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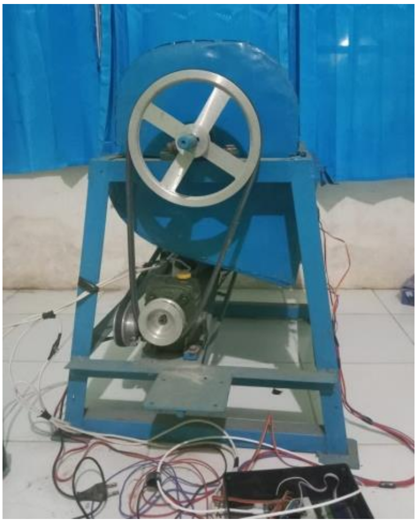
# LAMPIRAN

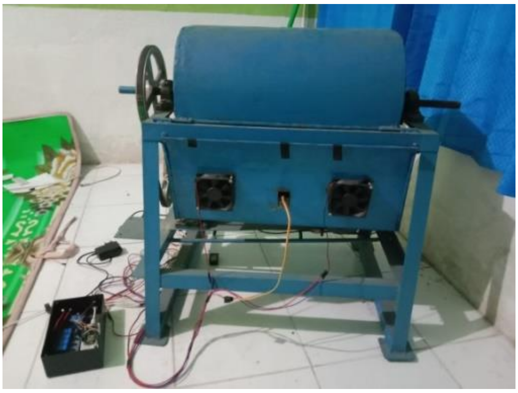
**Lampiran 1 Source Code Program**

```
#include <ESP8266WiFi.h>
#include <DHT.h>
#include <Wire.h>
#include <LiquidCrystal_I2C.h>
#include <FirebaseESP8266.h>
#include <time.h>

// Konfigurasi Wifi
const char* ssid = "E5576_EAA5";
const char* password = "TqETY27ieLH";
#define API_KEY "AIzaSyC1y9v4LWdOs6uCXxTxS-aXgIb2xB7BkVA"
#define DATABASE_URL "https://pengeringkopi-default-
rtdb.firebaseio.com/"
#define USER_EMAIL "nyssaromana01@gmail.com"
#define USER_PASSWORD "06062011"

// Firebase dan DHT
FirebaseData firebaseData;
FirebaseAuth auth;
FirebaseConfig config;
#define DHTPIN D7
#define DHTTYPE DHT22
DHT dht(DHTPIN, DHTTYPE);
LiquidCrystal_I2C lcd(0x27, 16, 2);

// Konfigurasi Relay
const int relayPins[] = {0, 2, 15};
bool relayStates[] = {false, false, false}; // {dinamo, heater, kipas}
float hum, temp;
int sisaMenit, sisaDetik;
char timestamp[30];
bool autoControl = true;

void setup() {
  Serial.begin(115200);
  WiFi.mode(WIFI_STA);
  WiFi.begin(ssid, password);
  while (WiFi.status() != WL_CONNECTED) {
    delay(500);
    Serial.print(".");
  }
  Serial.println("WiFi connected");
  dht.begin();
  Wire.begin(D2, D1);
  lcd.begin();
  lcd.backlight();

  for (int i = 0; i < 3; i++) {
    pinMode(relayPins[i], OUTPUT);
  }

  config.api_key = API_KEY;
  auth.user.email = USER_EMAIL;
  auth.user.password = USER_PASSWORD;
  config.database_url = DATABASE_URL;
  Firebase.begin(&config, &auth);

  configTime(8 * 3600, 0, "asia.pool.ntp.org", "time.nist.gov");
  while (!time(nullptr)) {
    delay(1000);
    Serial.print(".");
  }
  Serial.println("NTP time synchronized");
}

void fetchData() {
  if (Firebase.getString(firebaseData, "/Data/waktu")) sisaMenit =
firebaseData.stringData().toInt();
  if (Firebase.getString(firebaseData, "/Data/detik")) sisaDetik =
firebaseData.stringData().toInt();
  if (Firebase.getBool(firebaseData, "/Data/Mesin")) relayStates[0] =
firebaseData.boolData();
  if (Firebase.getBool(firebaseData, "/Data/Heater")) relayStates[1] =
firebaseData.boolData();
  if (Firebase.getBool(firebaseData, "/Data/Kipas")) relayStates[2] =
firebaseData.boolData();
  if (Firebase.getBool(firebaseData, "/Data/auto")) autoControl =
firebaseData.boolData();

  Serial.println("Data berhasil diambil dari Firebase:");
  Serial.print("Sisa Menit: "); Serial.println(sisaMenit);
  Serial.print("Sisa Detik: "); Serial.println(sisaDetik);
  Serial.print("Mesin (Relay 1): "); Serial.println(relayStates[0] ? "ON" :
"OFF");
  Serial.print("Heater (Relay 2): "); Serial.println(relayStates[1] ? "ON" :
"OFF");
  Serial.print("Kipas (Relay 3): "); Serial.println(relayStates[2] ? "ON" :
```

