LAMPIRAN

Coding Program

```
#include <TimerOne.h>
#include <LiquidCrystal.h>
LiquidCrystal lcd(11, 13, 8, 7, 6, 5);
#include <Wire.h>
#include "RTClib.h"
RTC_DS1307 RTC;
#include <EEPROM.h>

const int RW = 12,BUZZ=9, RLY_PIN=10;
int thn = 0, bln = 0, hri = 0, jam = 0, mnt = 0, dtk = 0,suhu=0;
int val=0,inten_adc=0;

const int set = 4, up = 3, down = 2;
int set_mode,set_up,set_down,indeks=0;
int buttonState = LOW,buttonUp = LOW,buttonDown = LOW;
int lastButtonState = LOW,lastStateUp = LOW,lastStateDown = LOW;
int lastDebounceTime = 0,lastDebounUPdown=0;
int debounceDelay = 50;

float mv;
float cel=0,cel_temp=0;
long tot_jam=0,tot_run=0,tot_off=0;
int addrs_jam=0,addrs_mnt=1,addrs_intjam=2,addrs_intmnt=3;
int jam_comp=0,mnt_comp=0,int_jam=0,int_menit;
int msec=0,msec_buz=0,sec=0,buz_indeks=0,buz_warn=0,dat_filt=0;
int indeks_jam=0,jam_time=0,time_off=0;

void tampil_disp()
{
 if(indeks==0){
 DateTime now = RTC.now();
 thn = now.year();
 bln = now.month(); hri = now.day(); jam = now.hour(); mnt =
now.minute(); dtk = now.second();

 tot_jam = (long)((long)jam*3600) + (mnt*60) + dtk; //untuk total
jam berjalan
 tot_run = (long)((long)jam_comp*3600) + (mnt_comp*60); //running
jam untuk posisi lampu hidup
 tot_off = (long)((long)int_jam*3600) + (int_menit*60); //untuk
waktu lamanya lampu menyala

 if(tot_run + tot_off<=86399)
 {
 if(tot_jam>=0 && tot_jam<tot_run){digitalWrite(RLY_PIN,
LOW);buz_warn=0;}
 if(tot_jam>=tot_run && tot_jam<=(tot_run + tot_off))
```

```
 {
  if(buz_indeks==0){msec=0;msec_buz=250;sec=0;buz_indeks=1;}
