TRƯỜNG ĐẠI HỌC BÁCH KHOA HÀ NỘI
HANOI UNIVERSITY OF SCIENCE AND TECHNOLOGY

KỸ THUẬT LẬP TRÌNH

GIAO TIẾP UART VỚI DHT11

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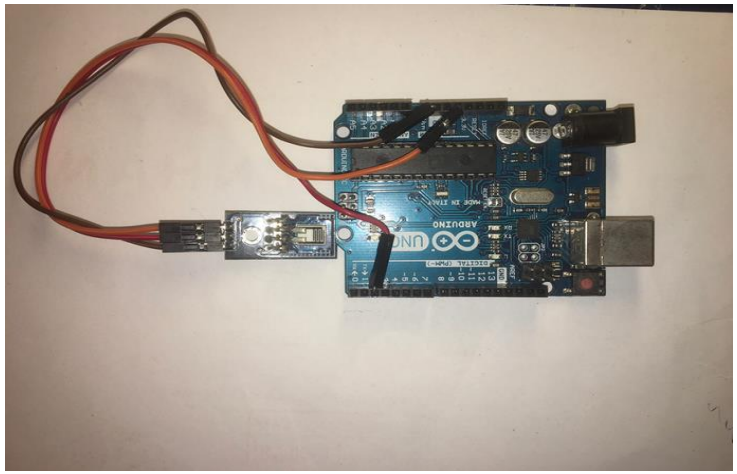
Sinh viên: Cao Thành Trung

