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GREENSENSE IOT NAVIGATOR USING ARDUINO

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Abstract: Agriculture plays a vital role in our lives, and extensive research has been conducted to create a regulated and controlled environment within greenhouses. The primary goal of this endeavour is to address key agricultural challenges: sustaining year-round crop cultivation within limited spaces like homes and reducing human intervention in small-scale greenhouse settings. The system's construction relied on a wired connection methodology, integrating various components such as connecting wire, sensor, LCD display, a Cooling system, Power banks, LEDs, LDRs, and an Arduino Uno board, among others. The outcome of this effort was the successful development of a fully operational system designed to oversee the Shaping a Distinctive Greenhouse Atmosphere.

***Keywords*— Arduino-Powered Greenhouse Monitoring & Control Innovations, led, lcd**

1. Introduction:

In today's era, everything has the potential to be under constant surveillance and automated control. Regrettably, in crucial sectors like agriculture, manual processes continue to play a significant role. This means that the full implementation of automatic monitoring and control within greenhouse systems is still a work in progress, particularly in the context of small-scale farming. The reasons for the limited adoption of greenhouse system automation several factors could contribute to this situation, such as a deficiency in technical knowledge, exorbitant expenses, and various other challenges. And demanding maintenance requirements. Agriculture has remained one of humanity's most fundamental occupations since the early stages of civilization. Unfortunately, even in the present day, Manual interventions in agriculture persist as an unavoidable necessity, with the need for human involvement remaining inevitable. When it comes to the management and control of greenhouse systems, it holds profound importance in the realm of

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agriculture. These systems allow for the cultivation of plants under carefully regulated climatic conditions, ensuring optimal plant growth [1]. Moreover, they serve a critical role by protecting plants from extreme weather conditions through the maintenance of a controlled climate. Greenhouses also extend the growing season, enabling the early sowing and late harvesting of crops. Temperature is a crucial environmental factor that significantly influences various aspects of our natural world. It refers to the degree of warmth or coldness in a specific region, and it plays a fundamental role in shaping ecosystems, weather patterns, and the well-being of living organisms. Here are some key points regarding the temperature as an environmental factor. Humidity is the measure of moisture content in the air. It profoundly influences weather, human comfort, agriculture, and industry. High humidity can intensify heat, impact indoor air quality, and promote disease vectors, while low humidity can cause discomfort, impact ecosystems, and affect industrial processes. Maintaining the right humidity levels is essential in various domains. Sunlight in a greenhouse is a vital element for plant growth. Greenhouses are designed to harness and control sunlight to create ideal conditions for crops. The glass or transparent material used in greenhouse construction allows sunlight to enter while trapping heat, creating a warmer environment than the outside. This extended exposure to light enhances photosynthesis, enabling year-round cultivation and improved crop yields, making greenhouses a valuable tool in agriculture and horticulture.

2. LITERATURE REVIEW:

In the worked by SparkFun. (2019, October 21), provides a general introduction to Arduino, describing it as an open-source electronics platform based on easy-to-use hardware and software. Arduino boards are commonly used for a wide range of projects, including those related to automation, sensing, and control. Arduino can play a crucial role in providing an efficient and cost-effective solution[1]. Another is worked by Kiran Sahu, Mrs. Susmita Ghosh Mazumdar " Digitally Greenhouse Monitoring and Controlling of System based on Embedded System " The paper likely discusses the design and implementation of a digitally controlled greenhouse monitoring system. The authors likely describe how the embedded system is utilized to control aspects of the greenhouse environment based on the monitored data. This could include

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temperature control, irrigation systems, or other relevant parameters[2]. Another suggested paper is K. Rangan, Indian Institute of Technology Madras, Chennai, India, T. Vigneswaran, SRM University, Chennai, India, the paper may delve into the techniques used for monitoring various parameters within the greenhouse, such as temperature, humidity, soil moisture, etc. as well as paper mention is the results obtained from implementing the embedded systems approach, showcasing the effectiveness and efficiency of the monitoring system [3]. Qiang, G., & Ming, C. (2008). "Research and design of web-based wireless sensor network management system for greenhouse." In Computer and Electrical Engineering, 2008. The paper appears to focus on the research and design of a web-based wireless sensor network management system specifically tailored for greenhouse environments. Here are some potential key points that could be discussed in the paper [4]. Attalla, D. & Tannfelt Wu, J. (2015). "Automated Greenhouse Temperature and soil moisture control. The authors likely introduce the context of their work, emphasizing the importance of temperature and soil moisture control in greenhouse environments. They may discuss the challenges associated with manual control and the potential benefits of automation[5].

