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IOT Based Smart System for Terrace Gardening

Mary Sindhuja N.M, Yuvaraj V, Chellakaruppr A, Senthil Kumar N

Assistant Professor, Dept. of E.C.E., Kamaraj College of Engineering and Technology, Madurai, India

PG Student, Dept. of E.C.E., Kamaraj College of Engineering and Technology, Madurai, India

ABSTRACT: In the recent times people are interested in terrace gardening to get their own yield of vegetables and fruits. To help them in all aspects the IoT based smart gardening system is developed to enhance the efficiency of traditional gardening practices by integrating advanced technologies. The system utilizes Arduino-based automation to create a smart and responsive environment for plants. The primary components include a Soil Moisture Sensor for automated irrigation, LDR for sun exposure control, Rain Sensor for terrace protection during rain, Microphone for pest detection, and a pump for pest repellent. Additionally, an LCD and Buzzer provide real-time feedback and alerts.The Soil Moisture Sensor plays a crucial role in maintaining optimal soil conditions by measuring the moisture contentThe LDR is employed to regulate the exposure of plants to sunlight. This feature protects plants from potential harm caused by overexposure to sunlight.The Rain Sensor ensures the protection of the garden during rain showers. Pest detection is facilitated by the Microphone, which identifies the presence of pests in the garden area. The Buzzer serves as an alert system, notifying the user of any critical conditions that require attention.

KEYWORDS: NodeMCU, Moisture, Pest Repellent, Irrigation, IoT,Gardening, Sensor

I. INTRODUCTION

As there is movement towards a more digitalized future,To support this growing trend and address the challenges inherent in traditional gardening practices, an innovative solution has emerged: the IoT-based smart gardening system. This system represents a fusion of cutting-edge technologies with age-old agricultural practices, aimed at bolstering efficiency and yield in home gardening endeavors. At its core, this system leverages Arduino-based automation to create an intelligent and responsive environment tailored to the needs of plants. Key components include a suite of sensors and actuators meticulously designed to cater to various aspects of plant care. The Soil Moisture Sensor stands as a pivotal element, ensuring the maintenance of optimal soil conditions by precisely monitoring moisture levels. Likewise, the Light Dependent Resistor (LDR) regulates sun exposure, shielding plants from potential harm caused by excessive sunlight. The inclusion of a Rain Sensor serves to safeguard the garden during inclement weather, while a Microphone aids in the detection of pests, offering proactive pest management measures. Complementing these functionalities are real-time feedback mechanisms such as an LCD display and a Buzzer, providing users with timely alerts and insights into their garden's well-being. Through this comprehensive integration of technology and horticulture, the IoT-based smart gardening system not only simplifies the cultivation process but also empowers individuals to nurture thriving gardens with greater ease and efficiency.

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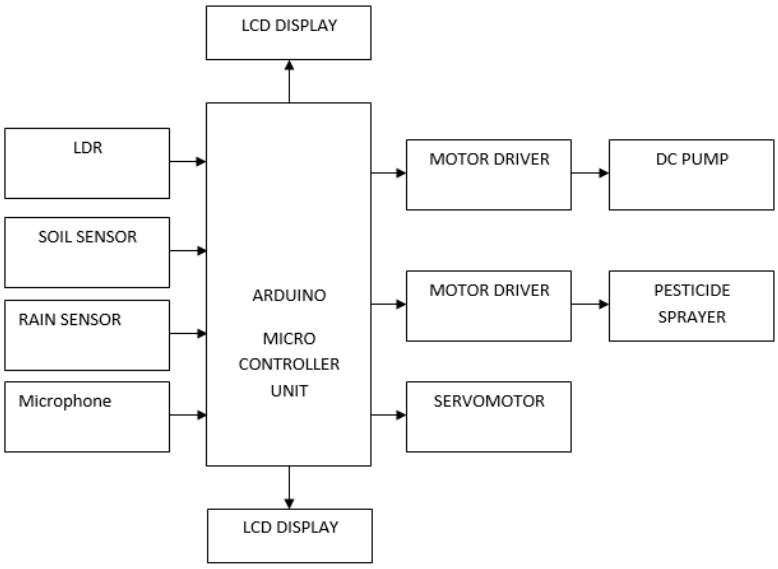

