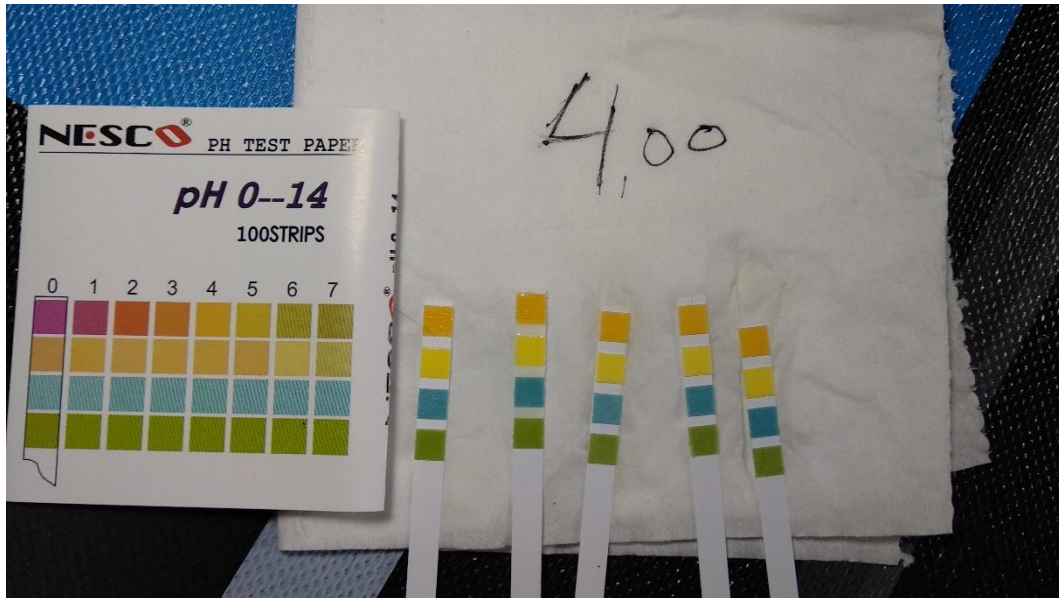


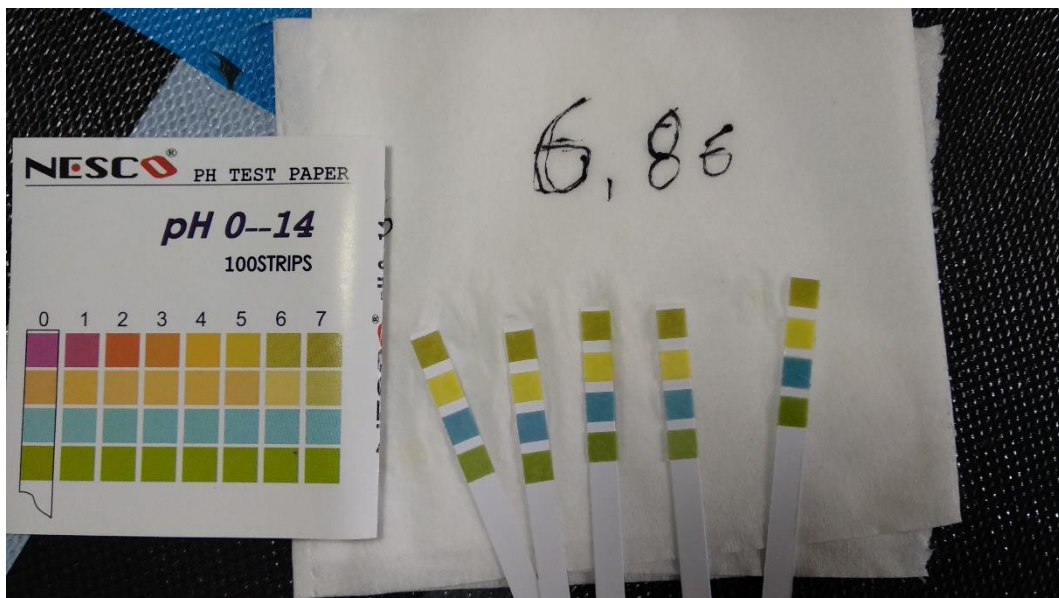
# LAMPIRAN

1. Percobaan menggunakan *strip test* pada larutan pH 4,00



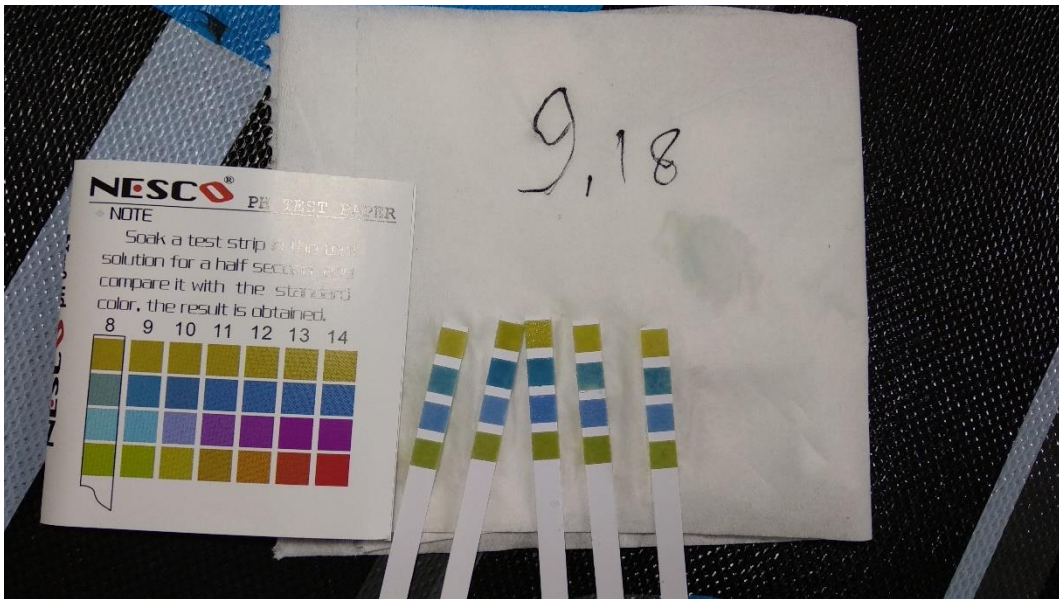
Gambar L.1 Data Pengukuran pH 4,00

2. Percobaan menggunakan *strip test* pada larutan pH 6,86



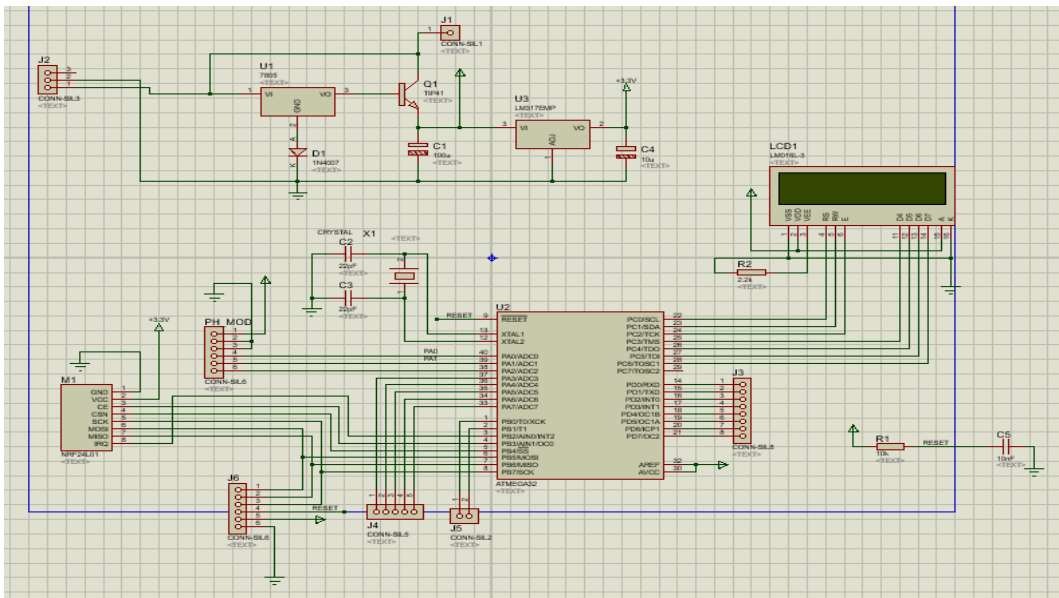
Gambar L.2 Data Pengukuran pH 6,86

