

DAFTAR PUSTAKA

Anastasya, Maressa. 2021. *Pengertian Air. Sumber, Unsur, Macam Jenis dan Manfaat*. Diakses pada 06 Januari 2023 pukul 00.24 WIB.

Arga. 2020. *Arduino Uno*. Diakses pada 11 Januari 2023 pukul 21.54 WIB.

Dewi Ariessanti, Hani. 2020. *Prototype Sistem Monitoring Penggunaan Air Berbasis Internet Of Things Pada PDAM Tirta Benteng Kota Tangerang*. Universitas Raharja. Diakses pada 11 Januari 2023 pukul 20.00 WIB.

Fahrudin. 2014. *Prototype Monitoring Ketinggian Air Pada Waduk Berbasis Mikrokontroler*. Universitas Islam Negeri Alauddin Makassar. Diakses pada 11 Januari 2023 pukul 19.00 WIB.

Immersa. 2015. *LCD, Keypad dan Sensor Ping*. Diakses pada 11 Januari 2023 pukul 20.25 WIB.

Kho, Budi. 2018. *Kontroling*. Diakses pada 11 Januari 2023 pukul 22.12 WIB.

Kho, Dickson. 2020. *Pengertian Sensor dan Relay*. Diakses pada 11 Januari 2023 pukul 20.35 WIB.

Permata, Indah. 2013. *Pengertian Rancang Bangun*. Diakses pada 11 Januari 2023 pukul 22.04 WIB.

Rosman N, Andi dan Kamaruddin. 2019. *Rancang Bangun Sistem Monitoring Salinitas Air Berbasis Mikrokontroler Arduino Uno*. Universitas Muslim Maros.

Sarif Hidayatullah, Sunan. 2020. Buzzer Elektronika. Diakses pada 11 Januari 2023 pukul 20.52 WIB.

Setyawan. 2021. Pengertian Mikrokontroler. Diakses pada 11 Januari 2022 pukul 20.41 WIB.

Susep. 2018. Pengertian Alat Ukur. Diakses pada 11 Januari 2023 pukul 20.15 WIB.

Tysara, Laudya. 2021. Pengertian Controlling. Diakses pada 11 Januari 2023 pukul 21.22 WIB.

LAMPIRAN

Lampiran 1. Program Coding Prototype Alat

```
#include "LiquidCrystal_I2C.h"
#include <SPI.h>
#include <SD.h>
int nomor;
File myFile;
LiquidCrystal_I2C lcd = LiquidCrystal_I2C(0x27, 16, 2);
/*
    sdcard pin
    ** MOSI - pin 11
    ** MISO - pin 12
    ** CLK - pin 13
    ** CS - pin 4 (for MKRZero SD: SDCARD_SS_PIN)
*/
#define echoPin 9
#define trigPin 10
#define chipSelect 4
#define relay0 2
#define relay1 3
#define led_merah 8
#define led_biru 7
#define led_hijau 6
#define buzz 5

long duration;
int distance;
int debit;
int cal;

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

    if (!SD.begin(4)) {

        Serial.println(" SD card Gagal! ");
        delay(2000);
        return;
    }
}
```

```

Serial.println("SD card Berhasil ");
delay(2000);

pinMode(trigPin, OUTPUT);
pinMode(echoPin, INPUT);
pinMode(relay0, OUTPUT);
pinMode(relay1, OUTPUT);
pinMode(led_merah, OUTPUT);
pinMode(led_biru, OUTPUT);
pinMode(led_hijau, OUTPUT);
pinMode(buzz, OUTPUT);
digitalWrite(relay0, HIGH);
digitalWrite(relay1, HIGH);
lcd.init();
lcd.backlight();
}

void loop() {

    cal = 150 - distance;          // RUMUS H
    debit = 0.98 * 0.82 * cal;    // RUMUS DEBIT

    digitalWrite(trigPin, LOW);
    delayMicroseconds(2);
    digitalWrite(trigPin, HIGH);
    lcd.clear();
    delayMicroseconds(10);
    digitalWrite(trigPin, LOW);
    duration = pulseIn(echoPin, HIGH);
    distance = duration * 0.034 / 2;
    Serial.print("Distance: ");
    Serial.print(distance);
    Serial.println(" cm");

    if (distance >= 100) {
        //lcd.clear();
        digitalWrite(relay0, HIGH);
        digitalWrite(led_hijau, HIGH);
        digitalWrite(led_biru, LOW);
        digitalWrite(led_merah, LOW);
    }
}

