

CHITKARA UNIVERSITY INSTITUTE OF ENGINEERING & TECHNOLOGY

ELECTRONICS & COMMUNICATION ENGINEERING

Lab Experiments Report

For

**Programming the Internet of Things
[25ECE0211]**

Submitted

By

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Submitted

To

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Remarks

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1. To examine the architectural framework of the Arduino Uno (ATmega328P) microcontroller and demonstrate fundamental General-Purpose Input/Output (GPIO) operations through digital signal manipulation.
2. To investigate digital input processing by utilizing tactile switch interfacing to control Light Emitting Diode (LED) states.
3. To implement Inter-Integrated Circuit (I²C) protocol for serial communication between Arduino and liquid crystal display (LCD) modules, enabling alphanumeric data visualization.
4. To quantify ambient thermal parameters through analog (LM35) and digital (DHT11) temperature sensors.
5. To evaluate time-of-flight principles through HC-SR04 ultrasonic transceiver operation, calculating object proximity via pulse-echo timing measurements.
6. To demonstrate electromechanical relay functionality for high-voltage circuit isolation, enabling microcontroller-based switching of alternating current (AC) loads.
7. To validate bipolar stepper motor actuation through Darlington array (ULN2003) driver implementation, examining step resolution.
8. To establish IEEE 802.11 wireless communication protocols using ESP8266 modules, executing AT commands for network configuration.
9. To architect an Internet of Things (IoT) framework for environmental parameter logging, integrating sensor nodes with ThingSpeak cloud analytics platform.
10. To synthesize mechatronic systems through integration of ultrasonic ranging, motor control algorithms, and kinematic feedback for autonomous navigation.