3. Percobaan menggunakan *strip test* pada larutan pH 9,18

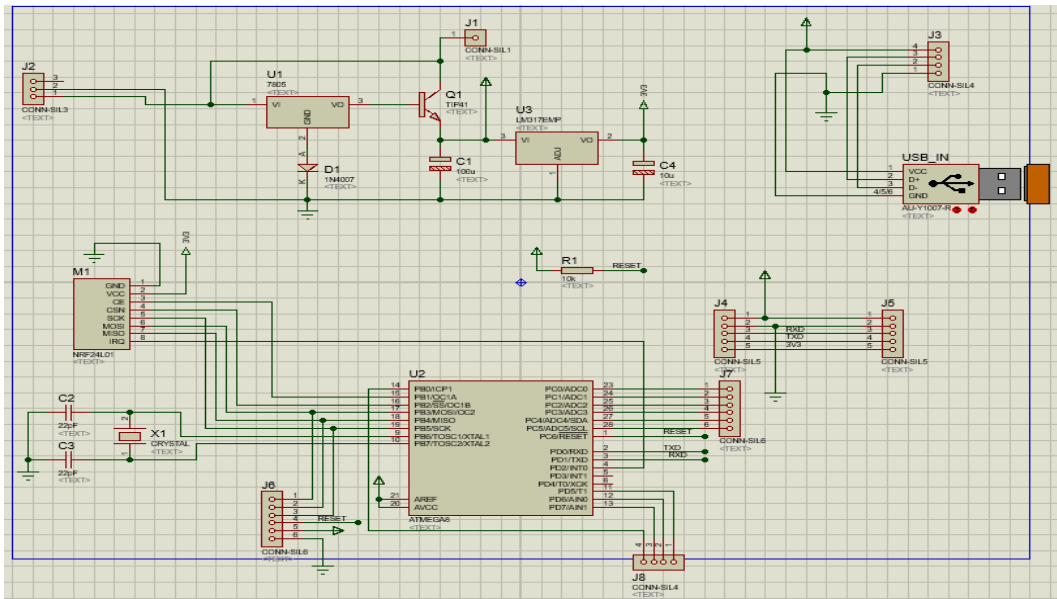


Gambar L.3 Data pengukuran pH 9,18

4. Gambar rangkaian keseluruhan



Gambar L.4 Gambar Rangkaian Utama dan *Transmitter*



Gambar L.5 Gambar Rangkaian *Reciver*

## PERHITUNGAN

### 1. Cola

#### a. Rata-rata

$$\text{Rata-rata } \bar{X} = \frac{\sum Xn}{n}$$

Diketahui :

$$\bar{X} = \dots?$$

$$\sum Xn = \text{jumlah nilai data (56.59)}$$

$$n = \text{banyak data (20)}$$

Dimana :

$$\bar{X} = \frac{56.59}{20} = 2.8295$$

#### b. %Simpangan

$$\% \text{Simpangan} = \bar{Y} - \bar{X}$$

Diketahui:

$$\% \text{Simpangan} = \dots?$$

$$\bar{Y} = \text{rata-rata alat pembanding (2.825)}$$

$\bar{X}$  = rata-rata alat penulis (2.8295)