```

```

digitalWrite(buzz, LOW);
lcd.setCursor(8, 0);
lcd.print(distance);
lcd.setCursor(0, 0);
lcd.print("JARAK = ");
lcd.setCursor(10, 1);
lcd.print("AMAN");
lcd.setCursor(1, 1);
lcd.print("D: ");
lcd.setCursor(4, 1);
lcd.print(debit);

myFile = SD.open("sensor.txt", FILE_WRITE);
if (myFile) {
    Serial.print("Simpan data ke :");
    Serial.println(nomor + 1);
    myFile.print(nomor + 1);
    myFile.print(" , | JARAK = ");
    myFile.print(distance);
    myFile.print(" , | DEBIT = ");
    myFile.print(debit);
    myFile.print(", | LED = Hijau ");
    myFile.print(", | Buzzer = OFF ");
    myFile.print(", | LCD = ");
    myFile.print(distance);
    myFile.println(" , | RELAY = OFF ");
    myFile.close();
    delay(1000);
    Serial.println(" Berhasil... ");
}
}
if (distance >= 20 && distance <= 50) {
    //lcd.clear();
    digitalWrite(relay0, HIGH);
    digitalWrite(led_merah, LOW);
    digitalWrite(led_biru, HIGH);
    digitalWrite(led_hijau, LOW);
    digitalWrite(buzz, LOW);
    lcd.setCursor(8, 0);
    lcd.print(distance);

```

```

    lcd.setCursor(0, 0);
    lcd.print("JARAK = ");
    lcd.setCursor(10, 1);
    lcd.print("SIAGA");
    lcd.setCursor(1, 1);
    lcd.print("D: ");
    lcd.setCursor(4, 1);
    lcd.print(debit);

    myFile = SD.open("sensor.txt", FILE_WRITE);
    if (myFile) {
        Serial.print("Simpan data ke :");
        Serial.println(nomor + 1);
        myFile.print(nomor + 1);
        myFile.print(" , | JARAK = ");
        myFile.print(distance);
        myFile.print(" , | DEBIT = ");
        myFile.print(debit);
        myFile.print(", | LED = Biru ");
        myFile.print(", | Buzzer = OFF ");
        myFile.print(", | LCD = ");
        myFile.print(distance);
        myFile.println(" , | RELAY = OFF ");
        myFile.close();
        delay(1000);
        Serial.println(" Berhasil... ");
    }
}
if (distance <= 20) {

    //lcd.clear();
    digitalWrite(relay0, LOW);
    digitalWrite(led_merah, HIGH);
    digitalWrite(led_biru, LOW);
    digitalWrite(led_hijau, LOW);
    digitalWrite(buzz, HIGH);
    lcd.setCursor(8, 0);
    lcd.print(distance);
    lcd.setCursor(0, 0);
    lcd.print("JARAK = ");

