Develop Routine of TFmini Plus in Arduino

In this routine, Arduino Uno and DUE board is taken as example, which is mainly for the user to quickly familiarize himself with our LiDAR and thus save the time of product development.

For detailed introduction and tutorial of Aruidno, please refer to following website:
Arduino Official website: www.arduino.cc

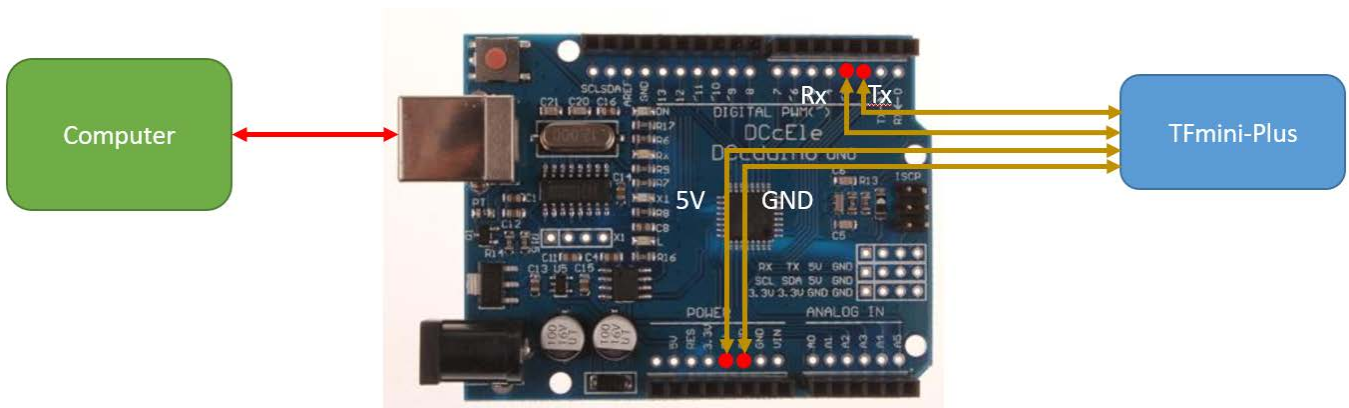**Step 1: Hardware Connection**

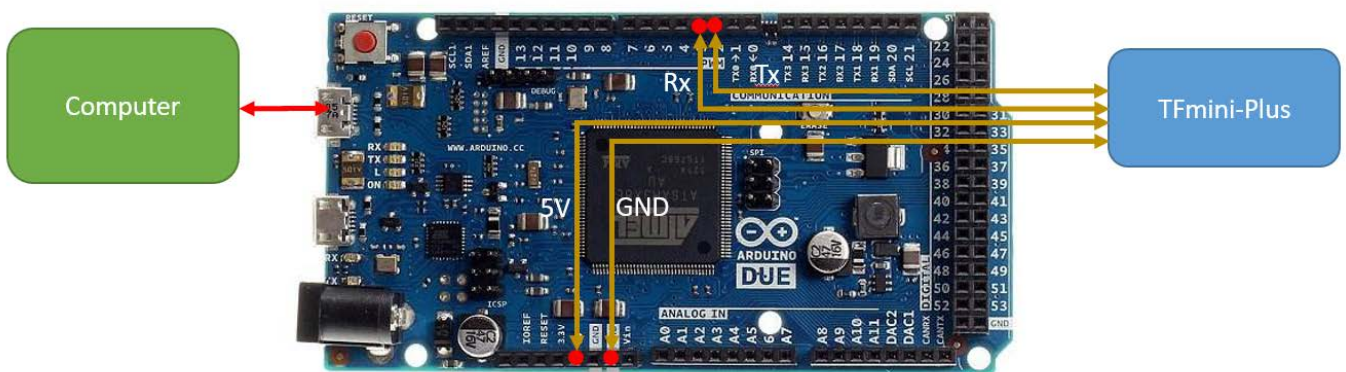Figure 1 Schematic Diagram of Connection between TFmini Plus and UNO Board

