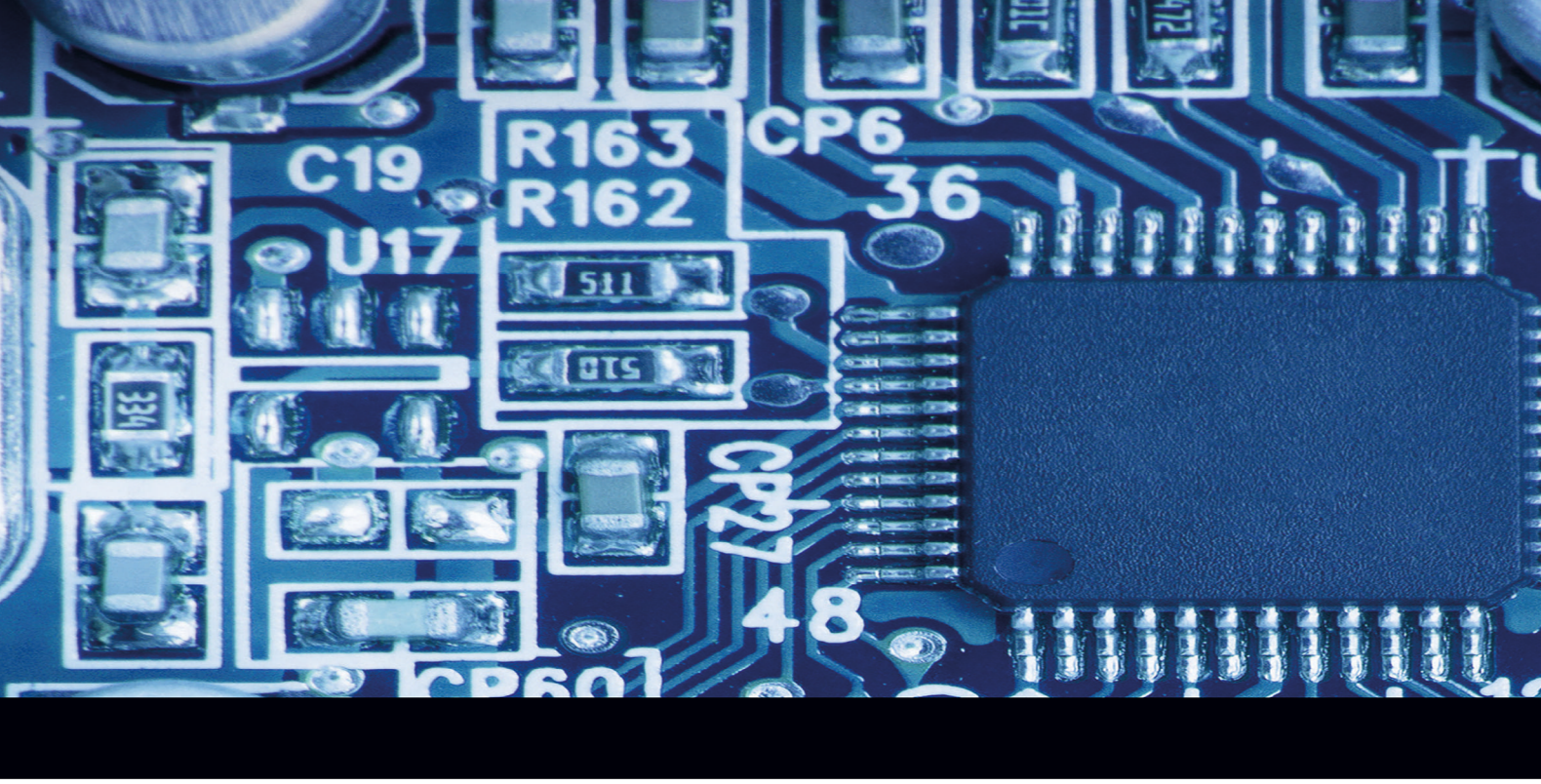

INTEGRATED TECHNOLOGIES IN ELECTRICAL, ELECTRONICS AND BIOTECHNOLOGY ENGINEERING

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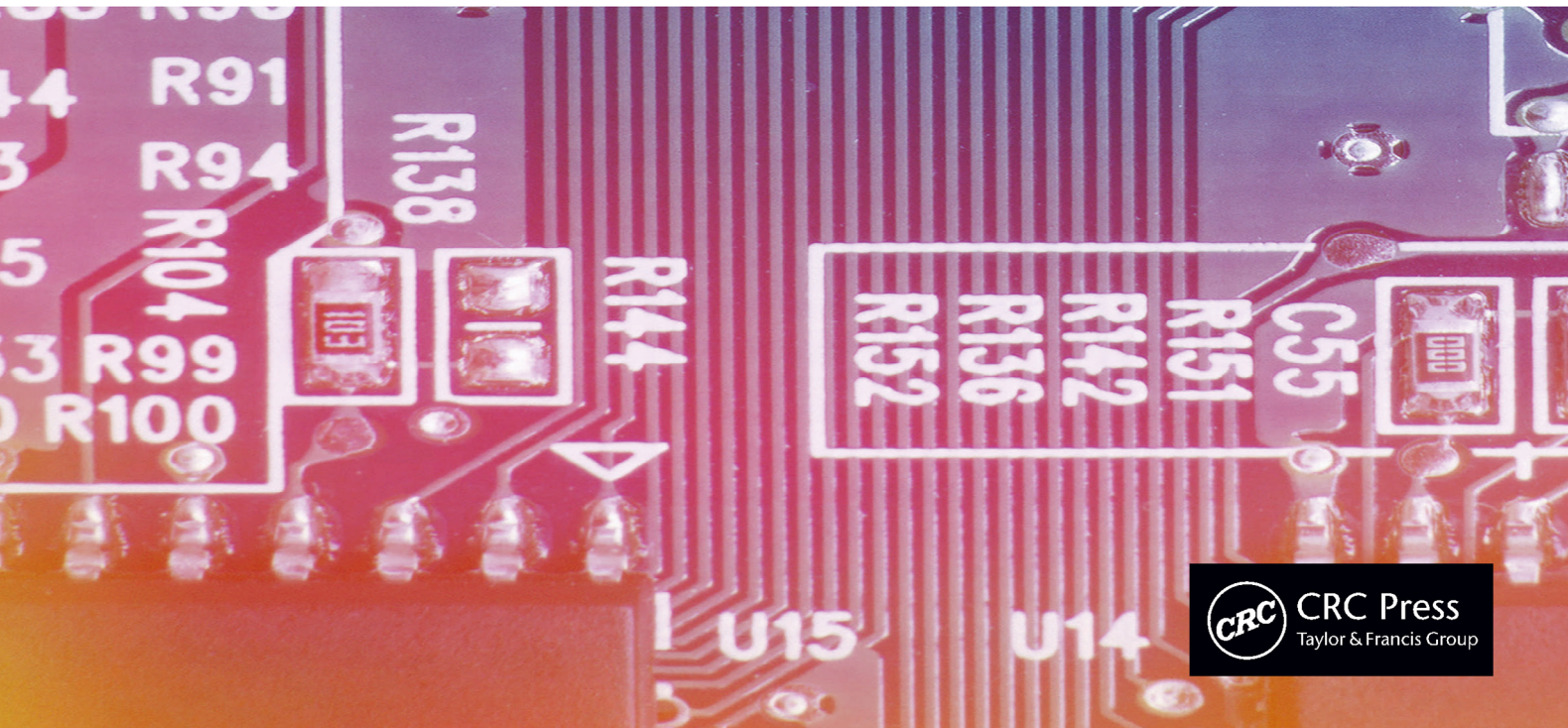

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Contents

12 Harvesting the future: smart farming system

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Abstract

Every aspect of the average person's life has undergone change because of Internet of Things (IoT) technology, which has made everything smart and intelligent. Our research paper tells the details about the development of a cutting-edge Smart Farming System, harnessing the capabilities of Arduino UNO and Node MCU. The project encompasses the creation of an automatic water control system for precise irrigation, seamlessly integrating soil moisture sensors. In tandem, a purpose-built chamber was constructed to house the entire system, fostering controlled agricultural environments. The research introduces an innovative scheme employing both DC pump and DC valve for water supply in precision agriculture.

Keywords: Decision support systems, humidity measurement, smart farming, internet of things, smart sensing, temperature measurement, water control

Introduction

A new era of productivity, sustainability, and efficiency in agriculture is being ushered in by smart farming systems. Fundamentally, this revolutionary strategy integrates cutting-edge technologies like automation, data analytics, artificial intelligence (AI), and the Internet of Things (IoT) to try and solve the many problems that traditional farming faces.

The main objective is to build an intelligent, networked ecosystem where real-time data- driven decision-making optimizes all aspects of farming, including crop production, irrigation, and soil management. The need to produce enough food to fulfill the growing global demand while reducing the negative environmental effects of traditional farming practices is what