```

```

    lcd.setCursor(9, 1);
    lcd.print("BAHAYA");
    lcd.setCursor(1, 1);
    lcd.print("D: ");
    lcd.setCursor(4, 1);
    lcd.print(debit);

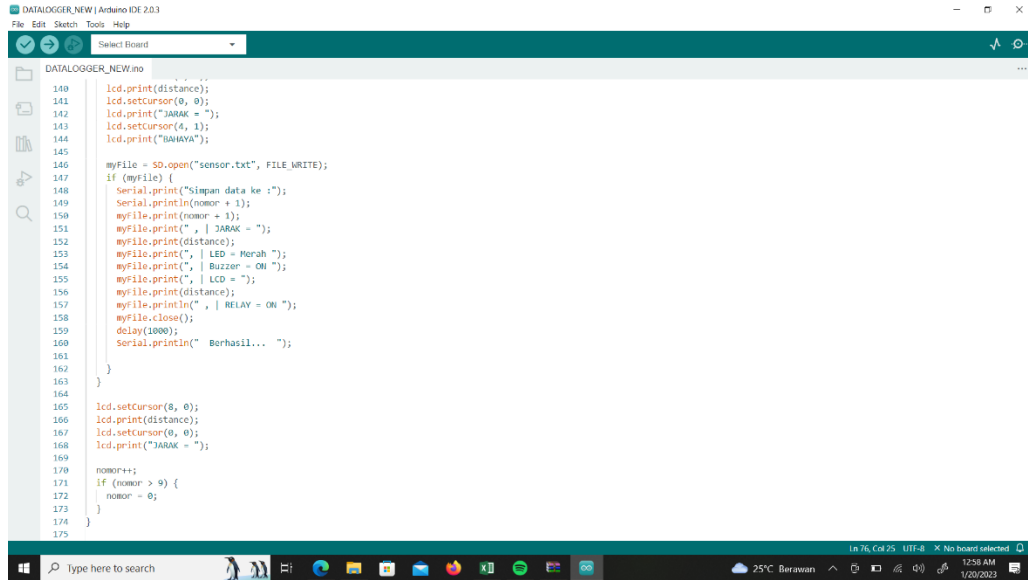
    myFile = SD.open("sensor.txt", FILE_WRITE);
    if (myFile) {
        Serial.print("Simpan data ke :");
        Serial.println(nomor + 1);
        myFile.print(nomor + 1);
        myFile.print(" , | JARAK = ");
        myFile.print(distance);
        myFile.print(" , | DEBIT = ");
        myFile.print(debit);
        myFile.print(", | LED = Merah ");
        myFile.print(", | Buzzer = ON ");
        myFile.print(", | LCD = ");
        myFile.print(distance);
        myFile.println(" , | RELAY = ON ");
        myFile.close();
        delay(1000);
        Serial.println(" Berhasil... ");
    }
}

lcd.setCursor(8, 0);
lcd.print(distance);
lcd.setCursor(0, 0);
lcd.print("JARAK = ");

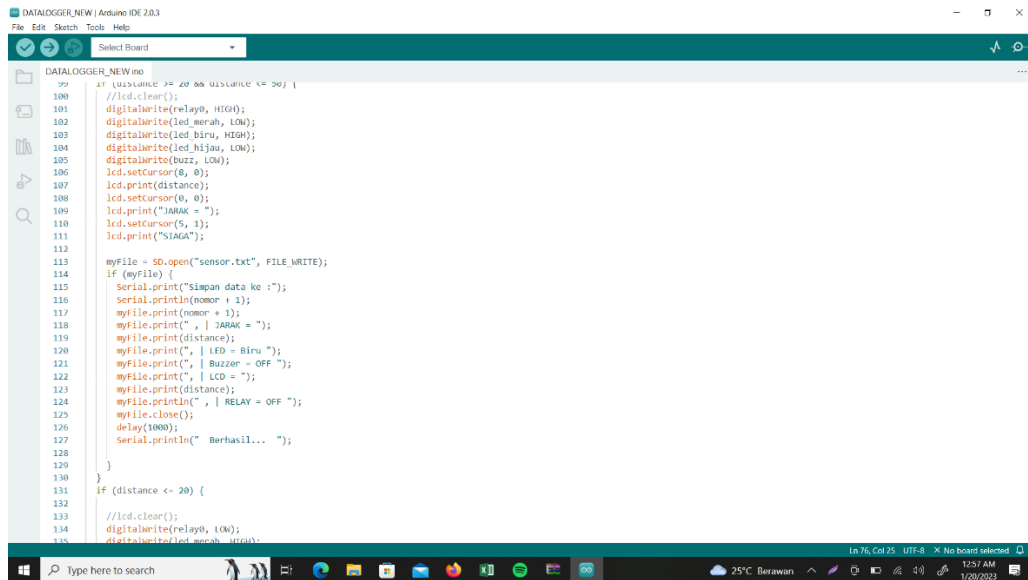
nomor++;
if (nomor > 9) {
    nomor = 0;
}
}