Figure 2 Schematic Diagram of Connection between TFmini Plus and DUE Board

Step 2: Program Compilation

At least two serial ports of Arduino are required for the achievement of this routine function with one for receiving data of LiDAR and another for outputting data to PC for display. The user may either

copy following code and paste it in Arduino IDE program editing window or directly open relevant enclosed file.

```
/*
   This program is the interpretation routine of standard output protocol of TFmini-Plus product on Arduino.
   For details, refer to Product Specifications.
   For Arduino boards with only one serial port like UNO board, the function of software visual serial port is to be used.
*/
#include <SoftwareSerial.h>    //header file of software serial port
SoftwareSerial Serial1(2,3); //define software serial port name as Serial1 and define pin2 as RX and pin3 as TX
/* For Arduinoboards with multiple serial ports like DUEboard, interpret above two pieces of code and directly use Serial1 serial port*/
int dist; //actual distance measurements of LiDAR
int strength; //signal strength of LiDAR
float temprature;
int check;    //save check value
int i;
int uart[9];    //save data measured by LiDAR
const int HEADER=0x59;    //frame header of data package
void setup() {
    Serial.begin(9600); //set bit rate of serial port connecting Arduino with computer
```

```
    Serial1.begin(115200);    //set bit rate of serial port connecting LiDAR with Arduino

}

void loop() {

    if (Serial1.available()) {    //check if serial port has data input

        if(Serial1.read() == HEADER) {    //assess data package frame header 0x59

            uart[0]=HEADER;

            if (Serial1.read() == HEADER) { //assess data package frame header 0x59

                uart[1] = HEADER;

                for (i = 2; i < 9; i++) { //save data in array

                    uart[i] = Serial1.read();

                }

                check = uart[0] + uart[1] + uart[2] + uart[3] + uart[4] + uart[5] + uart[6] + uart[7];

                if (uart[8] == (check & 0xff)){ //verify the received data as per protocol

                    dist = uart[2] + uart[3] * 256;        //calculate distance value

                    strength = uart[4] + uart[5] * 256; //calculate signal strength value

                    temprature = uart[6] + uart[7] *256;//calculate chip temprature

                    temprature = temprature/8 - 256;

                    Serial.print("dist = ");

                    Serial.print(dist); //output measure distance value of LiDAR

                    Serial.print('\t');

                    Serial.print("strength = ");

                    Serial.print(strength); //output signal strength value
```
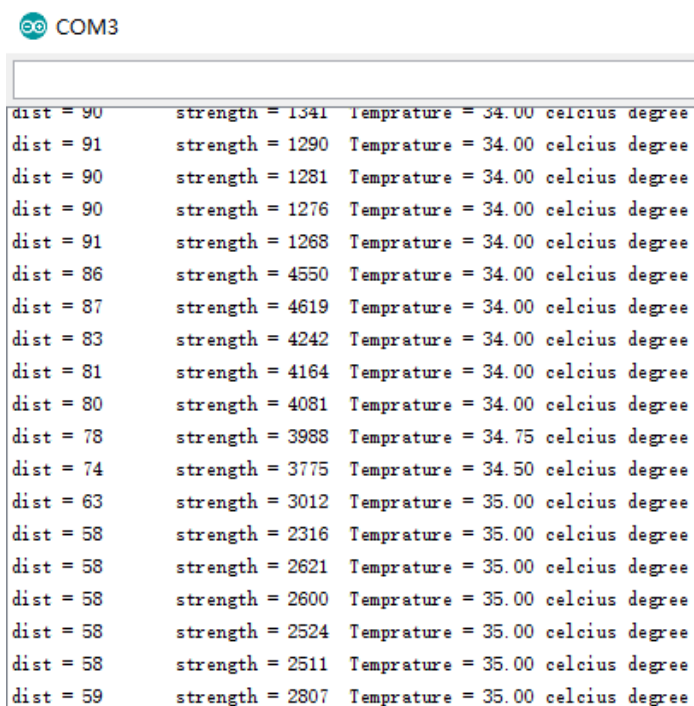
```
            Serial.print("\t Chip Temprature = ");

            Serial.print(temprature);

            Serial.println(" celcius degree"); //output chip temperature of Lidar

        }

      }

    }

  }

}
```