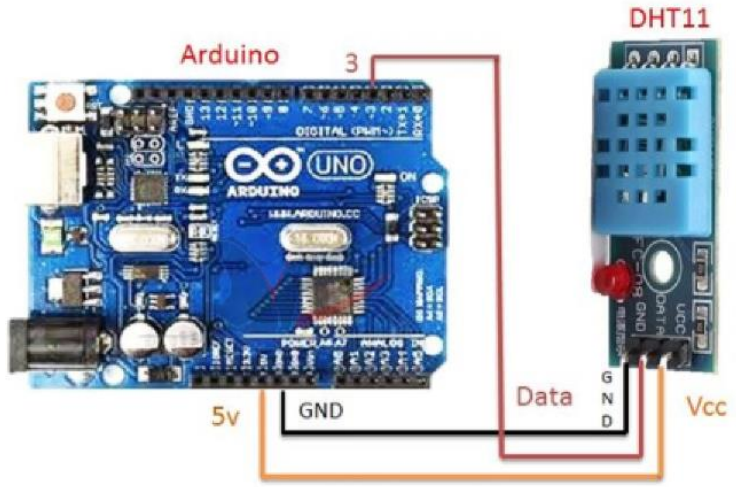
NỘI DUNG

1. Phần cứng
2. Giao diện (Gui-winform)
3. Arduino
4. Chức năng

1: Phần cứng

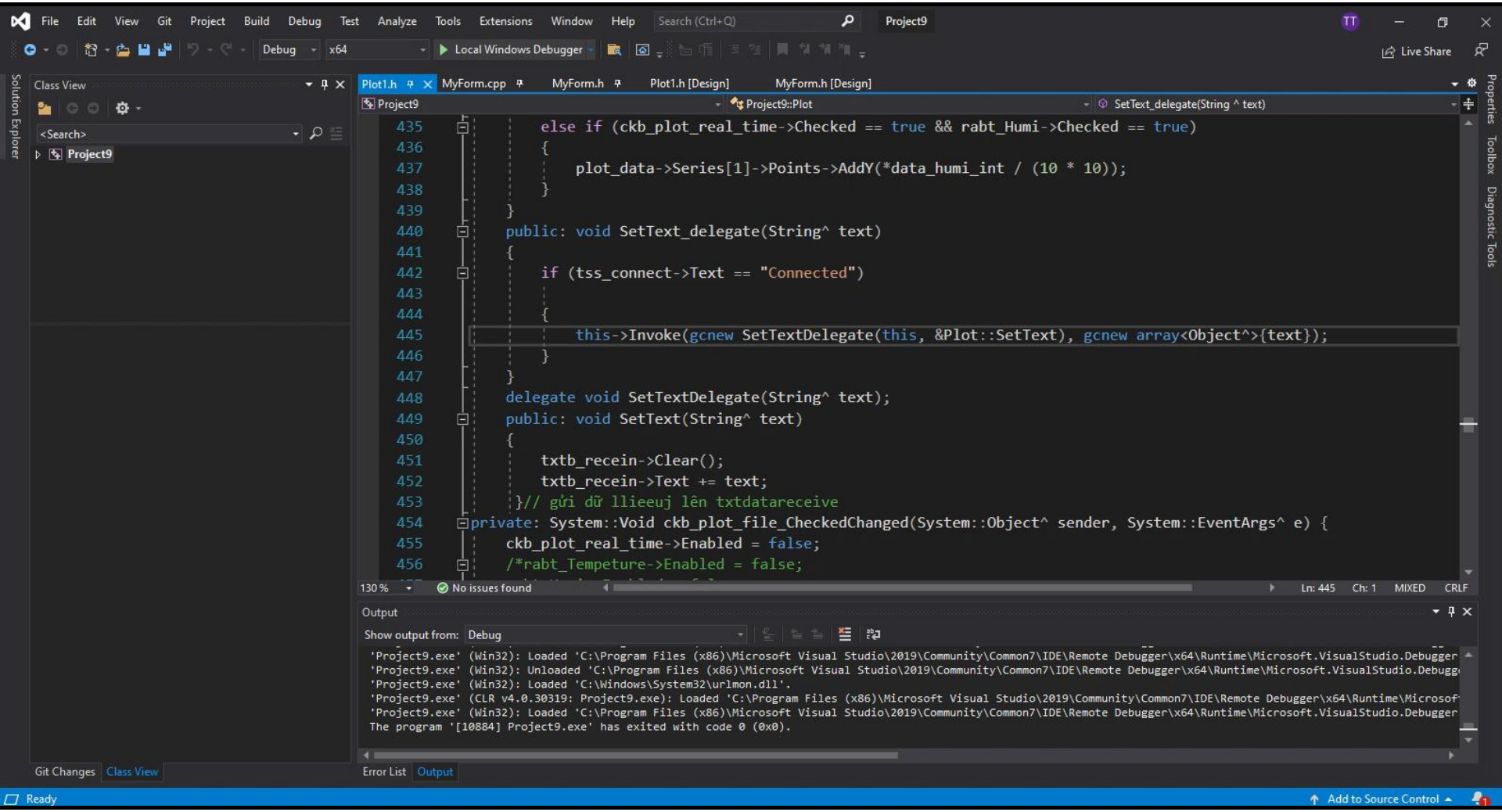
- Arduino Uno R3
- Cảm biến DHT11
- 1 sợi dây cáp





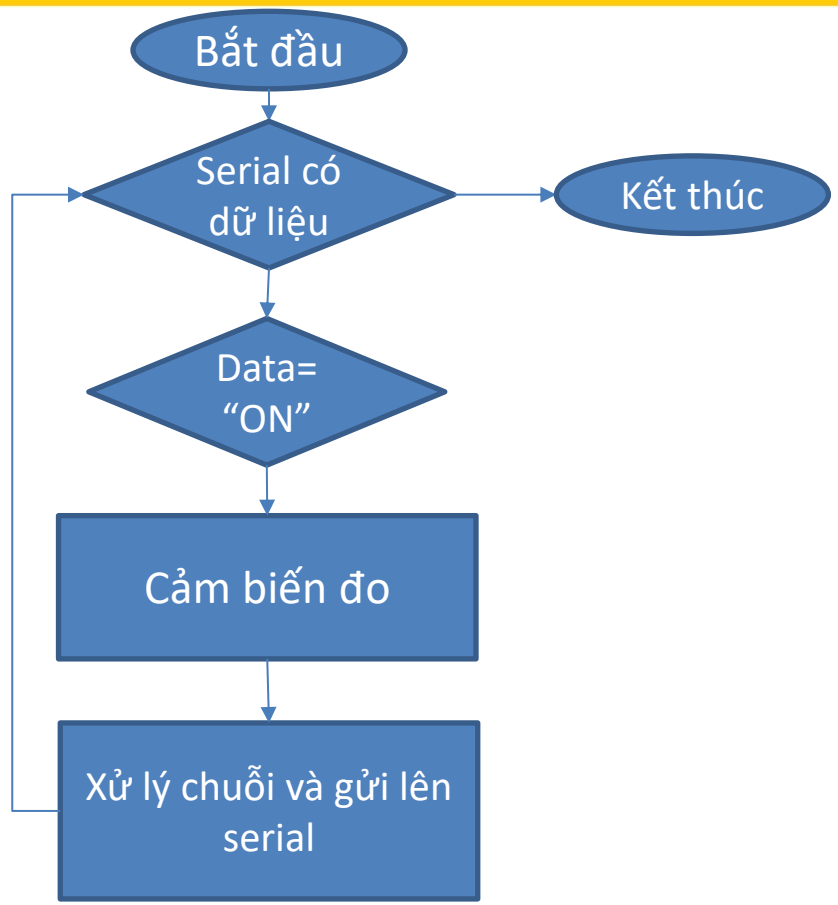
Sơ đồ kết nối cảm biến DHT11 với Arduino