```

Lampiran 2. Screenshoot Program Arduino Ide



```
140 lcd.print(distance);
141 lcd.setCursor(0, 0);
142 lcd.print("Jarak = ");
143 lcd.setCursor(4, 1);
144 lcd.print("BAHAYA");
145
146 myFile = SD.open("sensor.txt", FILE_WRITE);
147 if (myFile) {
148   Serial.print("Simpan data ke :");
149   Serial.println(nomor + 1);
150   myFile.print(nomor + 1);
151   myFile.print(" , | Jarak = ");
152   myFile.print(distance);
153   myFile.print(" , | LED = Merah ");
154   myFile.print(" , | Buzzer = ON ");
155   myFile.print(" , | LCD = ");
156   myFile.print(distance);
157   myFile.println(" , | RELAY = ON ");
158   myFile.close();
159   delay(1000);
160   Serial.println(" Berhasil... ");
161 }
162
163
164
165 lcd.setCursor(0, 0);
166 lcd.print(distance);
167 lcd.setCursor(0, 0);
168 lcd.print("Jarak = ");
169
170 nomor++;
171 if (nomor > 9) {
172   nomor = 0;
173 }
174
175 }
```



```
100 if (distance >= 20 || distance <= 20) {
101   //lcd.clear();
102   digitalWrite(relay0, HIGH);
103   digitalWrite(led_merah, LOW);
104   digitalWrite(led_biru, HIGH);
105   digitalWrite(buzz, LOW);
106   lcd.setCursor(0, 0);
107   lcd.print(distance);
108   lcd.setCursor(0, 0);
109   lcd.print("Jarak = ");
110   lcd.setCursor(5, 1);
111   lcd.print("SIAGA");
112
113   myFile = SD.open("sensor.txt", FILE_WRITE);
114   if (myFile) {
115     Serial.print("Simpan data ke :");
116     Serial.println(nomor + 1);
117     myFile.print(nomor + 1);
118     myFile.print(" , | Jarak = ");
119     myFile.print(distance);
120     myFile.print(" , | LED = Biru ");
121     myFile.print(" , | Buzzer = OFF ");
122     myFile.print(" , | LCD = ");
123     myFile.print(distance);
124     myFile.println(" , | RELAY = OFF ");
125     myFile.close();
126     delay(1000);
127     Serial.println(" Berhasil... ");
128   }
129 }
130
131 if (distance <= 20) {
132   //lcd.clear();
133   digitalWrite(relay0, LOW);
134   digitalWrite(led_merah, HIGH);
135 }
```

```
DATALOGGER_NEW | Arduino IDE 2.0.3
File Edit Sketch Tools Help
Select Board

DATALOGGER_NEW.ino
66
67 if (distance >= 100) {
68   //lcd.clear();
69   digitalWrite(relay0, HIGH);
70   digitalWrite(led_hijau, HIGH);
71   digitalWrite(led_biru, LOW);
72   digitalWrite(led_merah, LOW);
73   digitalWrite(buzz, LOW);
74   lcd.setCursor(8, 0);
75   lcd.print(distance);
76   lcd.setCursor(0, 0);
77   lcd.print("Jarak = ");
78   lcd.setCursor(6, 1);
79   lcd.print("Jarak");
80
81   myFile = SD.open("sensor.txt", FILE_WRITE);
82   if (myFile) {
83     Serial.print("Simpan data ke ");
84     Serial.println(nomor + 1);
85     myFile.print(nomor + 1);
86     myFile.print(" , | Jarak = ");
87     myFile.print(distance);
88     myFile.print(" , | LED = Hijau ");
89     myFile.print(" , | Buzzer = OFF ");
90     myFile.print(" , | LCD = ");
91     myFile.print(distance);
92     myFile.println(" , | RELAY = OFF ");
93     myFile.close();
94     delay(1000);
95     Serial.println(" Berhasil... ");
96   }
97 }
98
99 if (distance >= 20 && distance <= 50) {
100   //lcd.clear();
101   digitalWrite(relay0, HIGH);
102 }
```

```
DATALOGGER_NEW | Arduino IDE 2.0.3
File Edit Sketch Tools Help
Select Board

DATALOGGER_NEW.ino
34   return;
35 }
36 Serial.println("SD card Berhasil ");
37 delay(2000);
38
39 pinMode(trigPin, OUTPUT);
40 pinMode(echoPin, INPUT);
41 pinMode(relay0, OUTPUT);
42 pinMode(relay1, OUTPUT);
43 pinMode(led_merah, OUTPUT);
44 pinMode(led_biru, OUTPUT);
45 pinMode(led_hijau, OUTPUT);
46 pinMode(buzz, OUTPUT);
47 digitalWrite(relay0, HIGH);
48 digitalWrite(relay1, HIGH);
49 lcd.init();
50 lcd.backlight();
51 }
52
53 void loop() {
54   digitalWrite(trigPin, LOW);
55   delayMicroseconds(2);
56   digitalWrite(trigPin, HIGH);
57   lcd.clear();
58   delayMicroseconds(10);
59   digitalWrite(trigPin, LOW);
60   duration = pulseIn(echoPin, HIGH);
61   distance = duration * 0.034 / 2;
62   Serial.print("Distance: ");
63   Serial.print(distance);
64   Serial.println(" cm");
65
66
67   if (distance >= 100) {
68     //lcd.clear();
69     digitalWrite(relay0, HIGH);
```

