressor's output is divided into varied pressures by a pressure jumper that is fastened to it. Using temperature sensors with microprocessors and controller that receives input and uses it to drive a digital system's output. further to automating the air compressor and enabling distant or border operation.

C. A.Viswa Hari Haran, et al. "Automation of the air conditioner using ARDUINO". [3]

One of the key controls of an infrastructure is the air conditioner. This article is all about turning an air conditioner on and off using voice commands. Here, voice instructions are recognized by JARVIS by Michel C, which is utilized to turn on and off an air conditioner. Using voice sensors in the ARDUINO, the air conditioner will be able to understand spoken orders and regulate the compressor. a low-cost, adaptable, and dependable home automation system employing an Arduino microcontroller, as well as a smart phone application with IP connectivity through local WiFi for remote device access and control by authorized users The technology, which leverages the Internet of Things to manage human-desired equipment ranging from industrial machinery to consumer products, is independent of servers. The user may also utilize a web browser, a smart phone, or an IR remote module to operate various gadgets.

D. A J Taufiq , I H Kurniawan1, et al. " Analysisof Arduino Uno Application on Control System Based on Industrial Scale". [4]

In this research, an Arduino Uno controller replaces the plant's industrial controller for the oil and gas industry Research is carried out by building a large-scale simulation plant and comparing the findings to the real-world plant's controller As a consequence, the Arduino Uno is capable of handling Industrial-scale instrumentation for a single control loop that has been verified and demonstrated to reduce the disparity between Process Variables and Set Points are Proportional to Industrial Class Controllers. aim is to create a maintenance manual for nuclear power stations' instrument air systems. Although a nuclear power plant's instrument air system is normally categorized as a non-safety related system, instrument air is used by both safety related and non-safety related systems. This may result in significant transients throughout the plant's operational systems.

E. A Jose Calderon Godoy, et al. "Survey about the Utilization of Open Source Arduino for Control and Measurement Systems in Advanced Scenarios. Application to Smart Micro-Grid and Its Digital Replica".[5]

Because of its advantages, open source technology is increasingly being employed in cutting-edge applications such as Industry 4.0, Industrial Cyber-Physical Systems, and Smart Grids are some examples. The purpose of this study is to provide a comprehensive assessment of existing scientific studies on the usage of Arduino under such demanding settings, demonstrating its reliability for measurement and control. Furthermore, the usage of such a device as a hardware component to track the development and operation of a Smart Micro-Grid and its digital equivalent is considered. The Tire Inflation System with Compressed Air Controller. The goal of the project is to develop a method that will take less time and effort to properly inflate a vehicle's tires. The CACTIS employs a sturdy air distribution unit and a practical touch screen display to enable simultaneous inflation of numerous tires.

III. COMPARISION OF AUTOMATION OF INSTRUMENT AIR DISTRIBUTION SYSTEM USING ARDUINO AND INTEGRATE INDUSTRY 4.0

Table 3.1 does an analysis of the various system parameters.

Table 3.1

Author	Title	Remark
Yashika.B L, et al. "Compressor Air Pressure Monitoring Through Wireless Communication System".	"Compressor Air Pressure Monitoring Through Wireless Communication System"	The goal of the project is to create a straightforward and inexpensive air pressure monitoring system utilizing pressure sensors, LED, GSM, and Arduino. We are utilizing sensors and GSM for this project. The receiver's intended use for receiving the sensor reading, and message

		to be shown on the LED. The suggested design may It is feasible to send SMS using a GSM modem. Through a result of this approach, we learned that the air pressure may be sent as well as monitored using pressure sensors Successful SMS to mobile.
Eddy Erham, et al. "Design of a new PID controller based on Arduino Uno R3 with application to household refrigerator".	"Design of a new PID controller based on Arduino Uno R3 with application to household refrigerator"	To determine controller parameter values for use in implementation. In order to achieve new performance standards based on test results were also put out to determine the optimal refrigeration system performance. A framework must be given in order to combine the Internet of Things with an air compressor that has automatic valve control regulated by a solenoid valve for varied operational pressures.
A.Viswa Hari Haran, et al. "Automation of the air conditioner using ARDUINO".	"Automation of the air conditioner using ARDUINO"	The suggested work has successfully automated an air conditioning system using speech. The system could be turned on and off using voice commands that said "On" and "Off." The project is easy to install and may be used in real life. This work's most desirable goal is to improve lifestyle. Since air conditioners have become an integral element of a family, reliability is a key factor in the decision to pursue our project..
A J Taufiq , I H Kurniawan1, et al. " Analysisof Arduino Uno Application on Control System Based on Industrial Sale".	" Analysisof Arduino Uno Application on Control System Based on Industrial Scale"	An Arduino Uno controller replaces the plant's Oil and gas industry industrial-based controller sector. Making a large-scale simulation plant and comparing Research is conducted by comparing the outcomes using the plant's real controller. As a consequence, the Arduino Uno is now capable of operating industrial-scale plants.
A Jose Calderon Godoy, et al. "Survey about the Utilization of Open Source Arduino for Control and Measurement Systems in Advanced Scenarios. Application to Smart Micro-Grid and Its Digital Replica".	"Survey about the Utilization of Open Source Arduino for Control and Measurement Systems in Advanced Scenarios. Application to Smart Micro-Grid and Its Digital Replica"	This paper aims to give a complete review of existing scientific research on using Arduino in such demanding circumstances demonstrates its reliability for measurement and control.