drives these systems. Sustainability is fundamental to Smart Farming Systems because they leverage data-driven insights to eliminate waste, lessen environmental impact, and improve soil health. By automating repetitive operations, these systems aim to improve overall farm management by freeing up farmers to concentrate on strategic decision-making, rather than just maximizing resource efficiency.

Motivations and objectives

Here, we highlighted the main motivational points for our work and also stated our exact contribution. Firstly, the main objective is to create an intelligent, networked agricultural ecosystem that maximizes resource utilization and boosts crop yields via in-the-moment monitoring and decision-making. Secondly, one major area of emphasis is precision agriculture, which minimizes waste and its negative effects on the environment by applying inputs like fertilizer and water exactly where they are required. Precision agriculture is demonstrated by the smart irrigation system's integration of Arduino UNO, which uses sensor data to make intelligent judgments on water use. Lastly, by using data analytics to provide real-time information, these systems improve farm management by helping farmers predict crop yields and take immediate action to correct problems, which eventually boosts output and efficiency.

Challenges and contributions

The project faced several challenges. Integrating the smart farming system with existing infrastructure was difficult, requiring creative solutions to bridge new technology with legacy systems. Inconsistent sensor calibration affected data precision, necessitating extra time for calibration and algorithm development to address performance issues.

The paper is arranged into seven major sections: Introduction followed by related work, then dataset preparation and then methodology after that experiment, results and discussion, and finally, conclusion and future scope.

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