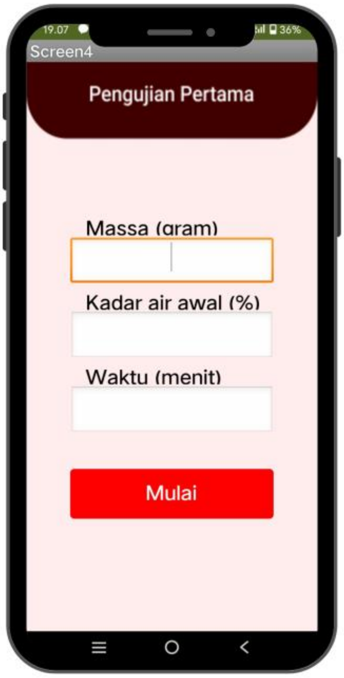
```
"OFF");
  Serial.print("Auto Control: "); Serial.println(autoControl ? "ON" : "OFF");
}

void updateFirebaseData(const String &path, bool value) {
  if (Firebase.setBool(firebaseData, path, value)) {
    Serial.print("Status "); Serial.print(path); Serial.println(" berhasil dikirim ke
Firebase");
  } else {
    Serial.print("Gagal mengirim status "); Serial.print(path); Serial.println(" ke
Firebase");
    Serial.println(firebaseData.errorReason());
  }
}

void sendDataToFirebase() {
  hum = dht.readHumidity();
  temp = dht.readTemperature();

// Print hasil ke serial monitor
  Serial.print("Humidity: ");
  Serial.print(hum);
  Serial.print(" %\t");
  Serial.print("Temperature: ");
  Serial.print(temp);
  Serial.println(" *C");

  lcd.clear();
  lcd.setCursor(0, 0);
  lcd.printf("Temp: %.2f C", temp);
  lcd.setCursor(0, 1);
  lcd.printf("Humid: %.2f %%", hum);
  delay(2500);

  if (Firebase.setFloat(firebaseData, "/Data/suhu", temp)) {
    Serial.println("Suhu berhasil dikirim ke Firebase");
  } else {
    Serial.println("Gagal mengirim suhu ke Firebase");
    Serial.println(firebaseData.errorReason());
  }

  if (Firebase.setFloat(firebaseData, "/Data/kelembapan", hum)) {
    Serial.println("Kelembapan berhasil dikirim ke Firebase");
  } else {
    Serial.println("Gagal mengirim kelembapan ke Firebase");
    Serial.println(firebaseData.errorReason());
  }

  time_t now = time(nullptr);
  struct tm *p_tm = localtime(&now);
  strftime(timestamp, sizeof(timestamp), "%Y-%m-%d %H:%M:%S", p_tm);
  String historyPath = "/History/" + String(timestamp);

  if (Firebase.setFloat(firebaseData, historyPath + "/suhu", temp)) {
    Serial.println("Suhu history berhasil dikirim ke Firebase");
  } else {
    Serial.println("Gagal mengirim suhu history ke Firebase");
    Serial.println(firebaseData.errorReason());
  }

  if (Firebase.setFloat(firebaseData, historyPath + "/kelembapan", hum)) {
    Serial.println("Kelembapan history berhasil dikirim ke Firebase");
  } else {
    Serial.println("Gagal mengirim kelembapan history ke Firebase");
    Serial.println(firebaseData.errorReason());
  }

  if (Firebase.setString(firebaseData, historyPath + "/Mesin", relayStates[0] ?
"ON" : "OFF")) {
    Serial.println("Status Mesin history berhasil dikirim ke Firebase");