Dimana:

$$\% \text{Simpangan} = 2.825 - 2.8295 = -0,0045 \%$$

c. % *Error*

$$\% \text{ Error} = \frac{\bar{Y} - \bar{X}}{\bar{Y}} \times 100$$

Diketahui:

$$\% \text{ Error} = \dots?$$

$$\bar{Y} = 2.52$$

$$\bar{X} = 2.8295$$

Dimana:

$$\% \text{ Error} = \frac{2.52 - 2.8295}{2.52} \times 100 = -0.15929 \%$$

## 2. Air Garam

b. Rata-rata

$$\text{Rata-rata } \bar{X} = \frac{\sum Xn}{n}$$

Diketahui :

$$\bar{X} = \dots?$$

$$\sum Xn = \text{jumlah nilai data (128.94)}$$

$$n = \text{banyak data (20)}$$

Dimana :

$$\bar{X} = \frac{128.94}{20} = 6.786316$$

c. %Simpangan

$$\% \text{Simpangan} = \bar{Y} - \bar{X}$$

Diketahui:

$$\% \text{Simpangan} = \dots?$$

$$\bar{Y} = \text{rata-rata alat pembanding (6.74)}$$

$$\bar{X} = \text{rata-rata alat penulis (6.786316)}$$

Dimana:

$$\% \text{Simpangan} = 6.74 - 6.786316 = -0.04632 \%$$

d. % *Error*

$$\% \text{ Error} = \frac{\bar{Y} - \bar{X}}{\bar{Y}} \times 100$$

Diketahui:

$$\% \text{ Error} = \dots?$$

$$\bar{Y} = 6.74$$

$$\bar{X} = 6.786316$$

Dimana:

$$\% \text{ Error} = \frac{6.74 - 6.786316}{6.74} \times 100 = -0.68712 \%$$

### 3. Air Sabun

c. Rata-rata

$$\text{Rata-rata } \bar{X} = \frac{\sum Xn}{n}$$

Diketahui :

$$\bar{X} = \dots?$$

$$\sum Xn = \text{jumlah nilai data (182.89)}$$

$$n = \text{banyak data (20)}$$

Dimana :

$$\bar{X} = \frac{182.89}{20} = 9.1445$$

d. %Simpangan

$$\% \text{Simpangan} = \bar{Y} - \bar{X}$$

Diketahui:

$$\% \text{Simpangan} = \dots?$$

$$\bar{Y} = \text{rata-rata alat pembanding (9.05)}$$

$$\bar{X} = \text{rata-rata alat penulis (9.1445)}$$

Dimana:

$$\% \text{Simpangan} = 9.05 - 9.1445 = -0.0945 \%$$

e. % *Error*

$$\% \text{ Error} = \frac{\bar{Y} - \bar{X}}{\bar{Y}} \times 100$$

Diketahui:

$$\% \text{ Error} = \dots?$$

$$\bar{Y} = 9.05$$

$$\bar{X} = 9.1445$$

Dimana:

