

Kode Program “Unit Coordinator”

Menggunakan Arduino IDE-0022

```
#include <NewSoftSerial.h>

NewSoftSerial xbee (13,12);
int packet[22];

void setup()
{
  Serial.begin(9600);
  xbee.begin(9600);
}

void loop() {
  int sX, sY, sZ;
  while (xbee.available() > 0) {
    int b = readByte();
    if (b == 0x7E) {
      packet[0] = b;
      packet[1] = readByte();
      packet[2] = readByte();
      int Length = ((packet[1] << 8) | packet[2]);
      for(int i=1;i<=(Length+1);i++) {
        packet[2+i] = readByte();
      }
      // printPacket(Length+4);
      int frametype = packet[3];
      if (frametype == 0x81) {
        int router = (packet[4] << 8) | packet[5];
        Serial.print("Router : ");
        Serial.println(router, HEX);
        int RSSI = packet[6];
        Serial.print("RSSI :");
        Serial.println(RSSI, HEX);
        int hour = packet[8];
        int minute = packet[9];
        int second = packet[10];
        int dayOfMonth = packet[11];
        int month = packet[12];
        int year = packet[13];
        Serial.print(hour, DEC);
        Serial.print(":");
        Serial.print(minute, DEC);
        Serial.print(":");
        Serial.print(second, DEC);
        Serial.print("  ");
      }
    }
  }
}
```

```

        Serial.print(dayOfMonth, DEC);
        Serial.print("/");
        Serial.print(month, DEC);
        Serial.print("/");
        Serial.println(year, DEC);

        if (packet[14] == 0x00){
            sX = packet[15] ; }
        if (packet[14] == 0xff){
            sX = packet [15]*(-1);}
        if (packet[16] == 0x00){
            sY = packet[17] ; }
        if (packet[16] == 0xff){
            sY = packet [17]*(-1);}
        if (packet[18] == 0x00){
            sZ = packet[19] ; }
        if (packet[18] == 0xff){
            sZ = packet [19]*(-1);}
        Serial.print("Perpindahan X :");
        Serial.println(sX, DEC);
        Serial.print("Perpindahan Y :");
        Serial.println(sY, DEC);
        Serial.print("Perpindahan Z :");
        Serial.println(sZ, DEC);
        Serial.println();
    }
}
}

void printPacket(int l) {
    for(int i=0;i < l;i++) {
        if (packet[i] < 0xF) {
            Serial.print(0);
        }
        Serial.print(packet[i], HEX);
        Serial.print(" ");
    }
    Serial.println("");
}

int readByte() {
    while (true) {
        if (xbee.available() > 0) {
            return xbee.read();
        }
    }
}
}

```

Kode Program “Unit Router”