  } else {
    Serial.println("Gagal mengirim status Mesin history ke Firebase");
    Serial.println(firebaseData.errorReason());
  }

  if (Firebase.setString(firebaseData, historyPath + "/Heater", relayStates[1]
? "ON" : "OFF")) {
    Serial.println("Status Heater history berhasil dikirim ke Firebase");
  } else {
    Serial.println("Gagal mengirim status Heater history ke Firebase");
    Serial.println(firebaseData.errorReason());
  }

  if (Firebase.setString(firebaseData, historyPath + "/Kipas", relayStates[2] ?
"ON" : "OFF")) {
    Serial.println("Status Kipas history berhasil dikirim ke Firebase");
  } else {
    Serial.println("Gagal mengirim status Kipas history ke Firebase");
    Serial.println(firebaseData.errorReason());
  }
  if (Firebase.setFloat(firebaseData, historyPath + "/sisaMenit", sisaMenit)) {
    Serial.println("Sisa menit history berhasil dikirim ke Firebase");
  } else {
    Serial.println("Gagal mengirim sisa menit history ke Firebase");
    Serial.println(firebaseData.errorReason());
  }

  if (Firebase.setFloat(firebaseData, historyPath + "/sisaDetik", sisaDetik)) {
    Serial.println("Sisa detik history berhasil dikirim ke Firebase");
  } else {
    Serial.println("Gagal mengirim sisa detik history ke Firebase");
    Serial.println(firebaseData.errorReason());
  }
}

void updateRelays() {
  for (int i = 0; i < 3; i++) {
    digitalWrite(relayPins[i], relayStates[i] ? LOW : HIGH);
    updateFirebaseData("/Data/relay" + String(i + 1), relayStates[i]);
    Serial.print("Relay "); Serial.print(i + 1); Serial.print(": ");
Serial.println(relayStates[i] ? "ON" : "OFF");
  }
}

void manualControl() {
  Serial.println("Auto-kontrol OFF");
  updateRelays();
}

void autoControlMode() {
  Serial.println("Auto-kontrol ON");

  if (sisaMenit != 0 || sisaDetik != 0) {
    relayStates[0] = true; // Mesin
    if (temp < 40) {
      relayStates[1] = true;  // Heater
      relayStates[2] = false; // Kipas
    } else {
      relayStates[1] = false; // Heater
      relayStates[2] = true;  // Kipas
    }
  } else {
    relayStates[0] = relayStates[1] = relayStates[2] = false; // Semua OFF
  }
  updateRelays();
}

void loop() {
  fetchData();
  sendDataToFirebase();
  if (autoControl) autoControlMode();
  else manualControl();
  delay(2000);
}
```