$$\% \text{ Error} = \frac{9.05 - 9.1445}{9.05} \times 100 = -1.0442 \%$$

## Program Keseluruhan AVR

```
#include <mega32a.h>
#include <stdio.h>
#include <delay.h>
#include <stdlib.h>
#include <string.h>
#include <alcd.h>
#include <nRF24L01+.h>

unsigned long int avgValue=0,avg_temp=0;
int buf[10],temp=0,lop_adc=0,lop_j=0;
int dat_filt=0;
//char buffer[]="TEST12345678920\r";
const char* stra="";
char bawah[16];
char buffer[10];

#define Offset 0.00 //deviation compensate
#define samplingInterval 20
#define printInterval 800
#define ArrayLenth 40 //times of collection
float pHVol=0;
float pHValue = 0;

#define ADC_VREF_TYPE 0x00
unsigned int read_adc(unsigned char adc_input)
{
ADMUX=adc_input | (ADC_VREF_TYPE & 0xff);
delay_us(10);
ADCSRA|=0x40;
while ((ADCSRA & 0x10)==0);
ADCSRA|=0x10;
return ADCW;
}
```

```

lcd_clear();
lcd_gotoxy(0,0);
lcd_puts(" SIGIT HARYA N ");
delay_ms(1000);
lcd_clear();
lcd_gotoxy(0,1);
lcd_puts(" 20153010005 ");
delay_ms(1000);
lcd_clear();

while (1)
{
    int count_S;

    for(lop_adc=0;lop_adc<10;lop_adc++)
    {
        buf[lop_adc] = read_adc(0);
        delay_ms(10);
    }
    for(lop_adc=0;lop_adc<9;lop_adc++)
    {
        for(lop_j=lop_adc+1;lop_j<10;lop_j++)
        {
            if(buf[lop_adc]>buf[lop_j])
            {
                temp=buf[lop_adc];
                buf[lop_adc]=buf[lop_j];
                buf[lop_j]=temp;
            }
        }
    }

    avg_temp=0;
    for(lop_adc=2;lop_adc<8;lop_adc++)
    {avg_temp+=buf[lop_adc];}
    if(dat_filt<=5)
    {
        if(avgValue<avg_temp){avgValue=avg_temp;}
    }
    if(dat_filt>5)
    {
        pHVol=(float)avgValue*5.0/1024/6;
        pHValue = -5.70 * pHVol + 21.34;
        avgValue=0;dat_filt=0;
    }
}

```



```

dat_filt = dat_filt + 1;

    sprintf(buffer, "%.2fa\r\n", pHValue);
    for(count_S=0;count_S<sizeof(buffer);count_S++)
    {
        Send_Data(1 , &buffer[count_S]);
    }
    sprintf(buffer, "%.2fb\r\n", pHVol);
    for(count_S=0;count_S<sizeof(buffer);count_S++)
    {
        Send_Data(1 , &buffer[count_S]);
    }
    //sprintf(bawah, "Volt: %d %.2f ", read_adc(0), pHVol);
    sprintf(bawah, "Volt: %.2f mV ", pHVol);
    sprintf(bawah, "PH: %.2f % ", pHValue);
    lcd_gotoxy(0,0);
    lcd_puts(bawah);
    delay_ms(20);
}
}
float avergearray(int* arr, int number){
    int i;
    int max,min;
    float avg;
    long amount=0;
    if(number<=0){
        //Serial.println("Error number for the array to
        avraging!\n");
        return 0;
    }
    if(number<5){ //less than 5, calculated directly
statistics
        for(i=0;i<number;i++){
            amount+=arr[i];
        }
        avg = amount/number;
        return avg;
    }else{
        if(arr[0]<arr[1]){
            min = arr[0];max=arr[1];
        }
        else{
            min=arr[1];max=arr[0];
        }
        for(i=2;i<number;i++){
            if(arr[i]<min){
                amount+=min; //arr<min

