EXPERIMENT NUMBER : 7

DATE : 26/03/2022 , SATURDAY

SERIAL COMMUNICATION PROTOCOLS (UART & SPI) USING ARDUINO ...

* AIM :

Analyze various communication protocols used in the design of portable devices.

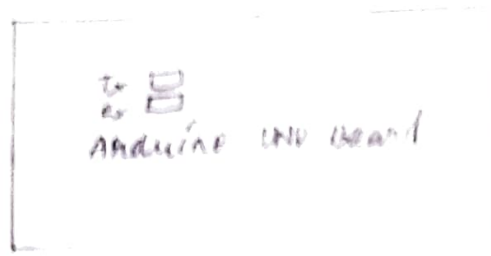
* CODE : (ARDUINO IDE)

(a) Serial Transmission using UART -

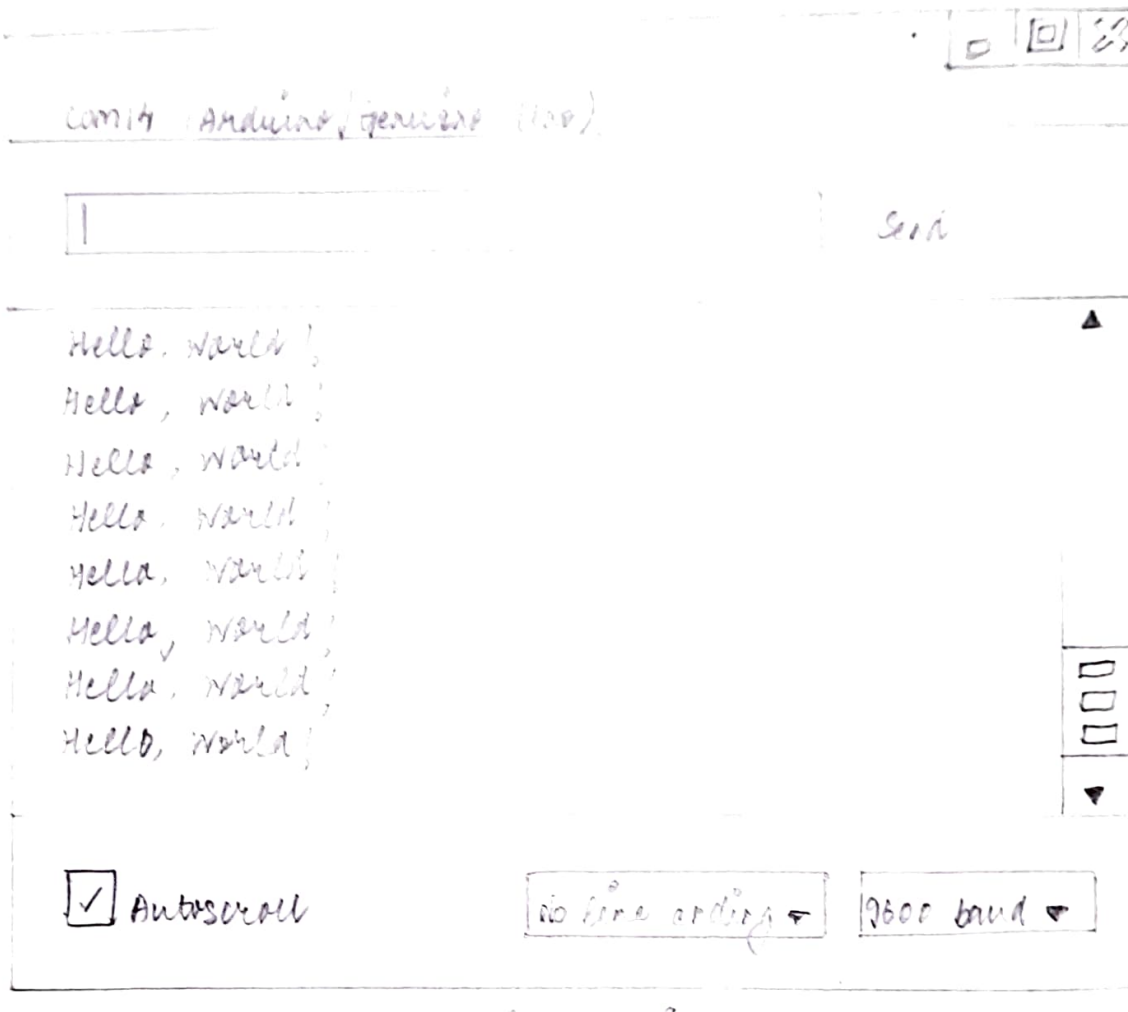
```
// The setup function runs once when you press reset or power
   the board:
void setup()
{
   Serial.begin(9600); // Initialize serial communications
}

// The loop function runs over and over again forever:
void loop()
{
   Serial.println("Hello, World!");
   delay(1); // Delay in between reads for stability
}
```