IV. CONCLUSION

The Arduino is used to control the entire instrument air compressor system. Arduino is used to feed in real-time data. The use of a web publishing tool exemplifies Industry 4.0. This implies cloud-based data storage and wireless communication, which eliminates the need for a large, complex system.

V. ACKNOWLEDGEMENT

The researchers appreciate the good debates and comments from their peers on the subjects discussed above.

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[3] A.Viswa Hari Haran, Prawin Angel Michael, A.Leander, J.Samuel Richard, JN.Mohammed Yusuf"Automation of the air conditioner using ARDUINO"
[4] A J Taufiq , I H Kurniawan1 , T A Y Nugraha,” Analysisof Arduino Uno Application on Control System Based on Industrial Scale”.
[5] A.Jose Calderon Godoy, Manuel Calderon Godoy, “Integration of Open Source Arduino with LabVIEW- based SCADA through OPC for Application in Industry 4.0 and Smart Grid Scenarios” (ICINCO 2019).

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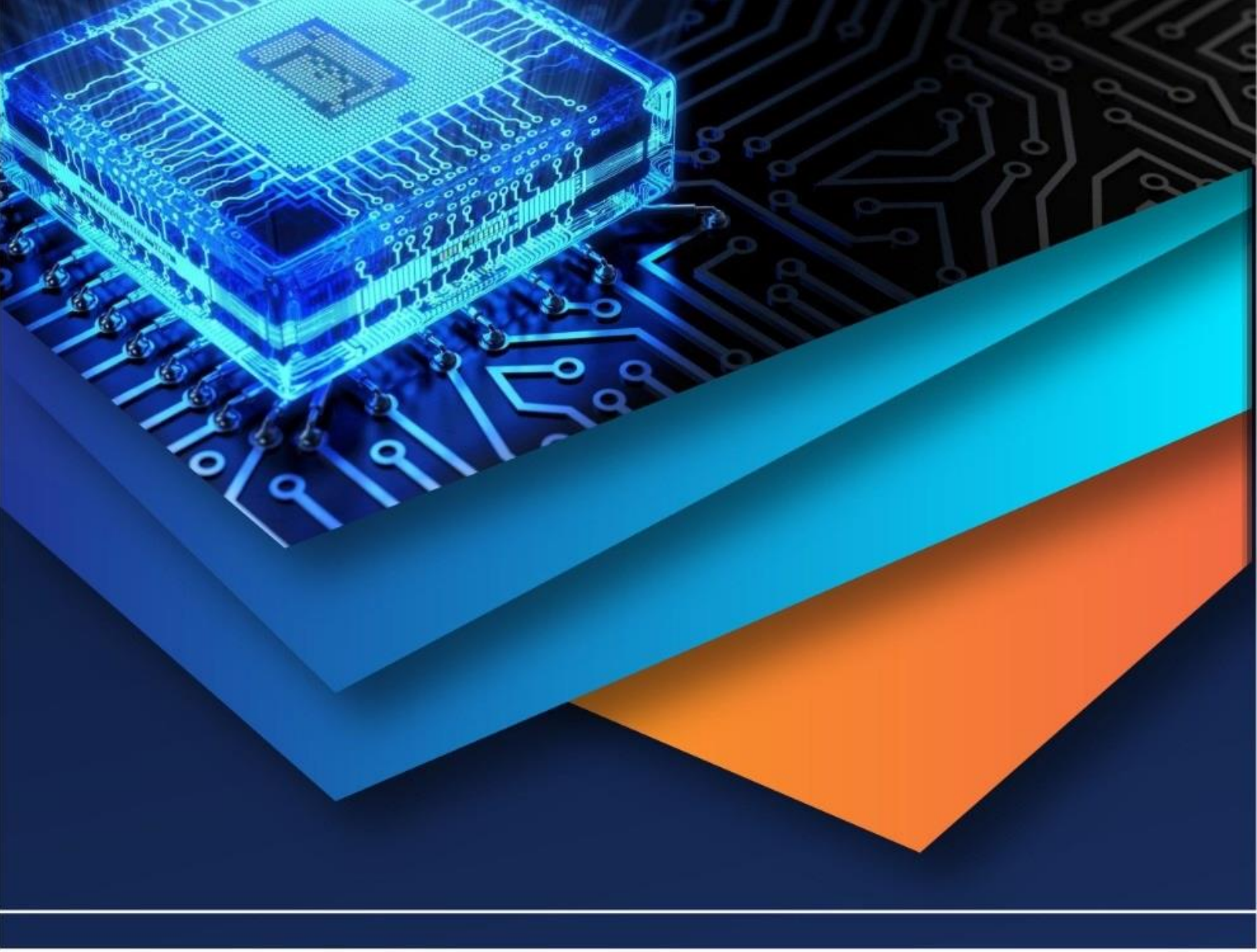

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