

Task: Modelling and Verification of Communication Protocol

The modelling and verification of a communication protocol will include hardware coding and circuit implementation using microcontrollers.

Objective of the Task

The objective of this task is to help students gain practical understanding of:

- Communication protocols used in embedded systems.
- Basic electronic circuitry and hardware connections.
- Working and interfacing of microcontrollers.
- Verification and simulation of communication between microcontrollers.

Instructions for Performing the Task

1. Select and implement **any one** communication protocol:
 - I2C
 - UART
2. Develop the hardware connections between two Arduino Uno microcontrollers using simulation software.
3. **Verification and Simulation Platform** : Tinkercad Circuits
4. **Microcontroller: Arduino Uno**
5. The circuit design should include:

Communication signal wiring between the two Arduino Uno boards.

One LED connected to the receiver Arduino.

Appropriate current-limiting resistor for the LED.

Required passive components and connections.

Common ground connection between both microcontrollers.

Clearly labeled circuit representation.

6. Develop separate programs for:
 - Transmitter Arduino**, Send data or a command periodically to the receiver Arduino.
 - Receiver Arduino**
 - Receive the transmitted data.
 - Turn ON an LED upon successful reception of the predefined signal.

Requirements for Submission

Students must submit:

- Complete circuit screenshot from Tinkercad.
- Source code for the transmitter Arduino.
- Source code for the receiver Arduino.
- A short video demonstrating:
 - Circuit connections.
 - Simulation execution.
 - Successful communication.
 - LED glowing on the receiver Arduino after receiving the signal.
 - Also scroll the code in while recording the simulation.

Note

- The design and coding should be neat, properly labeled, and logically organized.
- The circuit connections must be electrically valid.
- Use meaningful comments in the code for better readability and evaluation.