2: Giao diện


File Edit View Git Project Build Debug Test Analyze Tools Extensions Window Help
Search (Ctrl+Q)
Project9
Debug
x64
Local Windows Debugger
Live Share
Class View
<Search>
Project9
Plot1.h
MyForm.cpp
MyForm.h
Plot1.h [Design]
MyForm.h [Design]
Project9
Project9::Plot
SetText_delegate(String ^ text)
435 else if (ckb_plot_real_time->Checked == true && rabt_Humi->Checked == true)
436 {
437 plot_data->Series[1]->Points->AddY(*data_humi_int / (10 * 10));
438 }
439 }
440 public: void SetText_delegate(String^ text)
441 {
442 if (tss_connect->Text == "Connected")
443
444 {
445 this->Invoke(gcnew SetTextDelegate(this, &Plot::SetText), gcnew array<Object^>{text});
446 }
447 }
448 delegate void SetTextDelegate(String^ text);
449 public: void SetText(String^ text)
450 {
451 txtb_recein->Clear();
452 txtb_recein->Text += text;
453 }// gửi dữ llieeuj lên txtdatareceive
454 private: System::Void ckb_plot_file_CheckedChanged(System::Object^ sender, System::EventArgs^ e) {
455 ckb_plot_real_time->Enabled = false;
456 /*rabt_Tempeture->Enabled = false;
130 %
No issues found
Ln: 445
Ch: 1
MIXED
CRLF
Output
Show output from: Debug
'Project9.exe' (Win32): Loaded 'C:\Program Files (x86)\Microsoft Visual Studio\2019\Community\Common7\IDE\Remote Debugger\x64\Runtime\Microsoft.VisualStudio.Debugger
'Project9.exe' (Win32): Unloaded 'C:\Program Files (x86)\Microsoft Visual Studio\2019\Community\Common7\IDE\Remote Debugger\x64\Runtime\Microsoft.VisualStudio.Debugg
'Project9.exe' (Win32): Loaded 'C:\Windows\System32\urlmon.dll'.
'Project9.exe' (CLR v4.0.30319: Project9.exe): Loaded 'C:\Program Files (x86)\Microsoft Visual Studio\2019\Community\Common7\IDE\Remote Debugger\x64\Runtime\Microsof
'Project9.exe' (Win32): Loaded 'C:\Program Files (x86)\Microsoft Visual Studio\2019\Community\Common7\IDE\Remote Debugger\x64\Runtime\Microsoft.VisualStudio.Debugger
The program '[10884] Project9.exe' has exited with code 0 (0x0).
Git Changes
Class View
Error List
Output
Ready
Add to Source Control
Solution Explorer
Properties
Toolbox
Diagnostic Tools

3: Arduino

```
#include "DHT.h"
#define DHT11Pin 2
#define DHTType DHT11
DHT HT(DHT11Pin, DHTType);
float doam;
float doc;
int docnguyen,doamnguyen;
String cmd,x,y,z;
void setup() {
  Serial.begin(9600);
  HT.begin();
}
void loop() {
  while(Serial.available()>0)
  {
    cmd=Serial.readString();
      if(cmd=="ON")
      {
        doam = HT.readHumidity();
        doc = HT.readTemperature();
        docnguyen=doc*pow(10,2);
        doamnguyen=doam*pow(10,2);
        x=String(docnguyen);
        y=String(doamnguyen);
        Serial.print(x+y+"*");
      }
   }
```