  if(buz_indeks==2)
  {
    if(inten_adc>=270){buz_warn=1;msec_buz=170;}
    if(inten_adc<270){buz_warn=0;}}
   digitalWrite(RLY_PIN, HIGH);} //Lampu menyala

 if(tot_jam>(tot_run + tot_off) && tot_jam<=(tot_run + tot_off+3))
 {
  if(buz_indeks==2){msec=0;msec_buz=250;sec=0;buz_indeks=3;}
  digitalWrite(RLY_PIN, LOW);buz_warn=0;
 }
 if(tot_jam>(tot_run + tot_off+3) && tot_jam<86399)
  {

if(buz_indeks==2){msec=0;msec_buz=250;sec=0;buz_indeks=3;}buz_warn
=0;
    digitalWrite(RLY_PIN, LOW); // Lampu mati
  }}

 if(tot_run + tot_off>86399)
 {
 if(tot_jam>(tot_run + tot_off+3) - 86399 &&
tot_jam<tot_run){buz_warn=0;digitalWrite(RLY_PIN, LOW);}
 if(tot_jam>=tot_run && tot_jam<=86399)
 {
  if(buz_indeks==0){msec=0;msec_buz=250;sec=0;buz_indeks=1;}
  if(buz_indeks==2)
  {
    if(inten_adc>=270){buz_warn=1;msec_buz=170;}
    if(inten_adc<270){buz_warn=0;}
  }
   digitalWrite(RLY_PIN, HIGH);
 }
 if(tot_jam>=0 && tot_jam<=(tot_run + tot_off)-86399 )
 {
  if(buz_indeks==0){msec=0;msec_buz=250;sec=0;buz_indeks=1;}
  if(buz_indeks==2)
  {
    if(inten_adc>=300){buz_warn=1;msec_buz=170;}
    if(inten_adc<300){buz_warn=0;}
  }
   digitalWrite(RLY_PIN, HIGH);
 }
 if(tot_jam>((tot_run + tot_off)-86399) && tot_jam<=((tot_run +
tot_off+3) - 86399))
```

```
 {
if(buz_indeks==2){msec=0;msec_buz=250;sec=0;buz_indeks=3;}buz_warn
=0;
  digitalWrite(RLY_PIN, LOW);
 }}

 lcd.setCursor(0,0);
 lcd.print("Jam: ");lcd.print(jam); lcd.print(":");
lcd.print(mnt); lcd.print(":"); lcd.print(dtk);lcd.print("  ");
 lcd.setCursor(0,1);