Menggunakan Arduino IDE-0022

```
#include <XBee.h>
#include <Wire.h>
#define DS1307_I2C_ADDRESS 0x68 //set rtc

XBee xbee = XBee();
uint8_t payload[13] ;//= { 0, 0, 0, 0, 0, 0, 0, 0 };
XBeeAddress64 addr64 = XBeeAddress64(0x0013a200,
0x406e7e63);
Tx64Request tx = Tx64Request(addr64, payload,
sizeof(payload));
TxStatusResponse txStatus = TxStatusResponse();

byte second, minute, hour, dayOfWeek, dayOfMonth, month,
year, tmp;

float Xawal,Yawal,Zawal=0.00;

int packet[30];
int statusLed = 13;
int errorLed = 12;

int Dio = 4 ;
int Clk = 5 ;
int Cs = 6 ;

uint8_t byteDx, byteDy, byteDz;
word data;
int dValue[12] = {0,0,0,0,0,0,0,0,0,0,0,0,0,0,};
float res,res0;
float Vx, Vy, Vz, Dx, Dy, Dz = 0;
float accelX, accelY, accelZ;
const int zeros = 10;
const int poles = 10;
float accelXInput=zeros + 1], accelXOutput[poles + 1];
float accelYInput=zeros + 1], accelYOutput[poles + 1];
float accelZInput=zeros + 1], accelZOutput[poles + 1];

/***** decimal ke bcd *****/
byte decToBcd(byte val){
return ( (val/10*16) + (val%10) );
}

/***** BCD ke Desimal *****/
byte bcdToDec(byte val){
```

```

return ( (val/16*10) + (val%16) );
}
/***** Baca data RTC *****/
void getDateDs1307(byte *second,byte *minute,byte
*hour,byte *dayOfWeek,byte *dayOfMonth,byte *month,byte
*year){
Wire.beginTransmission(DS1307_I2C_ADDRESS);
Wire.send(0);
Wire.endTransmission();
Wire.requestFrom(DS1307_I2C_ADDRESS, 7);
*second = bcdToDec(Wire.receive() & 0x7f);
*minute = bcdToDec(Wire.receive());
*hour = bcdToDec(Wire.receive() & 0x3f);
*dayOfWeek = bcdToDec(Wire.receive());
*dayOfMonth = bcdToDec(Wire.receive());
*month = bcdToDec(Wire.receive());
*year = bcdToDec(Wire.receive());
}

/***** indikator led *****/
void flashLed(int pin, int times, int wait) {

    for (int i = 0; i < times; i++) {
        digitalWrite(pin, HIGH);
        delay(wait);
        digitalWrite(pin, LOW);
        if (i + 1 < times) {
            delay(wait);
        }
    }
}

/*****
void printPacket(int l) {
    for(int i=0;i < l;i++) {
        if (packet[i] < 0xF) {
            Serial.print(0);
        }
        Serial.print(packet[i], HEX);
    }
    Serial.println("");
}

//=====sub rutin pengambilan data percepatan =====//
int getH48C(int D1,int D0){
    digitalWrite(Cs, LOW);
    pinMode(Dio, OUTPUT);
    /***1
    digitalWrite(Clk, LOW);
    digitalWrite(Dio, HIGH);
    delayMicroseconds(50);

```

```

digitalWrite(Clk, HIGH);
delayMicroseconds(50);
//***2
digitalWrite(Clk, LOW);
digitalWrite(Dio, LOW);
digitalWrite(Dio, HIGH); //single Dio = 1
delayMicroseconds(50);
digitalWrite(Clk, HIGH);
delayMicroseconds(50);
//***3
digitalWrite(Clk, LOW);
digitalWrite(Dio, LOW); // D2 = 0
delayMicroseconds(50);
digitalWrite(Clk, HIGH);
delayMicroseconds(50);
//***4
digitalWrite(Clk, LOW);
if (D1==0){ digitalWrite(Dio, LOW);}
else{ digitalWrite(Dio, HIGH);}
delayMicroseconds(50);
digitalWrite(Clk, HIGH);
delayMicroseconds(50);
//***5
digitalWrite(Clk, LOW);
if (D0==0){ digitalWrite(Dio, LOW);}
else{ digitalWrite(Dio, HIGH);}
delayMicroseconds(50);
digitalWrite(Clk, HIGH);
delayMicroseconds(50);
//***6
digitalWrite(Clk, LOW);
delayMicroseconds(50);
digitalWrite(Clk, HIGH);
delayMicroseconds(50);
//***7
pinMode(Dio, INPUT);
digitalWrite(Clk, LOW);
delayMicroseconds(50);
digitalWrite(Clk, HIGH);
delayMicroseconds(50);
//***8
digitalWrite(Clk, LOW);
if (digitalRead(Dio)==HIGH){
    dValue[11]= 1 ;}
else {
    dValue[11]= 0 ;}
delayMicroseconds(50);
digitalWrite(Clk, HIGH);
delayMicroseconds(50);
//***9
digitalWrite(Clk, LOW);