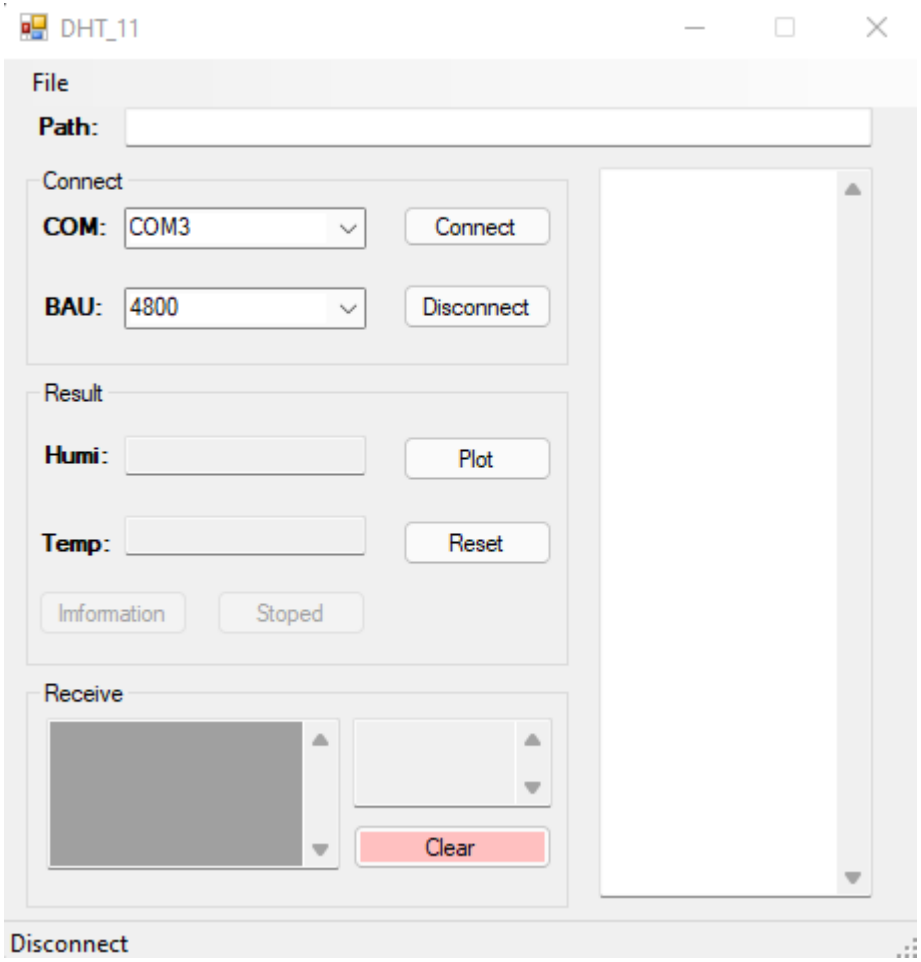
Nhiệm vụ:

- Đo nhiệt độ, độ ẩm
- Gửi chuỗi dữ liệu

4.1: Form 1

Chức năng:

- Màn hình chính
- Hiển thị nhiệt độ, độ ẩm
- Lưu dữ liệu
- Liên kết với các form khác