 lcd.print("Suhu: ");lcd.print(cel,1);lcd.print("C ");
 }

if(indeks==1)
 {
 lcd.setCursor(0,0);
 lcd.print("Set Jam");;
 lcd.setCursor(0,1);
 lcd.print(jam); lcd.print(":"); lcd.print(mnt); lcd.print(":");
lcd.print(dtk);lcd.print(" ");
  }

if(indeks==2)
 {
 lcd.setCursor(0,0);
 lcd.print("Set Menit");;
 lcd.setCursor(0,1);
 lcd.print(jam); lcd.print(":"); lcd.print(mnt); lcd.print(":");
lcd.print(dtk);lcd.print(" ");
 }

if(indeks==3)
 {
 lcd.setCursor(0,0);
 lcd.print("Tanggal");;
 lcd.setCursor(0,1);
lcd.print(hri);lcd.print("/");lcd.print(bln);lcd.print("/");lcd.pr
int(thn);lcd.print(" ");
  }

if(indeks==4)
 {
 lcd.setCursor(0,0);
 lcd.print("Bulan");;
 lcd.setCursor(0,1);
lcd.print(hri);lcd.print("/");lcd.print(bln);lcd.print("/");lcd.pr
int(thn);lcd.print(" ");
  }
```

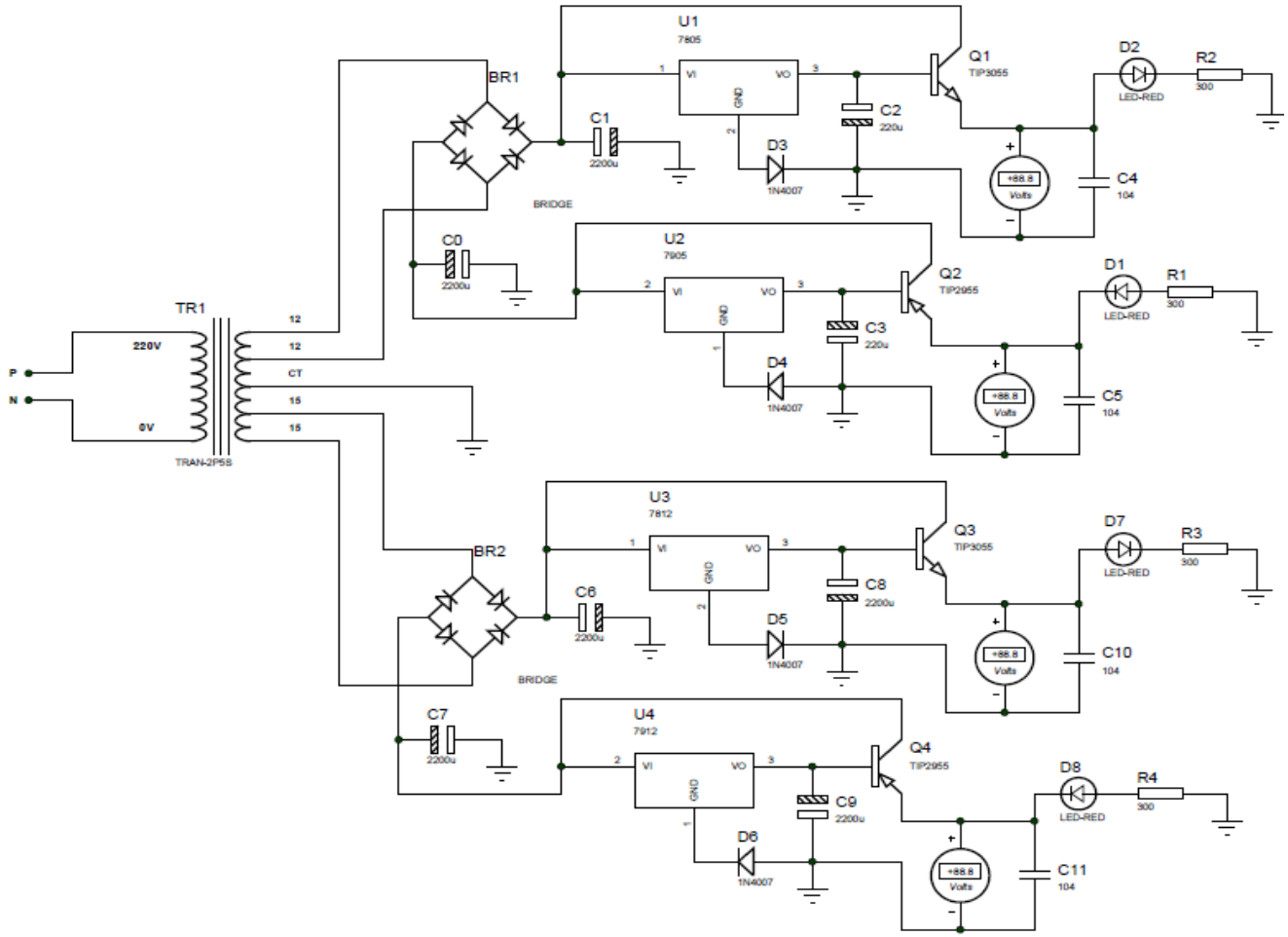
```
if(indeks==5)
 {
 lcd.setCursor(0,0);
 lcd.print("Tahun");;
 lcd.setCursor(0,1);
lcd.print(hri);lcd.print("/");lcd.print(bln);lcd.print("/");lcd.pr
int(thn);lcd.print(" ");
  }

if(indeks==6)
 {
 lcd.setCursor(0,0);
 lcd.print("Jam UV on");;
 lcd.setCursor(0,1);
lcd.print(jam_comp);lcd.print(":");lcd.print(mnt_comp);lcd.print("
");
  }

if(indeks==7)
 {
 lcd.setCursor(0,0);
 lcd.print("Menit UV on");;
 lcd.setCursor(0,1);
lcd.print(jam_comp);lcd.print(":");lcd.print(mnt_comp);lcd.print("
");
  }

if(indeks==8)
 {
 lcd.setCursor(0,0);
 lcd.print("Interval jam");;
 lcd.setCursor(0,1);
lcd.print(int_jam);lcd.print(":");lcd.print(int_menit);lcd.print("
");
  }

if(indeks==9)
 {
 lcd.setCursor(0,0);
 lcd.print("Interval menit");;