DATA LOGGER, NEW | Arduino IDE 2.0.3

File Edit Sketch Tools Help

Select Board

DATA LOGGER, NEW.ino

```
1  #include "LiquidCrystal_I2C.h"
2  #include <SPI.h>
3  #include <SD.h>
4  int nomor;
5  File myFile;
6  LiquidCrystal_I2C lcd = LiquidCrystal_I2C(0x27, 16, 2);
7  /*
8   * | sdcard pin
9   * ** MISO - pin 11
10  * ** MOSI - pin 12
11  * ** CLK - pin 13
12  * ** CS - pin 4 (for WIZ050 SD: SD_CARD_SS_PIN)
13  */
14  #define echoPin 9
15  #define trigPin 10
16  #define chipSelect 4
17  #define relay0 2
18  #define relay1 3
19  #define led_merah 8
20  #define led_biru 7
21  #define led_hijau 6
22  #define buzz 5
23
24  long duration;
25  int distance;
26
27  void setup() {
28    Serial.begin(9600);
29
30    if (!SD.begin(4)) {
31      Serial.println(" SD card gagal ");
32      delay(2000);
33      return;
34    }
35    Serial.println("SD card Berhasil ");
36  }
```

Type here to search

Ln 1, Col 1, UTF-8 No board selected

25°C Berawan 12:55 AM 1/20/2023

Lampiran 3. Data Pengujian Sistem Keseluruhan

NO.	JARAK (cm)	DEBIT (m3/detik)	OUTPUT			
			WARNA LED	BUZZER	LCD (cm)	RELAY
1	10	1,13	merah	ON	10	ON
2	15	1,08	merah	ON	15	ON
3	20	1,05	merah	ON	20	ON
4	25	0,96	biru	OFF	25	OFF
5	30	0,97	biru	OFF	30	OFF
6	35	0,92	biru	OFF	35	OFF
7	40	0,89	biru	OFF	40	OFF
8	45	0,85	biru	OFF	45	OFF
9	50	0,81	biru	OFF	50	OFF
10	55	0,75	hijau	OFF	55	OFF
11	60	0,73	hijau	OFF	60	OFF
12	65	0,68	hijau	OFF	65	OFF
13	70	0,65	hijau	OFF	70	OFF
14	75	0,60	hijau	OFF	75	OFF
15	80	0,57	hijau	OFF	80	OFF
16	85	0,52	hijau	OFF	85	OFF
17	90	0,49	hijau	OFF	90	OFF
18	95	0,43	hijau	OFF	95	OFF
19	100	0,40	hijau	OFF	100	OFF

Lampiran 4. Foto Lokasi Penelitian



Lampiran 5. Foto mengukur panjang lintasan aliran dan Lebar penampang