Step 3: Viewing of Data

Download the code into Arduino board and open the serial monitor for the serial port. Then real-time distance values as well as the corresponding strength and chip temperature can be viewed, as shown in figure 3.


```
COM3

dist = 90    strength = 1341  Temprature = 34.00 celcius degree
dist = 91    strength = 1290  Temprature = 34.00 celcius degree
dist = 90    strength = 1281  Temprature = 34.00 celcius degree
dist = 90    strength = 1276  Temprature = 34.00 celcius degree
dist = 91    strength = 1268  Temprature = 34.00 celcius degree
dist = 86    strength = 4550  Temprature = 34.00 celcius degree
dist = 87    strength = 4619  Temprature = 34.00 celcius degree
dist = 83    strength = 4242  Temprature = 34.00 celcius degree
dist = 81    strength = 4164  Temprature = 34.00 celcius degree
dist = 80    strength = 4081  Temprature = 34.00 celcius degree
dist = 78    strength = 3988  Temprature = 34.75 celcius degree
dist = 74    strength = 3775  Temprature = 34.50 celcius degree
dist = 63    strength = 3012  Temprature = 35.00 celcius degree
dist = 58    strength = 2316  Temprature = 35.00 celcius degree
dist = 58    strength = 2621  Temprature = 35.00 celcius degree
dist = 58    strength = 2600  Temprature = 35.00 celcius degree
dist = 58    strength = 2524  Temprature = 35.00 celcius degree
dist = 58    strength = 2511  Temprature = 35.00 celcius degree
dist = 59    strength = 2807  Temprature = 35.00 celcius degree
```

图 1 View readings at Serial Monitor

www.benewake.com

In addition, data curve can be viewed in the curve plotter for serial port, however, the above coding regarding the print of serial port should be modified:

```
//Serial.print("dist = ");

Serial.print(dist); //output measure distance value of LiDAR

Serial.print(" ");

//Serial.print("strength = ");

Serial.print(strength); //output signal strength value

//Serial.print("\t Chip Temprature = ");

Serial.print(" ");

Serial.print(temprature);

Serial.println();

//Serial.println(" celcius degree");
```

Re-compile and download to Arduino board and open the curve plotter. Then two curves including the dist and strength can be viewed, as shown in Figure 4.
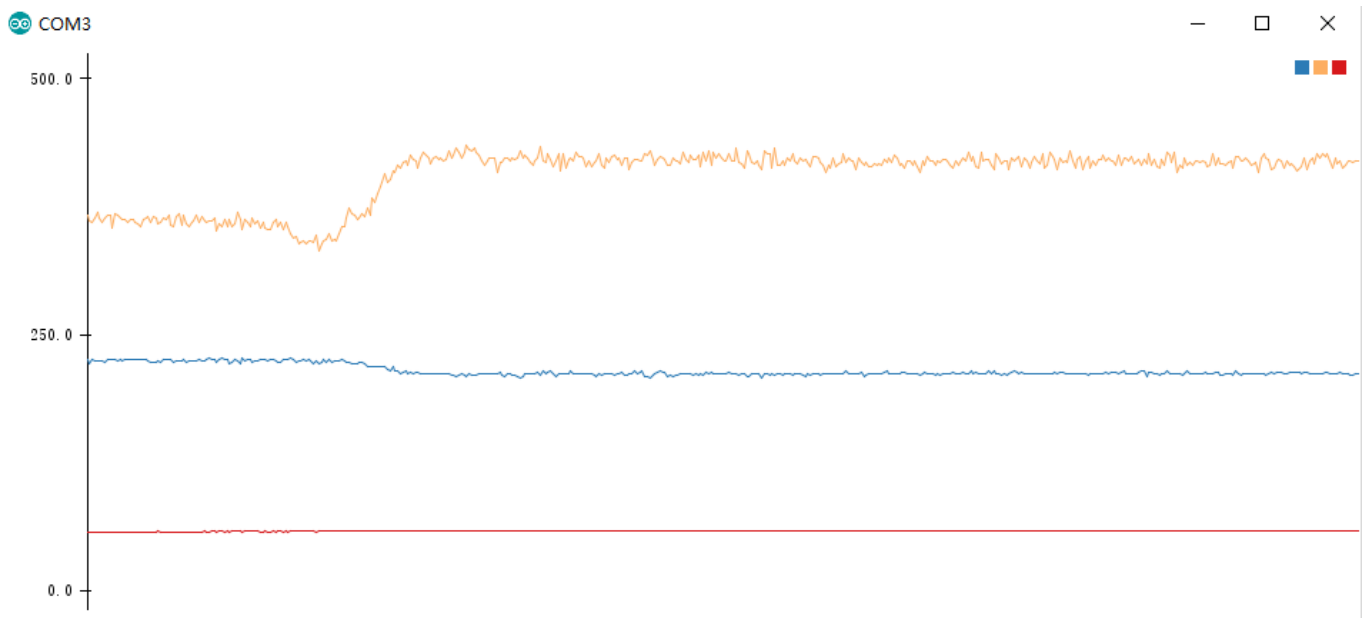

Figure 4 Plots of TFmini Plus data on Curve plotter for Serial Port