 lcd.setCursor(0,1);
lcd.print(int_jam);lcd.print(":");lcd.print(int_menit);lcd.print("
");
  }}

void tombol()
{
if(indeks!=0){
set_up = digitalRead(up);
```

```
if(set_up != lastStateUp){lastDebounUPdown = millis();}
if((millis() - lastDebounUPdown) > debounceDelay)
  {if(set_up != buttonUp)
    {buttonUp = set_up;
     if(buttonUp == LOW)
      {
       if(indeks==1){if(++jam>23){jam=0;}indeks_jam=1;}
       if(indeks==2){if(++mnt>59){mnt=0;}indeks_jam=1;}
       if(indeks==3){if(++hri>31){hri=1;}indeks_jam=1;}
       if(indeks==4){if(++bln>12){bln=1;}indeks_jam=1;}
       if(indeks==5){if(++thn>3000){thn=2015;}indeks_jam=1;}
       if(indeks==6){if(++jam_comp>23){jam_comp=0;}jam_time=1;}
       if(indeks==7){if(++mnt_comp>59){mnt_comp=0;}jam_time=1;}
       if(indeks==8){if(++int_jam>23){int_jam=0;}time_off=1;}
       if(indeks==9){if(++int_menit>59){int_menit=0;}time_off=1;}
       lcd.clear();
      }}}
lastStateUp = set_up;

set_down = digitalRead(down);
if(set_down != lastStateDown){lastDebounUPdown = millis();}
if((millis() - lastDebounUPdown) > debounceDelay)
  {if(set_down != buttonDown)
    {buttonDown = set_down;
     if(buttonDown == LOW)
      {
       if(indeks==1){if(--jam<0){jam=23;}indeks_jam=1;}
       if(indeks==2){if(--mnt<0){mnt=59;}indeks_jam=1;}
       if(indeks==3){if(--hri<1){hri=31;}indeks_jam=1;}
       if(indeks==4){if(--bln<1){bln=12;}indeks_jam=1;}
       if(indeks==5){if(--thn<2015){thn=3000;}indeks_jam=1;}
       if(indeks==6){if(--jam_comp<0){jam_comp=23;}jam_time=1;}