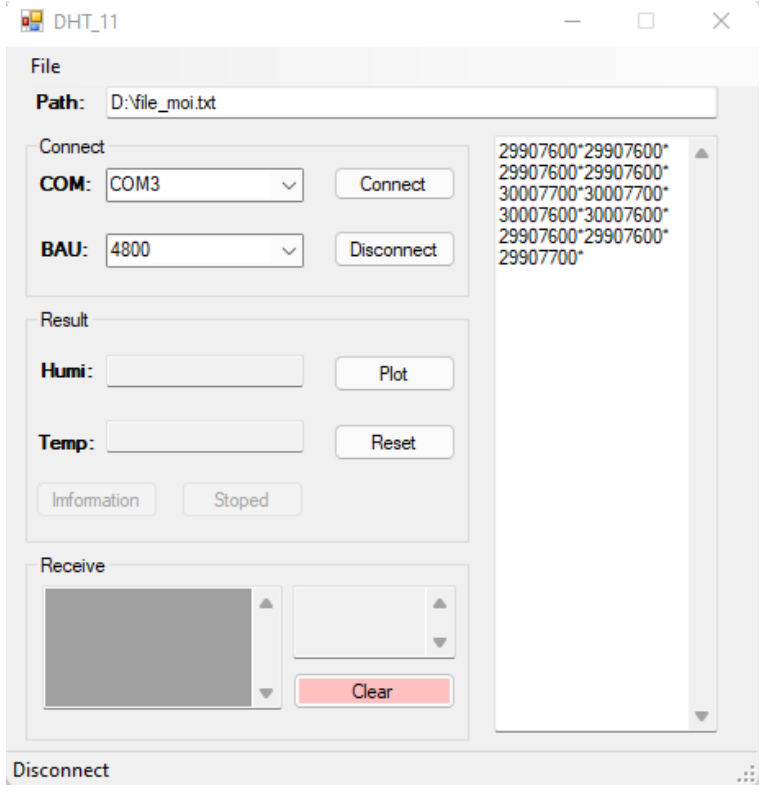


4.1: Form1

```
    OpenFileDialog^ open;
private: System::Void openToolStripMenuItem_Click(System::Object^ sender, System::EventArgs^ e) {
    open=gcnew OpenFileDialog();
    open->Filter = "|*.txt";
    if (open->ShowDialog() == Windows::Forms::DialogResult::OK)
    {
        txt_path->Text = open->FileName;
        StreamReader^ read = gcnew StreamReader(open->FileName);
        txt_hienthi->Text = read->ReadToEnd();
        read->Close();
    }
}
```