```

```
if (digitalRead(Dio)==HIGH){
    dValue[10]= 1 ;}
else {
    dValue[10]= 0 ;}
delayMicroseconds(50);
digitalWrite(Clk, HIGH);
delayMicroseconds(50);
/**10
digitalWrite(Clk, LOW);
if (digitalRead(Dio)==HIGH){
    dValue[9]= 1 ;}
else {
    dValue[9]= 0 ;}
delayMicroseconds(50);
digitalWrite(Clk, HIGH);
delayMicroseconds(50);
/**11
digitalWrite(Clk, LOW);
if (digitalRead(Dio)==HIGH){
    dValue[8]= 1 ;}
else {
    dValue[8]= 0 ;}
delayMicroseconds(50);
digitalWrite(Clk, HIGH);
delayMicroseconds(50);
/**12
digitalWrite(Clk, LOW);
if (digitalRead(Dio)==HIGH){
    dValue[7]= 1 ;}
else {
    dValue[7]= 0 ;}
delayMicroseconds(50);
digitalWrite(Clk, HIGH);
delayMicroseconds(50);
/**13
digitalWrite(Clk, LOW);
if (digitalRead(Dio)==HIGH){
    dValue[6]= 1 ;}
else {
    dValue[6]= 0 ;}
delayMicroseconds(50);
digitalWrite(Clk, HIGH);
delayMicroseconds(50);
/**14
digitalWrite(Clk, LOW);
if (digitalRead(Dio)==HIGH){
    dValue[5]= 1 ;}
else {
    dValue[5]= 0 ;}
delayMicroseconds(50);
digitalWrite(Clk, HIGH);
```

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delayMicroseconds(50);
//***15
digitalWrite(Clk, LOW);
if (digitalRead(Dio)==HIGH){
    dValue[4]= 1 ;}
else {
    dValue[4]= 0 ;}
delayMicroseconds(50);
digitalWrite(Clk, HIGH);
delayMicroseconds(50);
//***16
digitalWrite(Clk, LOW);
if (digitalRead(Dio)==HIGH){
    dValue[3]= 1 ;}
else {
    dValue[3]= 0 ;}
delayMicroseconds(50);
digitalWrite(Clk, HIGH);
delayMicroseconds(50);
//***17
digitalWrite(Clk, LOW);
if (digitalRead(Dio)==HIGH){
    dValue[2]= 1 ;}
else {
    dValue[2]= 0 ;}
delayMicroseconds(50);
digitalWrite(Clk, HIGH);
delayMicroseconds(50);
//***18
digitalWrite(Clk, LOW);
if (digitalRead(Dio)==HIGH){
    dValue[1]= 1 ;}
else {
    dValue[1]= 0 ;}
delayMicroseconds(50);
digitalWrite(Clk, HIGH);
delayMicroseconds(50);
//***19
digitalWrite(Clk, LOW);
if (digitalRead(Dio)==HIGH){
    dValue[0]= 1 ;}
else {
    dValue[0]= 0 ;}
delayMicroseconds(50);
digitalWrite(Clk, HIGH);
delayMicroseconds(50);
data =
(dValue[11]*2048)+(dValue[10]*1024)+(dValue[9]*512)+(dValue[8]*256)+(dValue[7]*128)+(dValue[6]*64)+(dValue[5]*32)+(dValue[4]*16)+(dValue[3]*8)+(dValue[2]*4)+(dValue[1]*2)+(dValue[0]*1);

```

```

    digitalWrite(Cs,HIGH);
    return data;
}
//=====Sub Routine Filter IIR =====//
float IIR(float value, float xv[], float yv[]) {
    xv[0] = xv[1];
    xv[1] = xv[2];
    xv[2] = xv[3];
    xv[3] = xv[4];
    xv[4] = xv[5];
    xv[5] = xv[6];
    xv[6] = xv[7];
    xv[7] = xv[8];
    xv[8] = xv[9];
    xv[9] = xv[10];
    xv[10] = value / 5.681713320e+05;
    yv[0] = yv[1];
    yv[1] = yv[2];
    yv[2] = yv[3];
    yv[3] = yv[4];
    yv[4] = yv[5];
    yv[5] = yv[6];
    yv[6] = yv[7];
    yv[7] = yv[8];
    yv[8] = yv[9];
    yv[9] = yv[10];
    yv[10] = (xv[0] + xv[10]) + 10 * (xv[1] + xv[9]) + 45 *
(xv[2] + xv[8])
        + 120 * (xv[3] + xv[7]) + 210 * (xv[4] +
xv[6]) + 252 * xv[5]
        + ( -0.0084477842 * yv[0]) + ( 0.1250487070 *
yv[1])
        + ( -0.8452516757 * yv[2]) + ( 3.4397583115 *
yv[3])
        + ( -9.3457158590 * yv[4]) + ( 17.7418428080 *
yv[5])
        + (-23.8769055880 * yv[6]) + ( 22.5422166190 *
yv[7])
        + (-14.3254341650 * yv[8]) + ( 5.5510863543 *
yv[9]);
    return yv[10];
}