       if(indeks==7){if(--mnt_comp<0){mnt_comp=59;}jam_time=1;}
       if(indeks==8){if(--int_jam<0){int_jam=23;}time_off=1;}
       if(indeks==9){if(--int_menit<0){int_menit=59;}time_off=1;}
       lcd.clear();
      }}}
lastStateDown = set_down;
}}

void setup() { //Persiapan sebelum eksekusi program
  pinMode(RW, OUTPUT);
  pinMode(RLY_PIN, OUTPUT);
  pinMode(BUZZ, OUTPUT);
  pinMode(set,INPUT_PULLUP);
  pinMode(up,INPUT_PULLUP);
  pinMode(down,INPUT_PULLUP);
  digitalWrite(RW, LOW);
```

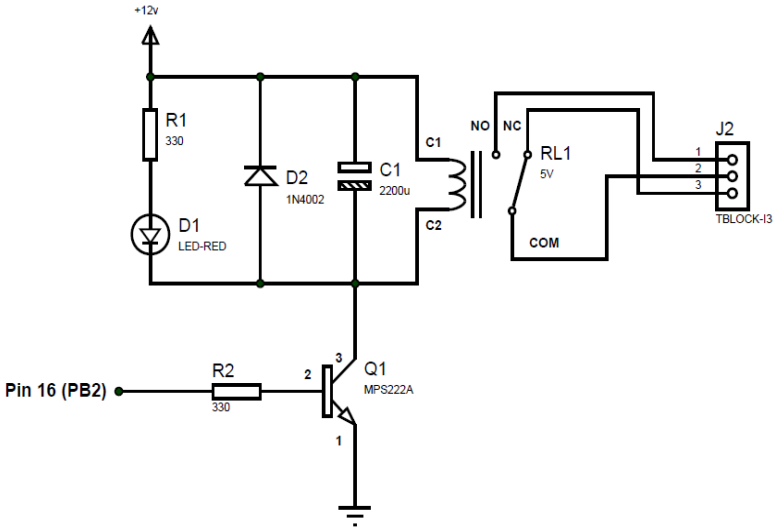
```
  Timer1.initialize(5000); // 5000 ms = 5 s
  Timer1.attachInterrupt( timerIsr );

  lcd.begin(16, 2);
  lcd.clear();
  lcd.setCursor(0,0);
  lcd.print("  PENYIMPANAN   ");
  lcd.setCursor(0,1);
  lcd.print(" DIALYZER REUSE ");
  delay(5000);
  digitalWrite(BUZZ, LOW);
  digitalWrite(RLY_PIN, LOW);
  Wire.begin();

  RTC.begin();

  DateTime now = RTC.now();
  thn = now.year(); bln = now.month(); hri = now.day(); jam =
now.hour(); mnt = now.minute(); dtk = now.second();
  lcd.clear();

  jam_comp = EEPROM.read(addrs_jam);
  mnt_comp = EEPROM.read(addrs_mnt);
  int_jam = EEPROM.read(addrs_intjam);
  int_menit = EEPROM.read(addrs_intmnt);
}

void loop() {
set_mode = digitalRead(set);
if(set_mode != lastButtonState){lastDebounceTime = millis();}
if((millis() - lastDebounceTime) > debounceDelay)
  {if(set_mode != buttonState)
    {buttonState = set_mode;
     if(buttonState == LOW)
      {
       lcd.clear();
       if(++indeks>9)
       {

if(indeks_jam==1){RTC.adjust(DateTime(thn,bln,hri,jam,mnt,0));}