1: File

- Open



4.1: Form1

1: File

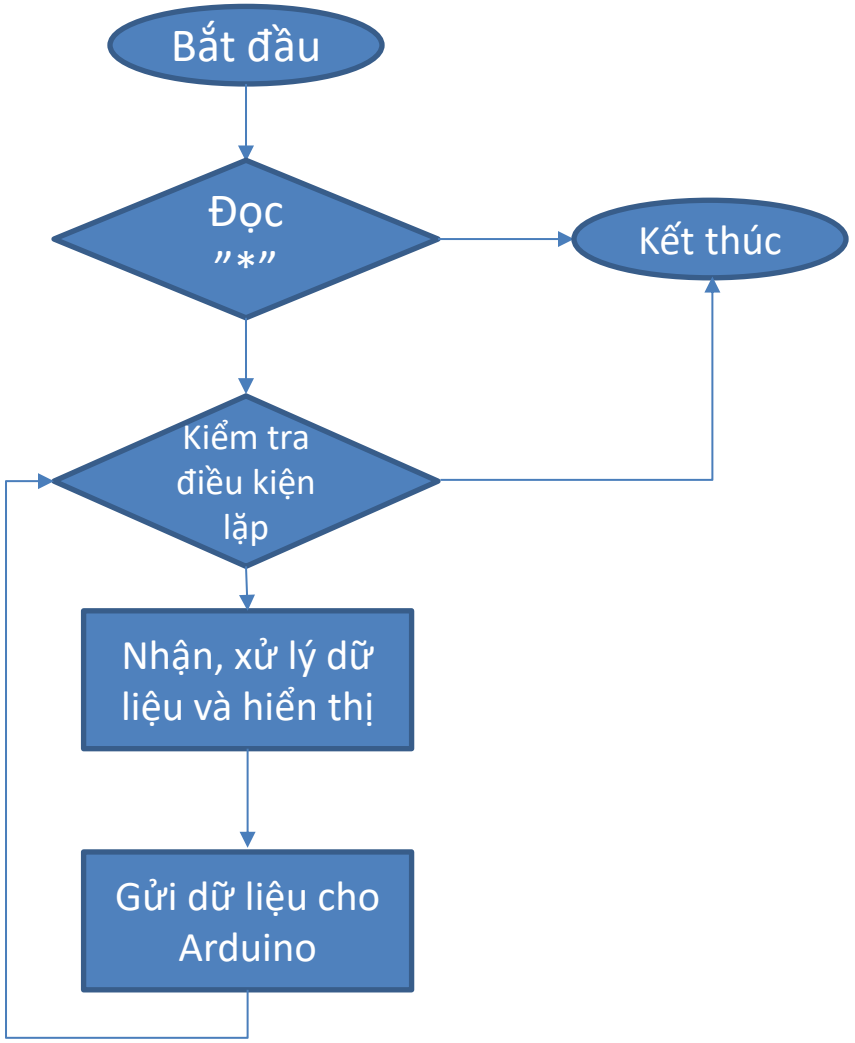
- Save

- Save as

```
private: System::Void saveToolStripMenuItem_Click(System::Object^ sender, System::EventArgs^ e) {
    StreamWriter^ write = gcnew StreamWriter(open->FileName->Trim());
    write->WriteLine(txtDatareceive->Text);
    write->Close();
    StreamReader^ read = gcnew StreamReader(open->FileName);
    txt_hienthi->Text = read->ReadToEnd();
    read->Close();

}
private: System::Void save_asToolStripMenuItem_Click(System::Object^ sender, System::EventArgs^ e) {
    SaveFileDialog^ save = gcnew SaveFileDialog();

    save->Filter = "|*.txt";
    save->RestoreDirectory = true;
    if (save->ShowDialog() == Windows::Forms::DialogResult::OK)
    {
        StreamWriter^ write = gcnew StreamWriter(save->FileName);
        write->WriteLine(txtDatareceive->Text);
        write->Close();

    }
}
```

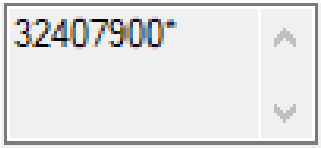
4.1: Form 1

2: Hiển thị nhiệt độ, độ ẩm



3.1: Form 1

2: Hiển thị nhiệt độ, độ ẩm



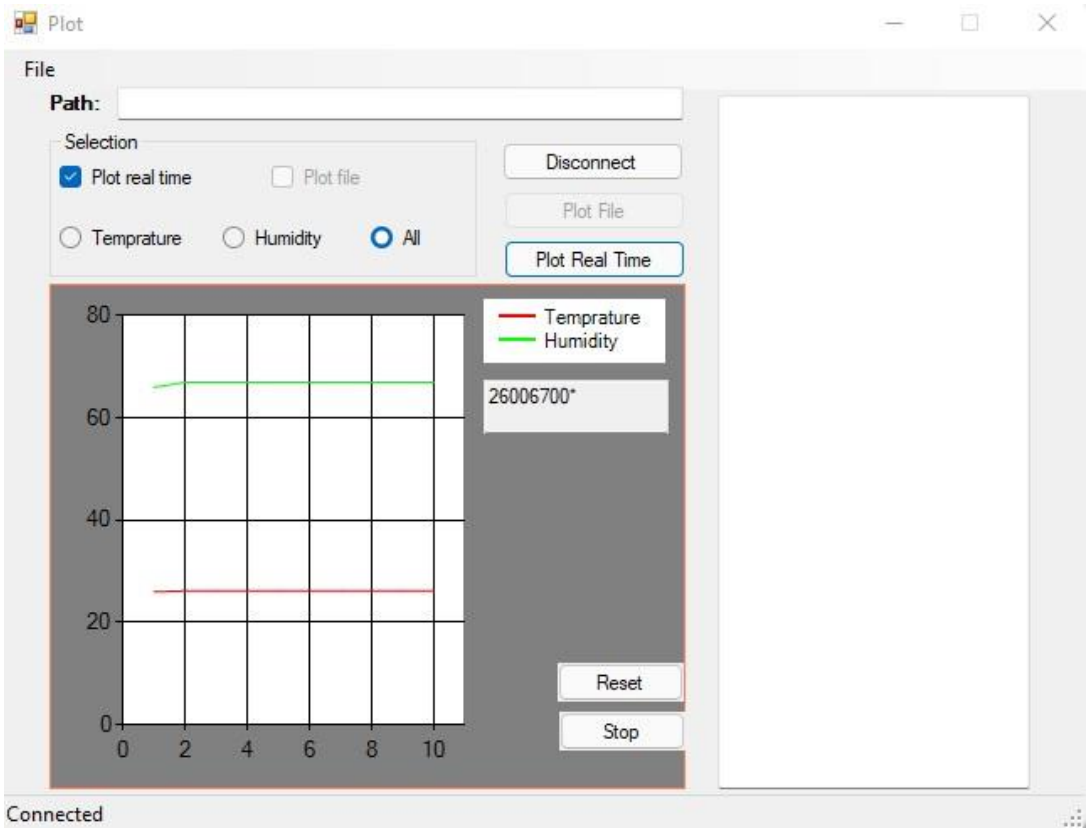

```
}//đọc và gửi dữ liệu lên chỗ cần gửi
        delegate void truyendata(String^ text);
        event truyendata^ truyen;

        delegate void SetTextDelegate(String^ text);
        void SetText(String^ text)
        {
            txtDatareceive->Text += text+"\n";
        }// gửi dữ llieeuj lên txtdatareceive
        void SetText_test(String^ text)
        {
            txtb_test->Clear();
            txtb_test->Text += text;
        }// gửi dữ liệu lên txt_tét

        void SetText_humi(String^ text)
        {
            txt_humi->Clear();
            txt_humi->Text += text+"%";
        }// gửi dữ liệu lên txt-humi