3.DESIGN: He main objective of this system is to establish a streamlined greenhouse environment, leading to a substantial decrease in labour expenditures and enabling small-scale farmers to cultivate crops year-round. The system comprises sensors, microcontrollers, and actuators. It operates by monitoring environmental parameters, and when they deviate from safe levels, sensors trigger the microcontroller to take corrective actions, such as activating actuators like fans, LEDs, or buzzers. An LCD display provides real-time. The microcontroller is programmed using the C/C++ programming language, a preference rooted in its status as the language of hardware and its primary role in microcontroller programming, particularly with Arduino. This language choice enables efficient and effective control of the microcontroller, ensuring seamless operation and robust functionality in the system.

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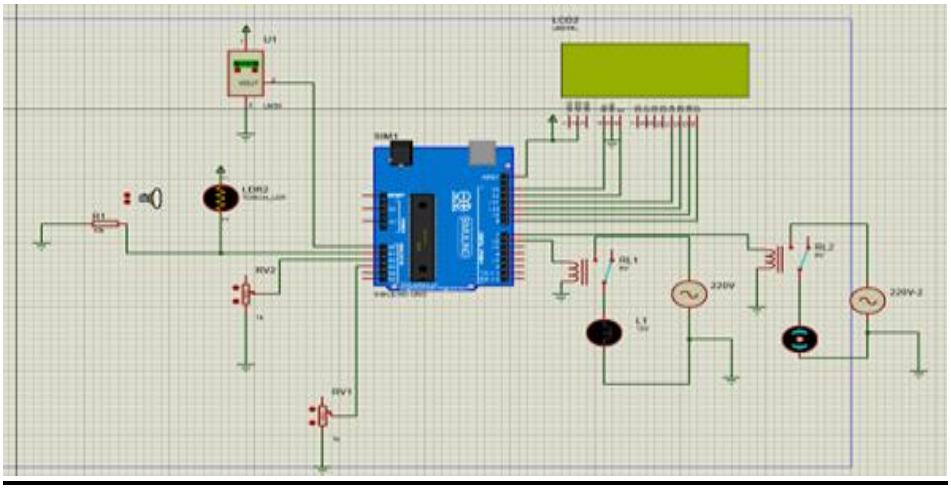

Figure 1 - Simulation Arduino based greenhouse navigator

Regarding the system's implementation, both input devices (sensors) and output devices (actuators) were intricately linked to the microcontroller. This setup facilitated the real-time monitoring and precise control of the greenhouse conditions. To elaborate, the actuators came into play when environmental variables, such as temperature, humidity, luminosity, and CO2 concentrations, strayed from their predetermined thresholds within the greenhouse setting. For instance, the fan acted as an actuator, adept at managing temperature and humidity, while the light bulb was designated for regulating light intensity, and CO2 levels were addressed as well**.** The Greenhouse Surveillance and Management System integrates the DHT11 sensor, renowned for its cost-effectiveness and user-friendly design. This digital temperature and humidity sensor utilize a capacitive humidity sensor and a thermistor to measure the surrounding conditions, transmitting information through a digital signal on the data pin. While user-friendly, precision timing is essential for data retrieval. provides a visual guide to connecting the DHT11 with the Arduino board**.**

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4.SIMULATION PARAMETER

Table 1 -Parameter of different devices

SL.NO	COMPONENTS	VALUE
1	ALTERNATOR	220V
2	LAMP	12V
3	LED-RED	12V
4	LMO16L	
5	LM35	22V
6	LM044L	
7	MOTOR	1K
8	POT-HG	
9	RELAY	10K
10	RESISTANCE	
11	SHT11	
12	SIMULINO UNO	
13	TORCH LDR	
14	TSL251RD	

