**Internet of Things**

**Lab Report 4**

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**19l-1316**

**Section-7A2**

**To Control IoT Actuators using PWM and Serial Communication: UART**

**INTRODUCTION:**

A computer's serial device interface is controlled by a microchip known as a UART (Universal Asynchronous Receiver/Transmitter).A hardware communication protocol called UART makes use of asynchronous serial communication at a speed that can be set. Asynchronous means that the output bits from the transmitting device to the receiving end are not synchronized by a clock signal. Through the USB port, the UART system communicates with digital pin 0 (RX), digital pin 1 (TX), and another computer.Due to the Arduino's onboard USB-to-Serial converter, this peripheral, which is included on all boards, enables the Arduino to communicate directly with a computer.UART is significantly slower than the SPI protocol.SPI provides synchronous communication at a high speed, whereas UART devices communicate with one another at speeds three times slower than SPI.A device that is synchronized uses the same clock and has synchronized timing with other devices.Asynchronous: Asynchronous devices have their own clocks and are triggered by the previous state's output.

**OBJECTIVES:**

• To learn and test UART communication using Arduino Mega 2560

• To learn and control IoT actuators using PWM signals of Arduino Mega 2560

**Application:**

A UART (Universal Asynchronous Receiver/Transmitter) is the microchip with programming that controls a computer's interface to its attached serial devices.UART is one of the most simple and most commonly used Serial Communication techniques. Today, UART is being used in many applications like GPS Receivers, Bluetooth Modules, GSM and GPRS Modems, Wireless Communication Systems, RFID based applications etc. Embedded systems, microcontrollers, and computers mostly use UART as a form of device-to-device hardware communication protocol. Among the available communication protocols, UART uses only two wires for its transmitting and receiving ends.

**Issues:**

We never find any issue regarding this lab.

**Conclusion:**

In this lab, we will learn how to use an Arduino Mega 2560 to test UART connectivity and to operate IoT actuators with its PWM signals. A UART is an asynchronous serial communication chip that allows for adjustable data formats and transfer rates. The least significant bit (Lsb) is sent first, followed by the most significant bit (Msb), all while being framed by start and stop bits.