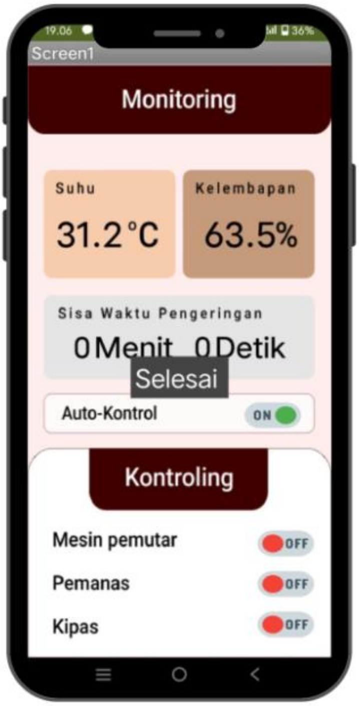
## Lampiran 2 Gambar Mesin Pengering Berbasis IoT



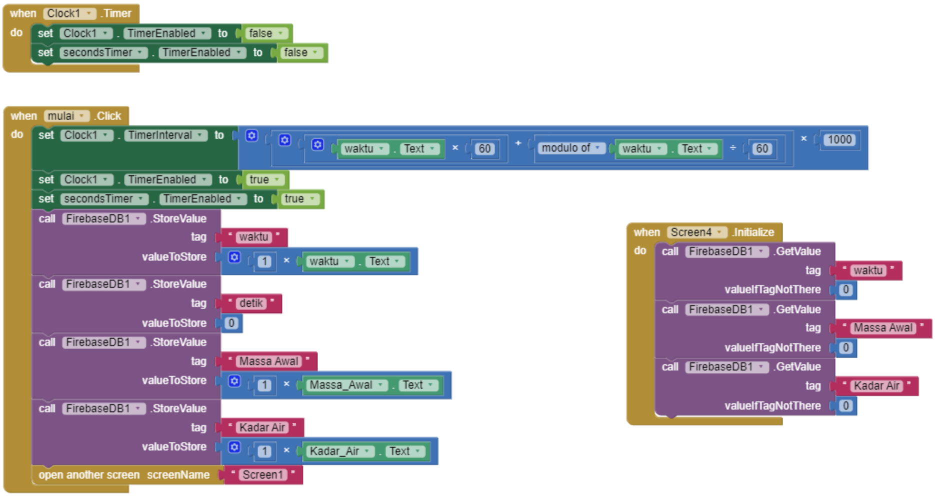


## Lampiran 3 Gambar Aplikasi Pantau dan Kendali Mobile



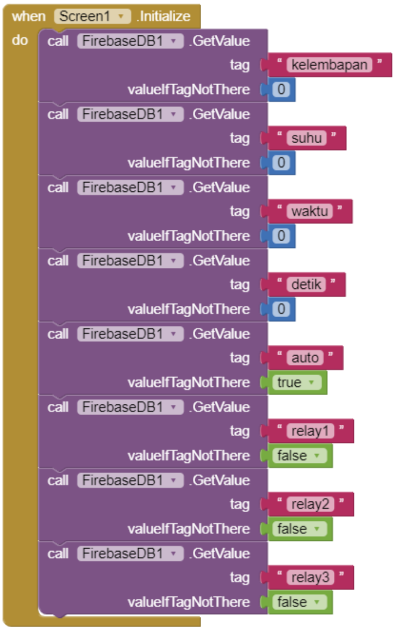


## Lampiran 4 Blok Aplikasi Mobile



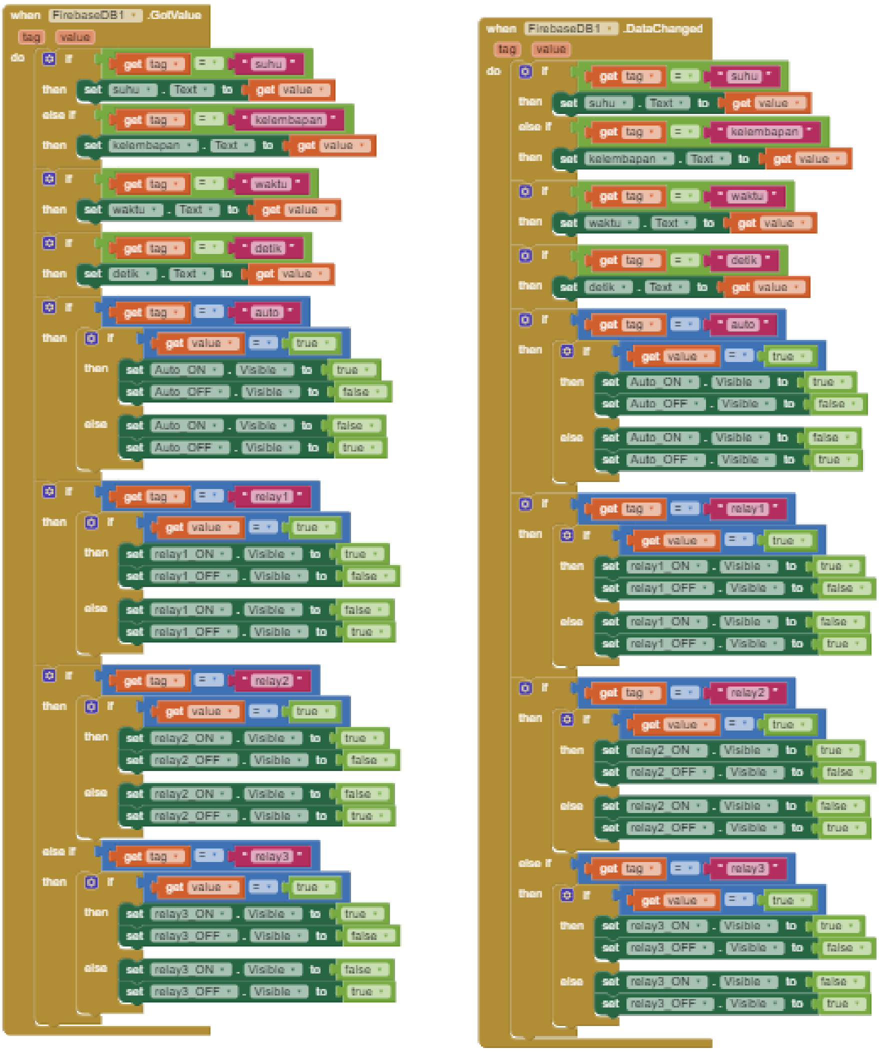
```
when Clock1 .Timer
do  set Clock1 . TimerEnabled to false
    set secondsTimer . TimerEnabled to false

when mulai .Click
do  set Clock1 . TimerInterval to ((waktu . Text × 60) + modulo of (waktu . Text ÷ 60)) × 1000
    set Clock1 . TimerEnabled to true
    set secondsTimer . TimerEnabled to true
    call FirebaseDB1 .StoreValue
                        tag " waktu "
               valueToStore 1 × waktu . Text
    call FirebaseDB1 .StoreValue
                        tag " detik "
               valueToStore 0
    call FirebaseDB1 .StoreValue
                        tag " Massa Awal "
               valueToStore 1 × Massa_Awal . Text
    call FirebaseDB1 .StoreValue
                        tag " Kadar Air "
               valueToStore 1 × Kadar_Air . Text
    open another screen  screenName " Screen1 "

when Screen4 .Initialize
do  call FirebaseDB1 .GetValue
                        tag " waktu "
          valueIfTagNotThere 0
    call FirebaseDB1 .GetValue
                        tag " Massa Awal "
          valueIfTagNotThere 0
    call FirebaseDB1 .GetValue
                        tag " Kadar Air "
          valueIfTagNotThere 0
```

**Blok tampilan awal untuk menginput Massa Awal, Kadar air, dan waktu pengeringan.**



```
when Screen1 .Initialize
do  call FirebaseDB1 .GetValue
                        tag " kelembapan "
          valueIfTagNotThere 0
    call FirebaseDB1 .GetValue
                        tag " suhu "
          valueIfTagNotThere 0
    call FirebaseDB1 .GetValue
                        tag " waktu "
          valueIfTagNotThere 0
    call FirebaseDB1 .GetValue
                        tag " detik "
          valueIfTagNotThere 0
    call FirebaseDB1 .GetValue
                        tag " auto "
          valueIfTagNotThere true
    call FirebaseDB1 .GetValue
                        tag " relay1 "
          valueIfTagNotThere false
    call FirebaseDB1 .GetValue
                        tag " relay2 "
          valueIfTagNotThere false
    call FirebaseDB1 .GetValue
                        tag " relay3 "
          valueIfTagNotThere false
```