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5.Result Analysis: The practical execution of the research involved bringing the conceptualized idea to life. This entailed rigorous testing of the hardware components within Iot based greenhouse navigator using Arduino. Unit testing was meticulously conducted to ascertain that each component in the system functioned in alignment with its intended design, ensuring the system's overall performance matched its intended functionality. Adjusting the threshold values for temperature and humidity parameters had a notable effect on the Greenhouse system. For example, establishing the temperature threshold at 32°C, with the sensor reading at 28.50°C, yielded a significant outcome deactivating the cooling system. Adjusting the threshold to 26°C led to the fan activation at the same 28.50°C, indicating unsuitability for tomato growth, which necessitates an optimal temperature range for successful cultivation. Finally, unit testing was conducted for light intensity. The test comprised two phases. Initially, the light-dependent resistor was shielded from light, causing the intensity value to drop below the predetermined threshold, thereby activating the LED bulb. In the second phase, while the LED bulb was on, an external light source (a torchlight) was introduced into the Greenhouse system. surpassing the set threshold, promptly turning off the LED.

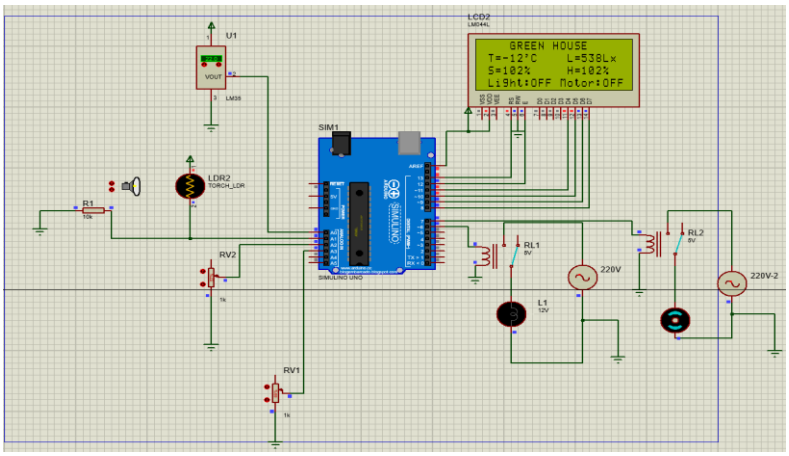

Figure 2 - Simulation Arduino based greenhouse navigator

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6.Conclusion: The greenhouse monitoring and control system effectively tracked temperature, humidity, light intensity, and gas levels in the greenhouse. Diverse sensors promptly activated actuators in response to environmental shifts. This research aims to enhance convenience and facilitate plant growth for small-scale farmers. The proposed system empowers them to cultivate healthy crops throughout the year with minimal oversight, ensuring a sustainable and efficient agricultural process.

7.References

1. SparkFun. (2019, October 21). "What is an Arduino?" [Online]. Available: https://learn.sparkfun.com/tutorials/what-is-an-arduino/all what say about green house monitoring and control system using Arduino
2. Kiran Sahu, Mrs. Susmita Ghosh Mazumdar " Digitally Greenhouse Monitoring and Controlling of System based on Embedded System " International Journal of Scientific & Engineering Research, Volume 3, Issue 1, January- 2015 1 ISSN 2229- 551
3. K. Rangan, Indian Institute of Technology Madras, Chennai, India, T. Vigneswaran,SRM University, Chennai, India " An Embedded Systems Approach to Monitor Green House" 978-1-4244- 9182-7/10/ ©2014 IEEE
4. Qiang, G., & Ming, C. (2008). "Research and design of web-based wireless sensor network management system for greenhouse." In Computer and Electrical Engineering, 2008. ICCEE 2008. International Conference on, pp. 657-661.
5. Attalla, D., & Tannfelt Wu, J. (2015). "Automated Greenhouse: Temperature and soil moisture control."
6. TechTarget. (2019, October 21). "Light Dependent Resistor." [Online]. Available: https://whatis.techtarget.com/definition/LCD-light-dependent-resistor