        void SetText_temp(String^ text)
        {
            txt_temp->Clear();
            txt_temp->Text += text + "_*C";
        }//gửi dữ liệu lên txt_temp
```

```
        if (serialPort1->ReadTo("*"))//ddocj du lieu chuan
        {
            while (1)
            {
                if (bto_stop->Text == "Stoped")
                {
                    serialPort1->Write("OFF");
                    break;
                }
                Thread::Sleep(1100);
                String^ dataInput = serialPort1->ReadExisting();
                /*Thread::Sleep(2000);*/
                if (dataInput != String::Empty)
                {
                    Double^ data_humi_int = Convert::ToDouble(dataInput->Substring(4, 4));
                    Double^ data_temp_int = Convert::ToDouble(dataInput->Substring(0, 4));
                    String^ data_humi = Convert::ToString(*data_humi_int / (10 * 10));
                    String^ data_temp = Convert::ToString(*data_temp_int / (10 * 10));
                    if (dataInput != String::Empty)
                    {
                        this->Invoke(gcnew SetTextDelegate(this, &MyForm::SetText_test), gcnew array<Object^>{dataInput});
                        this->Invoke(gcnew SetTextDelegate(this, &MyForm::SetText), gcnew array<Object^>{dataInput});
                        this->Invoke(gcnew SetTextDelegate(this, &MyForm::SetText_humi), gcnew array<Object^>{data_humi});
                        this->Invoke(gcnew SetTextDelegate(this, &MyForm::SetText_temp), gcnew array<Object^>{data_temp});
                    }
                    truyen(dataInput);

                }

                serialPort1->Write("ON");
                //Thread::Sleep(1000);*/
            }
```