(b) Serial Reception and Transmission using UART -

```
char inputchar = ' '; // A character variable to hold
                      incoming data
```



Hardware



Output of Serial Monitor

Components Required:

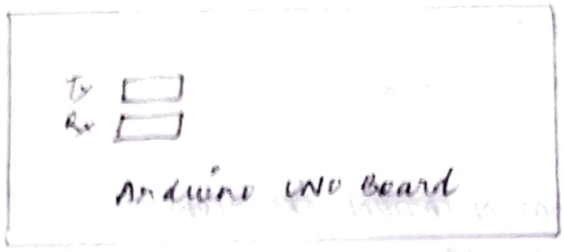
1. Arduino UNO Board
2. Battery / Power Supply Cable
3. connecting Wires

(a) Serial Transmission using UART

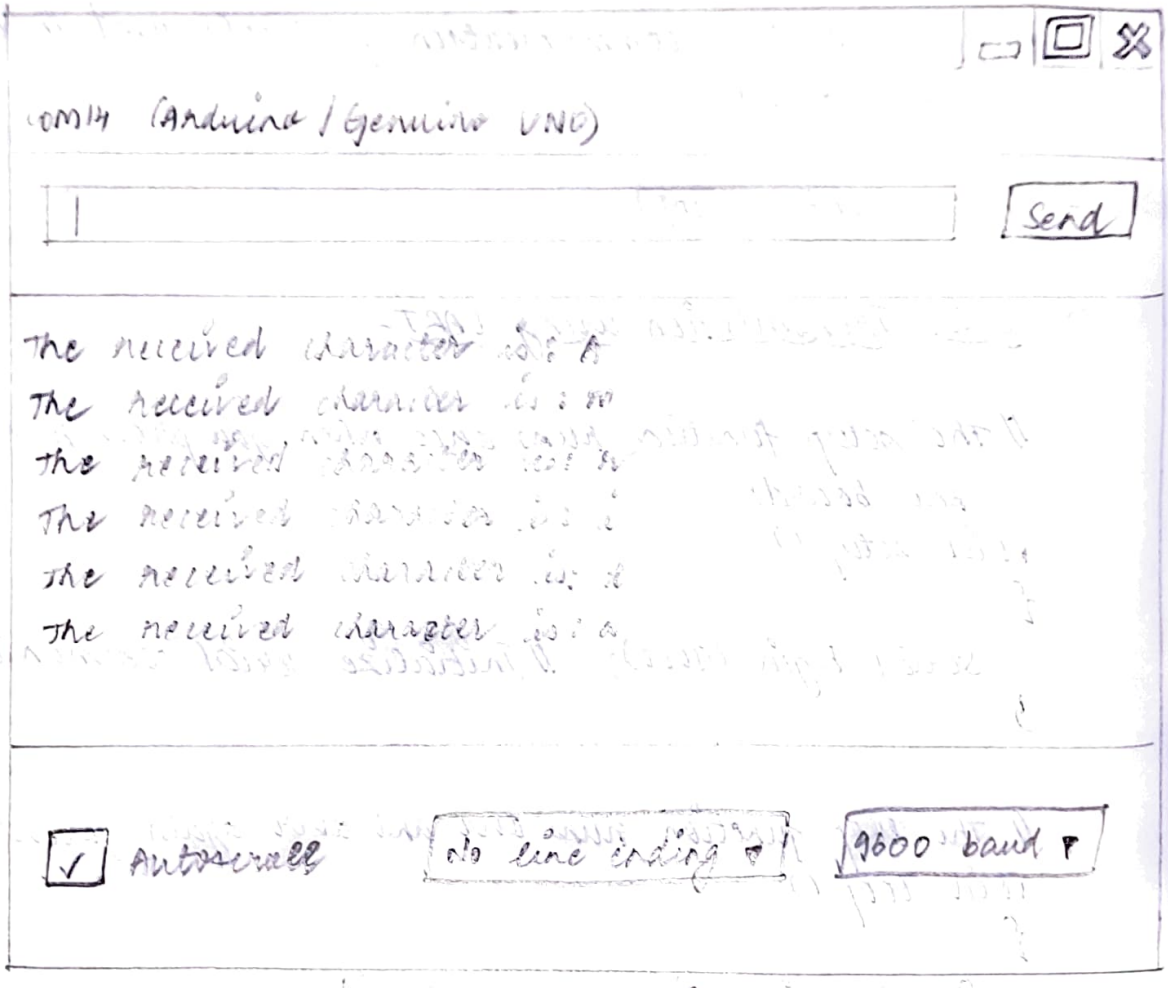
```
// The setup function runs once when you press reset or power
   the board:
void setup ()
{
  Serial. begin (9600);  // Initialize serial communications
}

// The loop function runs over and over again forever:
void loop ()
{
  if ((( Serial. available () ) > (0) ))
  {
    inputChar = Serial. read ();
    Serial. print ("The received character is: ");
    Serial. println (inputChar);
  }
}
```