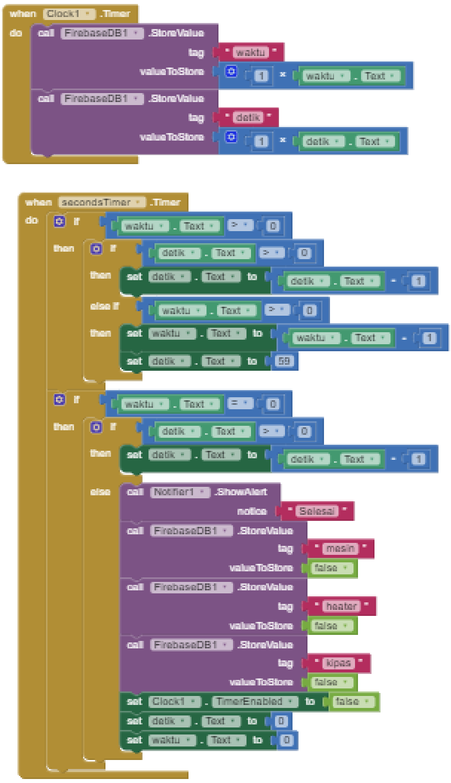
**Inisialisasi variable yang digunakan**



```
when FirebaseDB1 .GotValue
  tag  value
do  if   get tag = "suhu"
    then set suhu . Text to get value
    else if  get tag = "kelembapan"
    then set kelembapan . Text to get value
    if   get tag = "waktu"
    then set waktu . Text to get value
    if   get tag = "detik"
    then set detik . Text to get value
    if   get tag = "auto"
    then if   get value = true
         then set Auto_ON . Visible to true
              set Auto_OFF . Visible to false
         else set Auto_ON . Visible to false
              set Auto_OFF . Visible to true
    if   get tag = "relay1"
    then if   get value = true
         then set relay1_ON . Visible to true
              set relay1_OFF . Visible to false
         else set relay1_ON . Visible to false
              set relay1_OFF . Visible to true
    if   get tag = "relay2"
    then if   get value = true
         then set relay2_ON . Visible to true
              set relay2_OFF . Visible to false
         else set relay2_ON . Visible to false
              set relay2_OFF . Visible to true
    else if  get tag = "relay3"
    then if   get value = true
         then set relay3_ON . Visible to true
              set relay3_OFF . Visible to false
         else set relay3_ON . Visible to false
              set relay3_OFF . Visible to true
```

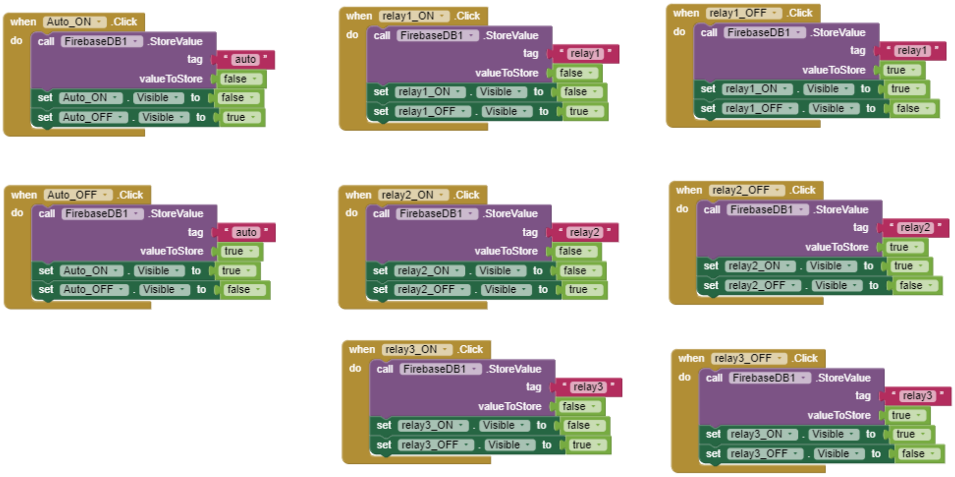
```
when FirebaseDB1 .DataChanged
  tag  value
do  if   get tag = "suhu"
    then set suhu . Text to get value
    else if  get tag = "kelembapan"
    then set kelembapan . Text to get value
    if   get tag = "waktu"
    then set waktu . Text to get value
    if   get tag = "detik"
    then set detik . Text to get value
    if   get tag = "auto"
    then if   get value = true
         then set Auto_ON . Visible to true
              set Auto_OFF . Visible to false
         else set Auto_ON . Visible to false
              set Auto_OFF . Visible to true
    if   get tag = "relay1"
    then if   get value = true
         then set relay1_ON . Visible to true
              set relay1_OFF . Visible to false
         else set relay1_ON . Visible to false
              set relay1_OFF . Visible to true
    if   get tag = "relay2"
    then if   get value = true
         then set relay2_ON . Visible to true
              set relay2_OFF . Visible to false
         else set relay2_ON . Visible to false
              set relay2_OFF . Visible to true
    else if  get tag = "relay3"
    then if   get value = true
         then set relay3_ON . Visible to true
              set relay3_OFF . Visible to false
         else set relay3_ON . Visible to false
              set relay3_OFF . Visible to true
```