Fig.1.FunctionalBlockDiagram

II. RELATED WORK

Fatima Ali: Employed Arduino microcontroller for data processing and control. Integrated soil moisture sensor for irrigation control, LDR sensor for sunlight detection and controlling a servomotor to close the terrace, rain sensor for rainfall detection and terrace closure, PIR sensor for pest detection and pump activation for repellent spray. Also included LCD and buzzer for user interaction.[1]Maria Garcia: Utilized Arduino platform for sensor interfacing and actuator control. Integrated soil moisture sensor for irrigation management, LDR sensor for sunlight detection and terrace shading, rain sensor for rain detection and terrace closure, PIR sensor for pest detection and repellent spray activation, along with LCD and buzzer for user interface.[2]Neha Gupta: Implemented Arduino microcontroller for data processing and control. Integrated soil moisture sensor for irrigation scheduling, LDR sensor for sunlight detection and terrace shading, rain sensor for rainfall detection and terrace closure, PIR sensor for pest detection and repellent spray activation, with LCD and buzzer for user feedback.[3]Amit Singh: Employed Arduino platform for sensor integration and actuator control. Integrated soil moisture sensor for irrigation control, LDR sensor for sunlight detection and terrace closure, rain sensor for rainfall detection and terrace protection, PIR sensor for pest detection and repellent spray activation, along with LCD and buzzer for user interaction.[4]David Brown: Utilized Arduino microcontroller for sensor data acquisition and actuator control. Integrated soil moisture sensor for irrigation management, LDR sensor for sunlight detection and terrace shading, rain sensor for rain detection and terrace closure, PIR sensor for pest detection and repellent spray activation, with LCD and buzzer for user interface.

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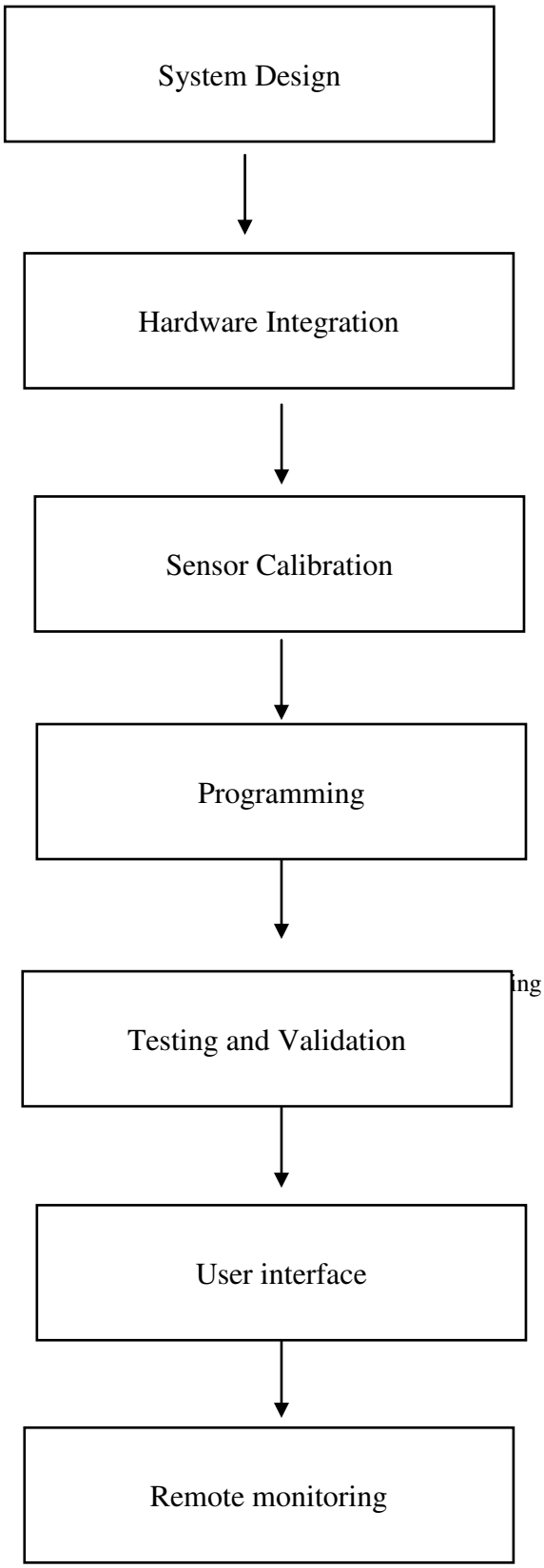
III. PROPOSED WORK



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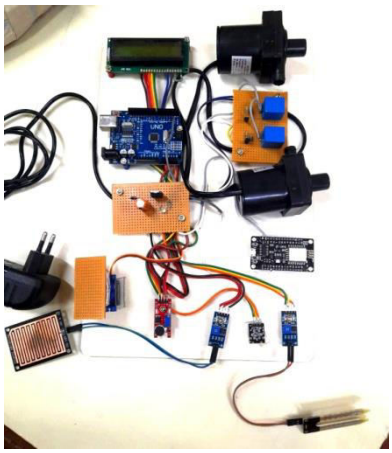