4.2: Form 2

Chức năng:

- Vẽ đồ thị thời gian thực
- Vẽ đồ thị theo file

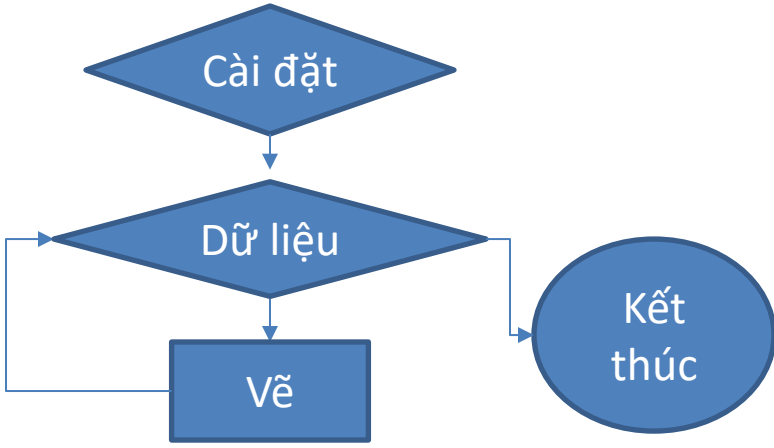


3.2: Form 2

1: Plot realtime

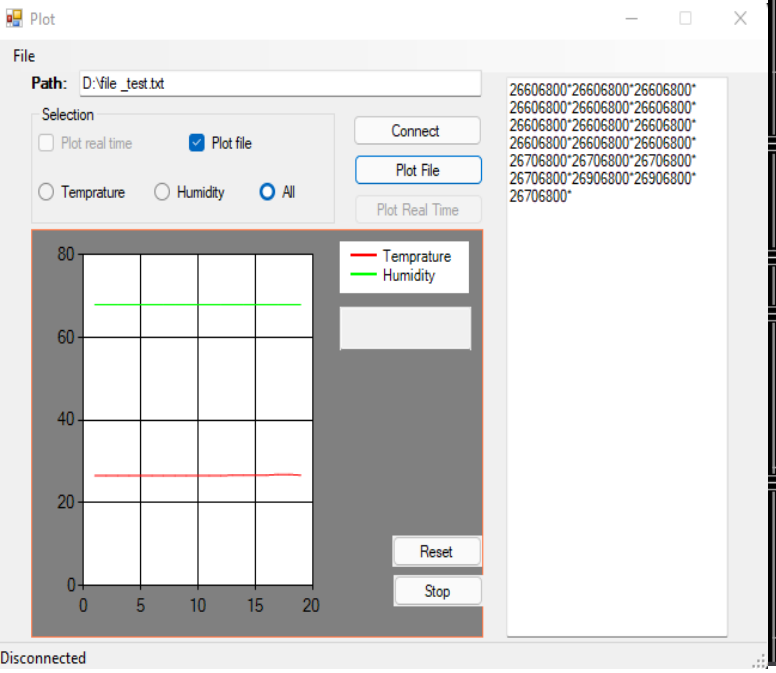
```
    int i = 0;
private: System::Void timer1_Tick(System::Object^ sender, System::EventArgs^ e) {
    i+=1;

    if (i == 100)
    {
        i = 0;
        plot_data->Series[0]->Points->Clear();
        plot_data->Series[1]->Points->Clear();
    }

    String^ data = txtb_recein->Text;
    //lb_test->Text = data;
    Double^ data_humi_int = Convert::ToDouble(data->Substring(4, 4));
    Double^ data_temp_int = Convert::ToDouble(data->Substring(0, 4));
    String^ data_humi = Convert::ToString(*data_humi_int / (10 * 10));
    String^ data_temp = Convert::ToString(*data_temp_int / (10 * 10));
    /*lb_humi->Text = data_humi;
    lb_temp->Text = data_temp;*/
    if (ckb_plot_real_time->Checked == true && rabt_ca2->Checked == true)
    {

        plot_data->Series[1]->Points->AddY(*data_humi_int / (10 * 10));
        plot_data->Series[0]->Points->AddY(*data_temp_int / (10 * 10));
    }
    else if (ckb_plot_real_time->Checked == true && rabt_Tempeture->Checked == true)
    {
        plot_data->Series[0]->Points->AddY(*data_temp_int / (10 * 10));
    }
    else if (ckb_plot_real_time->Checked == true && rabt_Humi->Checked == true)
    {
        plot_data->Series[1]->Points->AddY(*data_humi_int / (10 * 10));
    }
```

```
public: void SetText_delegate(String^ text)
{
    if (tss_connect->Text == "Connected")

    {
        this->Invoke(gcnew SetTextDelegate(this, &Plot::SetText), gcnew array<Object^>{text});
    }
}
delegate void SetTextDelegate(String^ text);
public: void SetText(String^ text)
{
    txtb_recein->Clear();
    txtb_recein->Text += text;
}// gửi dữ llieeuj lên txtdatareceive
```



4.2: Form 2

2: Plot file




```
private: System::Void btn_plot_file_Click(System::Object^ sender, System::EventArgs^ e) {
    int a = 0;
    String^ data_file = txt_hien_thi->Text;
    array<String^>^ data;
    array<String^>^ data1;
    data =data_file->Split('*');

    for (int i = 0; i < txt_hien_thi->Text->Length; i++)
    {
        a +=1;
    }
    int c = (a - 2)/10;
    //lb_test->Text = Convert::ToString(txt_hien_thi->Text->Length);
    if (ckb_plot_file->Checked == true && rabt_Humi->Checked == true)
    {
        plot_data->Series[0]->Points->Clear();
        plot_data->Series[1]->Points->Clear();
        for (int i = 0; i < c; i++)
        {
            if (i == 0)
            {
                Double^ data_humi_int = Convert::ToDouble(data[i]->Substring(4, 4));
                Double^ data_humi = *data_humi_int / (10 * 10);
                plot_data->Series[1]->Points->AddY(data_humi);
            }
            else
            {
                Double^ data_humi_int = Convert::ToDouble(data[i]->Substring(5, 4));
                Double^ data_humi = *data_humi_int /(10*10);
                plot_data->Series[1]->Points->AddY(data_humi);
            }
        }
```


Thank You
For Your
Attention