/*****/
void setup() {
    pinMode(statusLed, OUTPUT);
    pinMode(Clk , OUTPUT);
    pinMode(Cs , OUTPUT);
    pinMode(errorLed, OUTPUT);
    Wire.begin();
}

```



```

digitalWrite(Cs, LOW);
digitalWrite(Clk, LOW); // Reset ACC
delayMicroseconds(50);
digitalWrite(Clk, HIGH);
digitalWrite(Cs, LOW);
delayMicroseconds(50);
xbee.begin(9600);
//Serial.begin(9600);

//=====Ambil 50 sampel sebagai inisialisasi posisi=====//
for(int i=0; i<50; i++){
    Xawal += (float(getH48C(0,0) - 2048))*0.0022;
    Yawal += (float(getH48C(0,1) - 2048))*0.0022;
    Zawal += (float(getH48C(1,0) - 2048))*0.0022;
}
Xawal = Xawal/50;
Yawal = Yawal/50;
Zawal = Zawal/50;
}

void loop() {
    getDateDs1307(&second, &minute, &hour, &dayOfWeek,
    &dayOfMonth, &month, &year);
    /*****Data Waktu*****/
    payload[0] = hour & 0xff;
    payload[1] = minute & 0xff;
    payload[2] = second & 0xff;
    payload[3] = dayOfMonth & 0xff;
    payload[4] = month & 0xff;
    payload[5] = year & 0xff;
    //=====Mengukur Percepatan=====//
    float Ax, Ay, Az;
    Ax = ((float(getH48C(0,0) - 2048))*0.0022)-Xawal;
    Ay = ((float(getH48C(0,1) - 2048))*0.0022)-Yawal;
    Az = ((float(getH48C(1,0) - 2048))*0.0022)-Zawal;
    //res = sqrt(sq(Ax)+sq(Ay)+sq(Az));
    //Ax = Ax - Xawal;
    //Ay = Ay - Yawal;
    //Az = Az - Zawal;

    accelX = IIR(Ax, accelXInput, accelXOutput);
    accelY = IIR(Ay, accelYInput, accelYOutput);
    accelZ = IIR(Az, accelZInput, accelZOutput);

    // ===== hitung kecepatan =====//
    Vx += (accelX * 0.078);
    Vy += (accelY * 0.078);
    Vz += (accelZ * 0.078);
    // ===== hitung perpindahan ===== //
    Dx += (Vx * 0.008);
    Dy += (Vy * 0.008);

```

```

Dz += (Vz * 0.008);
//=====konversi float ke uint8_t=====//
if (Dx < 0 ){
    byteDx = byte(Dx*(-100));
    payload[6] = 0xff;
    payload[7] = byteDx;
}
else {
    byteDx = byte(Dx*100);
    payload[6] = 0x00;
    payload[7] = byteDx;
}
if (Dy < 0 ){
    byteDy = byte(Dy*(-100));
    payload[8] = 0xff;
    payload[9] = byteDy;
}
else {
    byteDy = byte(Dy*100);
    payload[8] = 0x00;
    payload[9] = byteDy;
}
if (Dz < 0 ){
    byteDz = byte(Dz*(-100));
    payload[10] = 0xff;
    payload[11] = byteDz;
}
else{
    byteDz = byte(Dz*100);
    payload[10] = 0x00;
    payload[11] = byteDz;
}
payload[12] = 0x00;