(c) Device control using UART in Arduino -

```
// The setup function runs once when you press reset or power
   the board:
void setup ()
{
  Serial. begin (9600); // Initialize serial communications
  pinMode (13, OUTPUT); // Initialize digital pin 13 as an output
}

// The loop function runs over and over again forever:
void loop ()
{
  if ((( Serial. available () ) > (0) ))
  {
```



Hardware



Output of Serial Monitor

(c)

Components Required -

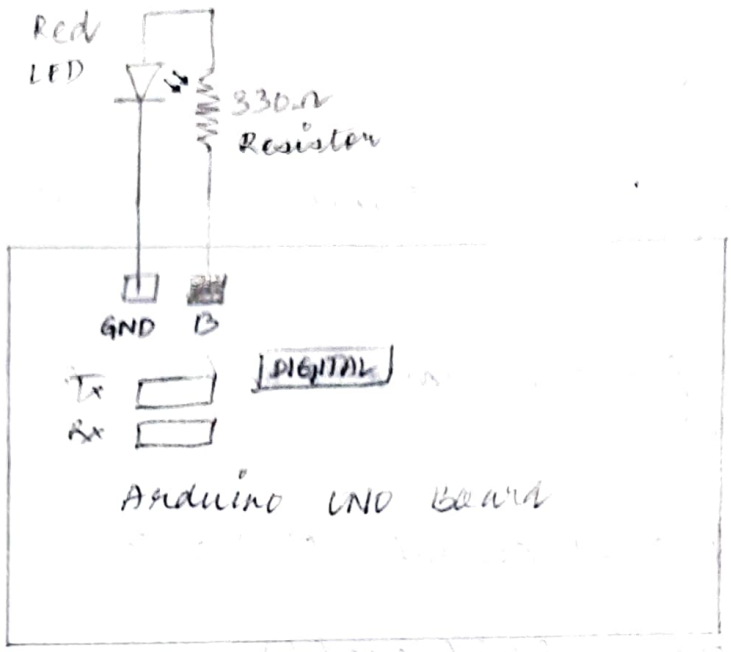
1. Arduino UNO Board
2. Battery / Power supply cable
3. Connecting wires

(b) Serial Reception and Transmission using USART

```
char inputChar = Serial.read();
Serial.print("The received character is: ");
Serial.println(inputChar);
if (inputChar == 'A')
{
  digitalWrite(13, HIGH); // Turn the LED on by making the
  delay(2000);                    voltage HIGH
  // Wait for two seconds
}
 else
 {
   digitalWrite(13, LOW); // Turn the LED off by making the
   delay(2000);                    voltage LOW
   // Wait for two seconds
 }
}
}
```

(d) Device control with Bluetooth Module using UART -

```
// These constants won't change:
const int ledPin 1 = 13; // Pin that the LED is attached to
const int ledPin 2 = 2; // Pin that the LED is attached to

// The setup function runs once when you press reset or power
   the board:
void setup()
{
  Serial.begin(9600); // Initialize serial communications
  pinMode(ledPin 1, OUTPUT); // Initialize the LED pin 1 as
                                an output
  pinMode(ledPin 2, OUTPUT); // Initialize the LED pin 2 as
                                an output
}
```