Fig.3.Hardware Setup of Smart Terrace Gardening

IV. RESULT AND DISCUSSION

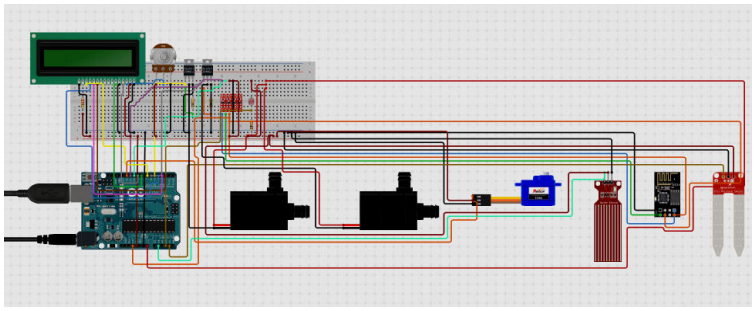

Fig. 4. Circuit Diagram in Arduino IDE

Fig. 5. Intensity Level Output

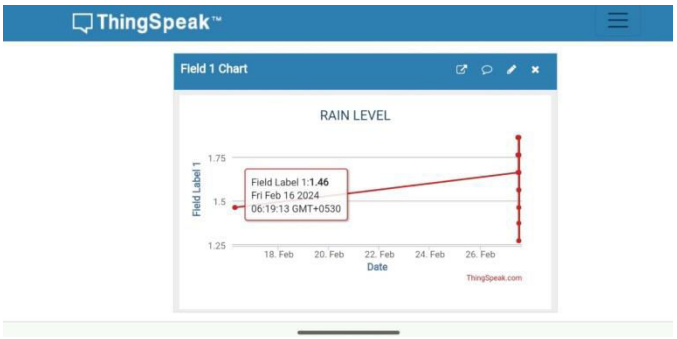

Fig. 6. Rain level Output

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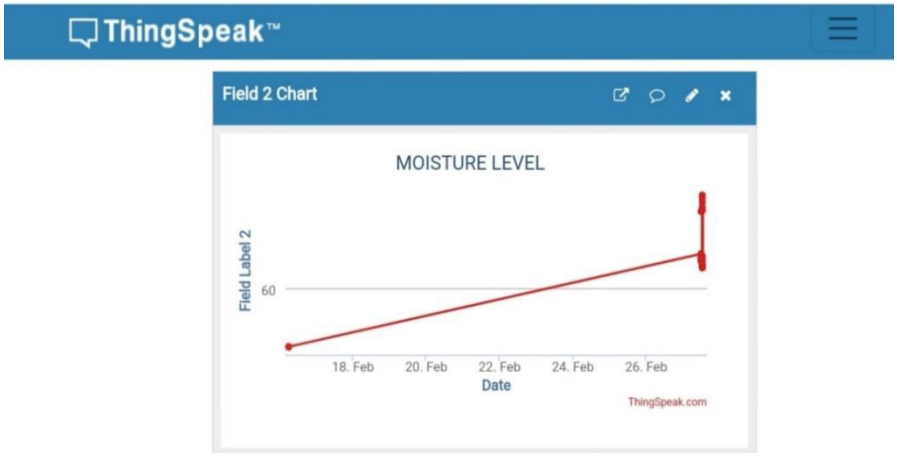

Fig. 7. Moisture level Output

Fig. 8. Noise level Output

V. CONCLUSION

The implementation of the "Smart Gardening System" using Arduino, incorporating various sensors such as the Soil Moisture Sensor, LDR, Rain Sensor, and PIR Sensor, along with actuators like the servomotor and pump, has proven to be a valuable addition to modern gardeningpractices. This system offers an intelligent and automated approach to managing a garden, ensuring optimal conditions for plant growth and protection. In conclusion, the Smart Terrace Gardening System presents a promising solution for efficient and sustainable plant care in urban environments, particularly on limited spaces such as terraces or balconies. Through the integration of IoT technology and automation, the system offers users the ability to monitor and control key environmental factors such as soil moisture levels, sunlight exposure, rainfall, and pest presence, leading to optimized plant health and resource conservation. The results of the implementation demonstrate the system's effectiveness in improving plant outcomes, conserving water and energy resources, and enhancing user experience and satisfaction. While certain challenges and limitations were encountered during the implementation process, such as initial setup costs and technical complexities, the overall benefits of the system outweigh these drawbacks. Looking ahead, further research and development efforts can focus on addressing these limitations and refining the system to better meet the needs of urban gardeners. With continued advancements in technology and innovation, the Smart Terrace Gardening System holds great potential to contribute to sustainable urban agriculture practices.

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