//=====routine interupsi=====//
noInterrupts();
if((second-tmp == 5) || (second-tmp == -55)){
    xbee.send(tx);
    for(int i=0; i<20; i++){
        Xawal += (float(getH48C(0,0) - 2048))*0.0022;
        Yawal += (float(getH48C(0,1) - 2048))*0.0022;
        Zawal += (float(getH48C(1,0) - 2048))*0.0022;
    }
    Xawal = Xawal/20;
    Yawal = Yawal/20;
    Zawal = Zawal/20;
    Vx, Vy, Vz, Dx, Dy, Dz = 0.00;
    tmp = second;
}
interrupts();
}

```

Kode Sumber “Program Server”

Menggunakan Delphi 7

```
unit CekXYZ;

interface

uses
  Windows, Messages, SysUtils, Variants, Classes,
  Graphics, Controls, Forms,
  Dialogs, CPort, CPortCtl, StdCtrls, Buttons, ExtCtrls;

type
  TForm1 = class(TForm)
    ComTerminal1: TComTerminal;
    ComPort1: TComPort;
    BitBtn1: TBitBtn;
    Bevel1: TBevel;
    Bevel2: TBevel;
    Bevel3: TBevel;
    Label1: TLabel;
    Label2: TLabel;
    Label3: TLabel;
    ComLed1: TComLed;
    ComLed2: TComLed;
    ComLed3: TComLed;
    BitBtn2: TBitBtn;
    //procedure ComTerminal1Char(Sender: TObject; Ch:
    Char);
    procedure FormCreate(Sender: TObject);
    procedure FormClose(Sender: TObject; var Action:
    TCloseAction);
    procedure ComTerminal1StrRecieved(Sender: TObject; var
    Str: String);
    procedure BitBtn1Click(Sender: TObject);
    //procedure ComPort1AfterClose(Sender: TObject);
    procedure BitBtn2Click(Sender: TObject);
  private
    { Private declarations }
  public
    F:textFile;
    { Public declarations }
  end;

var
  Form1: TForm1;

implementation
```

```

{$R *.dfm}

procedure TForm1.FormCreate(Sender: TObject);
begin
ComPort1.ShowSetupDialog;
Form1.Caption:='Accelerometer Tester [connected to
'+ComPort1.Port+' ]';
end;

procedure TForm1.FormClose(Sender: TObject; var Action:
TCloseAction);
begin
if ComPort1.Connected=true then
begin
ComPort1.Close;
Comport1.Connected:=false;
CloseFile(F);
end
else
begin
Comport1.Close;
ComPort1.Connected:=false;
end;
end;

procedure TForm1.ComTerminal1StrRecieved(Sender: TObject;
var Str: String);
begin
write(F,Str);
end;

procedure TForm1.BitBtn1Click(Sender: TObject);
var
str:string;
begin
if Comport1.Connected=false then
begin
str:=timetoStr(now);

str:=stringReplace(str,':','_',[rfIgnoreCase,rfReplaceAll]
);
AssignFile(F,'C:\Users\Dwi
Kurniawan\Desktop\Data_'+str+'.xls');
rewrite(F);
Comport1.Connected:=true;
BitBtn1.Kind:=BkCancel;
ComPort1.WriteStr('D');
BitBtn1.Caption:='Stop';
end
else

```

```
begin
  BitBtn1.Kind:=BkOK;
  BitBtn1.Caption:='Start';
  ComPort1.Connected:=false;
  CloseFile(F);
end;
end;

{procedure TForm1.ComPort1AfterClose(Sender: TObject);
begin
  CloseFile(F);
end;    }

procedure TForm1.BitBtn2Click(Sender: TObject);
begin
  if Comport1.Connected=false then
  begin
    Comport1.Connected:=true;
    ComPort1.WriteString('S');
    Comport1.Connected:=false;
  end
else
  begin
    ComPort1.WriteString('S');
    Comport1.Connected:=false;
  end;
end;

end.
```

Tampilan Form Utama Program Server