```

## Program Keseluruhan Delphi

```
unit Delphi_PH_meter_V2;

interface

uses
  Windows, Messages, SysUtils, Variants, Classes,
  Graphics, Controls, Forms,
  Dialogs, StrUtils, StdCtrls, ExtCtrls, CPort, DB,
  ADODB, Grids, DBGrids,
  CPortCtl, jpeg;

type
  TForm1 = class(TForm)
    pH: TEdit;
    Label1: TLabel;
    Label2: TLabel;
    Timer1: TTimer;
    Button_Open: TButton;
    Button_Save: TButton;
    Button_Settings: TButton;
    ComPort1: TComPort;
    Edit_Data: TEdit;
    Edit1: TEdit;
    Hapus: TButton;
    DBGrid1: TDBGrid;
    ADOConnection1: TADOConnection;
    ADOTable1: TADOTable;
    DataSource1: TDataSource;
    Memo: TMemo;
    Edit2: TEdit;
    Label3: TLabel;
    Label4: TLabel;
    Label6: TLabel;
    ComRadioGroup1: TComRadioGroup;
    Image1: TImage;
    Label7: TLabel;
    ID: TEdit;
    Label5: TLabel;
    GroupBox1: TGroupBox;
    Button1: TButton;
    procedure Button_OpenClick(Sender: TObject);
    procedure Button_SettingsClick(Sender: TObject);
    procedure Button_SaveClick(Sender: TObject);
    procedure HapusClick(Sender: TObject);
    procedure Timer1Timer(Sender: TObject);
    procedure ComPort1RxChar(Sender: TObject; Count:
    Integer);
```

```

    procedure Button1Click(Sender: TObject);
private
    { Private declarations }
public
    { Public declarations }
end;

var
    Form1: TForm1;
    Str_dat: String;
    data_in: integer;
implementation

{$R *.dfm}

procedure TForm1.Button_OpenClick(Sender: TObject);
begin

if Button_Open.Caption='Connect' then
begin
    Button_Open.Caption:='Disconnect';
    comport1.Open;
end
else if Button_Open.Caption='Disconnect' then
begin
    Button_Open.Caption:='Connect';
    comport1.Close;
end;

end;

procedure TForm1.Button_SettingsClick(Sender: TObject);
begin
    ComPort1.ShowSetupDialog;
end;

procedure TForm1.Button_SaveClick(Sender: TObject);
begin
// Data_view.Text := 'test data';
ADOTable1.Open;
    AdoTable1.Append;
    //ADOTable1.FieldName('No').AsString:=edit9.Text;
    ADOTable1.FieldName('PH').AsString:=pH.Text;

ADOTable1.FieldName('Time').AsString:=FormatDateTime('h
h:nn:ss',Time);

```

```

ADOTable1.FieldByName('Date').AsString:=FormatDateTime('d
/mm/yyyy',Date);
    ADOTable1.FieldByName('ID').AsString:=ID.Text;
    ADOTable1.Post;

end;

procedure TForm1.HapusClick(Sender: TObject);
begin

if Application.MessageBox('Apakah anda yakin ingin
menghapus data yang dipilih','konfirmasi',MB_YESNO or
MB_ICONINFORMATION)=idyes then
begin
    ADOTable1.Delete;
end;

end;

procedure TForm1.Timer1Timer(Sender: TObject);
begin
label1.Caption:='Date  '+
FormatDateTime('d/mm/yyyy',Date);
label2.Caption:='Time  '+
FormatDateTime('hh:nn:ss',Time);

end;

procedure TForm1.ComPort1RxChar(Sender: TObject; Count:
Integer);
var
    Str: String;
    ruang,kulit:double;
    v1,v2:string;
    jumlahdata:integer;

begin
    ComPort1.ReadStr(Str, Count);
    Memo.Text := Memo.Text + Str;
    Str_dat := Str_dat + Str;

    if Str= '#' then
        begin
            data_in:=1;
            end;
    edit2.Text := Str_dat;

```

```
v1:=Memo.Lines[Memo.Lines.count-2];
v2:=Memo.Lines[Memo.Lines.count-1];

if rightstr(v1,1)= 'a' then
begin
pH.Text:=leftstr(v1,length(v1)-1);
end;
if rightstr(v2,1)='b' then
begin
edit1.Text:=leftstr(v2,length(v2)-1);
end;

//Data_view.Text := Str;

//Data_view.Text := Data_view.Text + Str;//

end;

procedure TForm1.Button1Click(Sender: TObject);
begin
ID.Clear;
end;

end.
```