Hardware

Components Required -

1. Arduino UNO Board
2. Red LED
3. 330 Ω Resistor
4. Battery Power Supply
5. Connecting wires

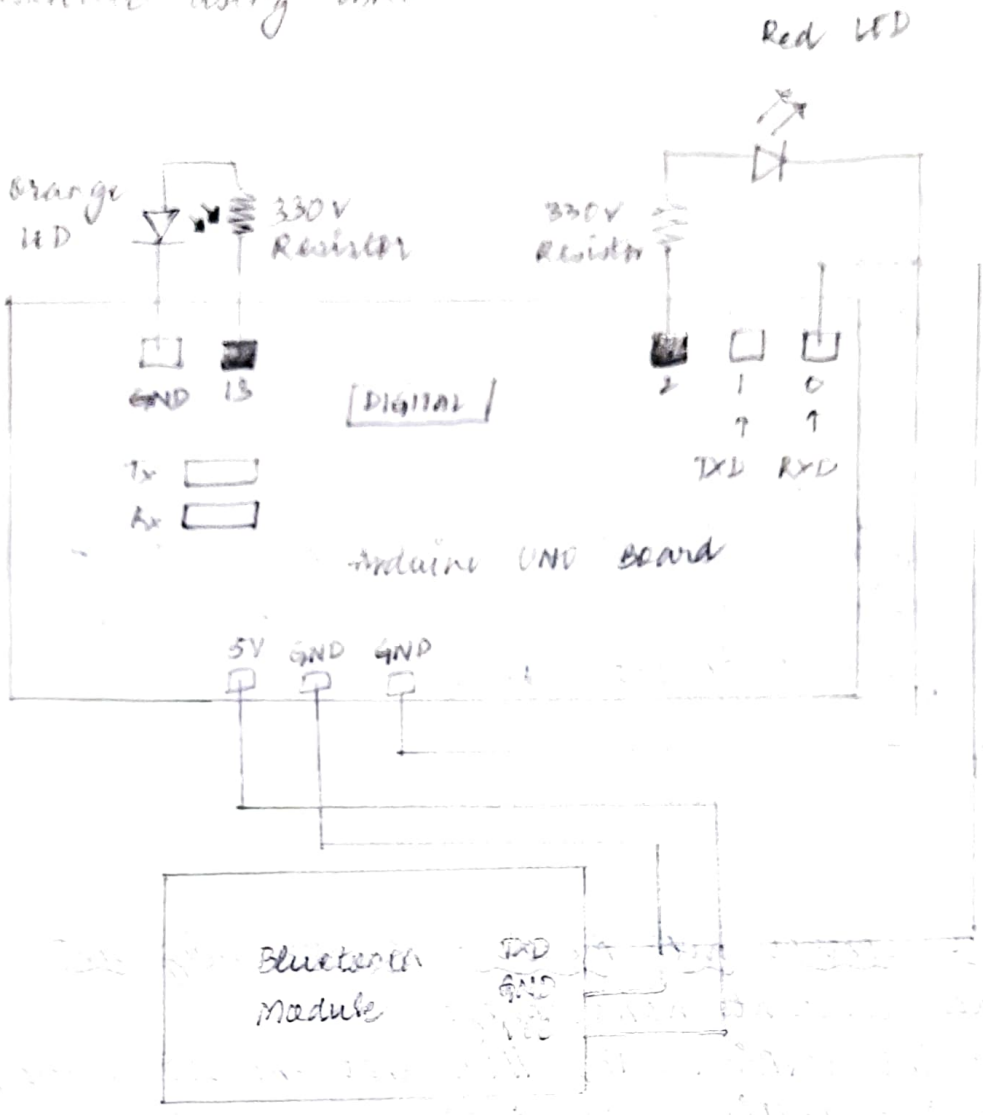
(c) Device control using UART in Arduino

```
// The loop function runs over and over again forever:
void loop()
{
  if ((Serial.available()) > (0))
  {
    char inputchar = Serial.read();
    Serial.print("the receiving character is: ");
    Serial.println(inputchar);
    if (inputChar == 'A')
    {
      digitalWrite(ledPin1, HIGH); // Turn the LED on by
                                   making the voltage HIGH
      digitalWrite(ledPin2, LOW); // Turn the LED off by
                                   making the voltage LOW
    }
    else if (inputchar == 'B')
    {
      digitalWrite(ledPin1, LOW); // Turn the LED off by
                                   making the voltage LOW
      digitalWrite(ledPin2, HIGH); Turn the LED on by
                                   making the voltage HIGH
    }
  }
}
```

* INFERENCE:

Analyze various communication protocols used in the design of portable devices and all simulation results were successfully verified.

(4) Device Control with Bluetooth Module using VDRT



Components Required

1. Arduino UNO Board
2. Orange LED
3. Red LED
4. 330 V Resistor - 2
5. Bluetooth Module HC-05
6. Battery / Power supply
7. Connecting Wires