**Blok Untuk Menampilkan hasil pembacaan sensor-sensor dan aktuator yang diambil dari firebase**



```
when Clock1 .Timer
do  call FirebaseDB1 .StoreValue
        tag          " waktu "
        valueToStore  1 × waktu . Text
    call FirebaseDB1 .StoreValue
        tag          " detik "
        valueToStore  1 × detik . Text

when secondsTimer .Timer
do  if  waktu . Text > 0
    then  if  detik . Text > 0
          then  set detik . Text to  detik . Text - 1
          else if  waktu . Text > 0
          then  set waktu . Text to  waktu . Text - 1
                set detik . Text to 59
    if  waktu . Text = 0
    then  if  detik . Text > 0
          then  set detik . Text to  detik . Text - 1
          else  call Notifier1 .ShowAlert
                    notice  " Selesai "
                call FirebaseDB1 .StoreValue
                    tag          " mesin "
                    valueToStore  false
                call FirebaseDB1 .StoreValue
                    tag          " heater "
                    valueToStore  false
                call FirebaseDB1 .StoreValue
                    tag          " kipas "
                    valueToStore  false
                set Clock1 . TimerEnabled to  false
                set detik . Text to 0
                set waktu . Text to 0
```

**Blok untuk mengatur timer**



```
when Auto_ON .Click
do  call FirebaseDB1 .StoreValue
        tag          " auto "
        valueToStore  false
    set Auto_ON . Visible to  false
    set Auto_OFF . Visible to  true

when relay1_ON .Click
do  call FirebaseDB1 .StoreValue
        tag          " relay1 "
        valueToStore  false
    set relay1_ON . Visible to  false
    set relay1_OFF . Visible to  true

when relay1_OFF .Click
do  call FirebaseDB1 .StoreValue
        tag          " relay1 "
        valueToStore  true
    set relay1_ON . Visible to  true
    set relay1_OFF . Visible to  false

when Auto_OFF .Click
do  call FirebaseDB1 .StoreValue
        tag          " auto "
        valueToStore  true
    set Auto_ON . Visible to  true
    set Auto_OFF . Visible to  false

when relay2_ON .Click
do  call FirebaseDB1 .StoreValue
        tag          " relay2 "
        valueToStore  false
    set relay2_ON . Visible to  false
    set relay2_OFF . Visible to  true

when relay2_OFF .Click
do  call FirebaseDB1 .StoreValue
        tag          " relay2 "
        valueToStore  true
    set relay2_ON . Visible to  true
    set relay2_OFF . Visible to  false

when relay3_ON .Click
do  call FirebaseDB1 .StoreValue
        tag          " relay3 "
        valueToStore  false
    set relay3_ON . Visible to  false
    set relay3_OFF . Visible to  true

when relay3_OFF .Click
do  call FirebaseDB1 .StoreValue
        tag          " relay3 "
        valueToStore  true
    set relay3_ON . Visible to  true
    set relay3_OFF . Visible to  false
```

**Blok untuk mengatur ON/OFF aktuator**