        if(jam_time==1)
        {EEPROM.write(addrs_jam,jam_comp);
         EEPROM.write(addrs_mnt,mnt_comp);
        }
        if(time_off==1)
        {EEPROM.write(addrs_intjam,int_jam);
         EEPROM.write(addrs_intmnt,int_menit);
        }
        indeks_jam=0,jam_time=0,time_off=0;
```

```
        indeks=0;
       }}}}
lastButtonState = set_mode;

if(dat_filt<=200)
{
  if(val<analogRead(A2)){val = analogRead(A2);}
}
if(++dat_filt>200)
{cel_temp = (float)(cel_temp + val)/2;val=0;
 dat_filt=0;
}

mv = ( cel_temp/1024.0)*5000; //suhu berupa tegangan
cel = mv/10; //suhu dikonversi ke derajat
inten_adc = (inten_adc + analogRead(A1))/2;
tampil_disp();
tombol();
}

void timerIsr()
{
 if(buz_indeks==1 || buz_indeks==3 || buz_indeks==2)
 {
  if(++msec>msec_buz)
  {
//Lampu menyala, buzzer bunyi 3x
   if(buz_indeks==1)
   {if(++sec>6){buz_indeks=2;sec=0;}
    digitalWrite(BUZZ, sec%2);
   }
//Lampu mati, buzzer bunyi 3x
   if(buz_indeks==3)
   {if(++sec>6){buz_indeks=0;sec=0;}
    digitalWrite(BUZZ, sec%2);
   }
//Lampu mati yang seharusnya menyala, buzzer bunyi terus menerus
   if(buz_indeks==2 && buz_warn==1)
   {if(++sec>5){sec=0;}
    digitalWrite(BUZZ, sec%2);
   }
   msec=0;
  }}
else
{if(buz_warn==0){digitalWrite(BUZZ, LOW);}
}}
```

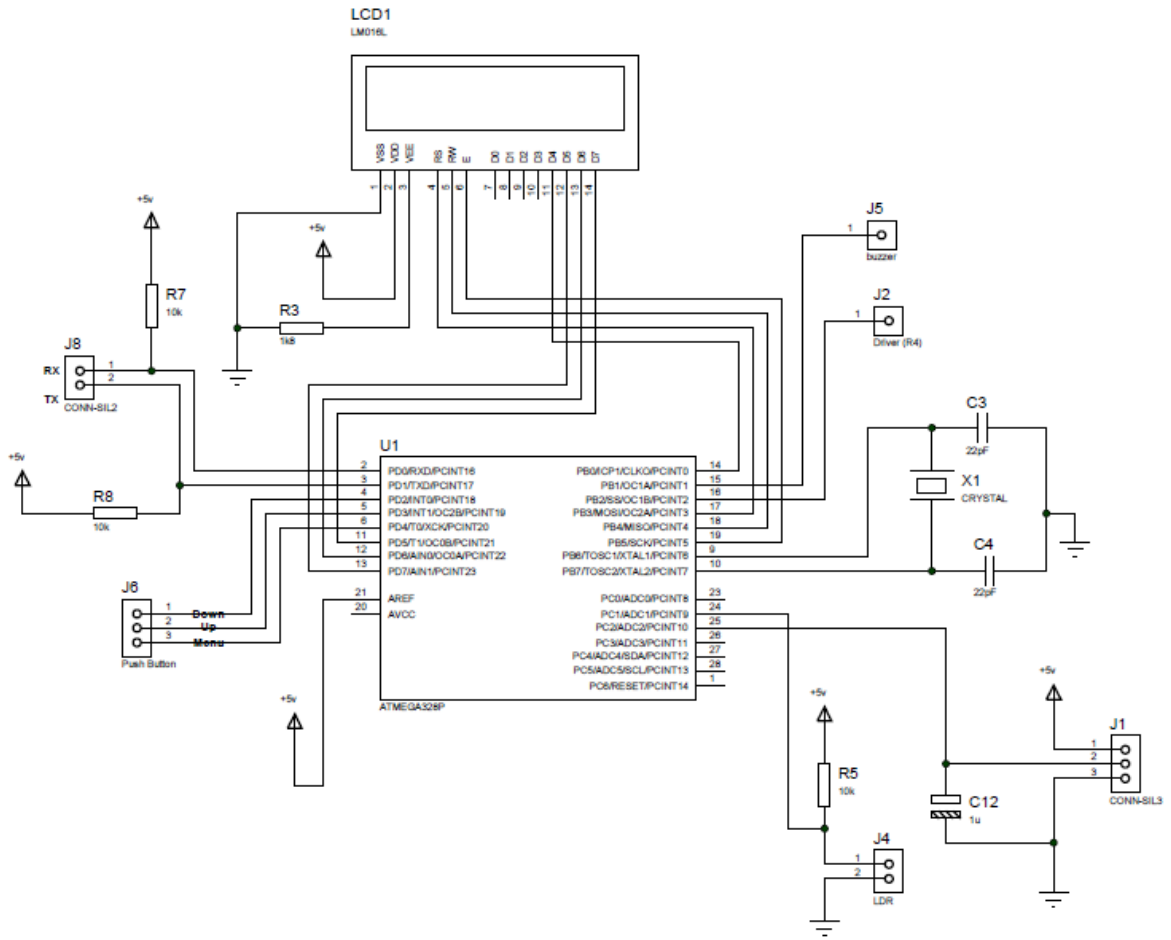
Rangkaian Power Supply



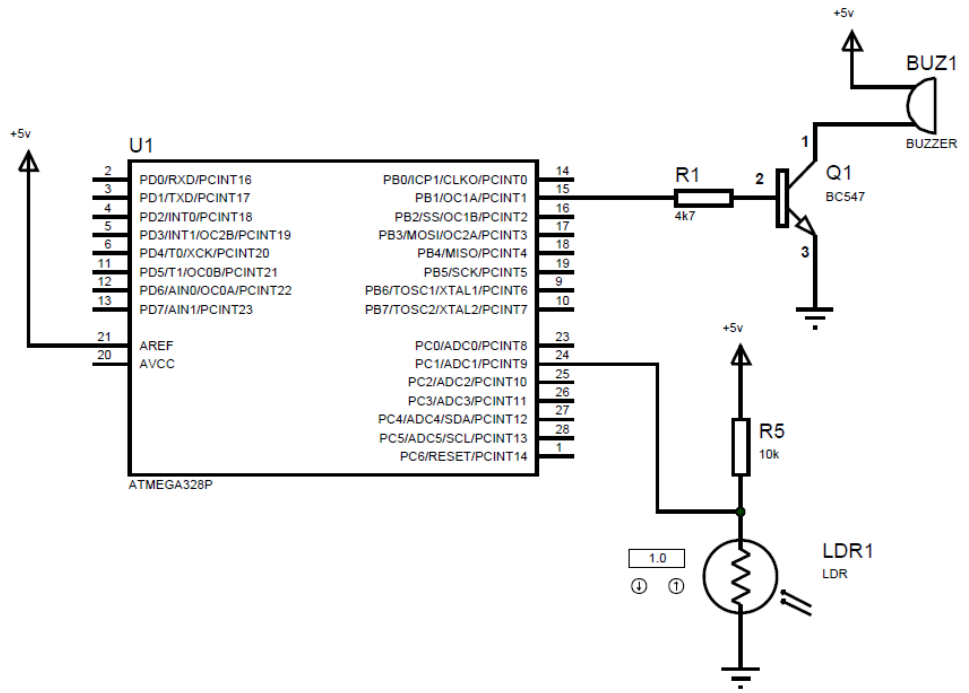
Rangkaian Driver



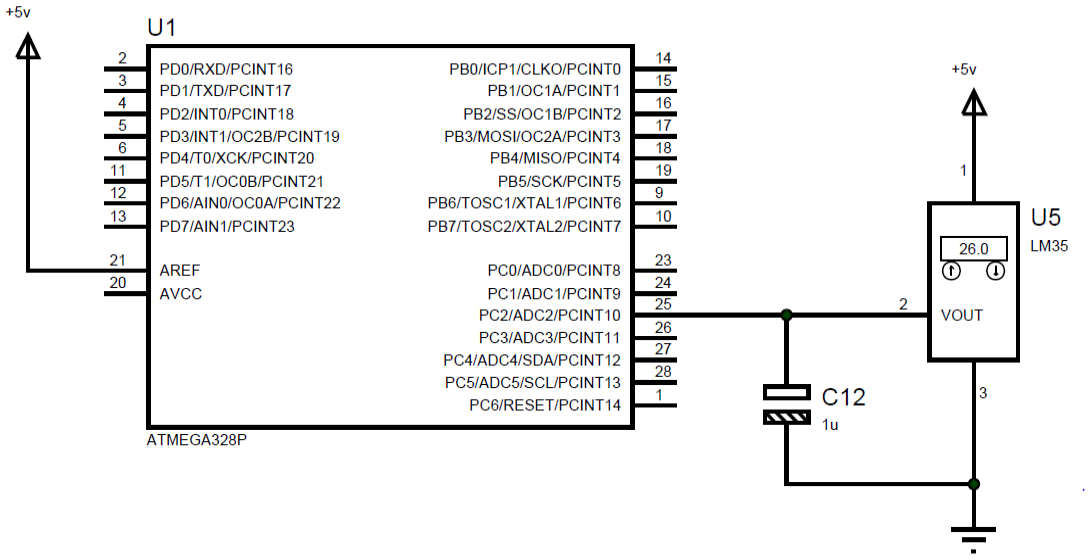
Rangkaian Sistem Minimum



Rangkaian Sensor LDR dan Buzzer



Rangkaian Sensor LM35



Rangkaian Keseluruhan