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LAMPIRAN

Lampiran 1. Tabel Data Pengukuran Suhu Dengan Variasi Jarak

Jarak	Data pengukuran suhu		Nilai Selisih (°C)
	MLX90614 (°C)	Thermogun (°C)	
0	47,3	36,3	11,0
1	38,9	36,3	2,6
2	38,2	36,3	1,9
3	38,0	36,2	1,8
4	37,6	36,2	1,4
5	36,4	36,2	0,2
6	36,2	36,2	0,0
7	35,9	36,2	0,3
8	35,3	36,2	0,9
9	35,5	36,2	0,7
10	35,5	36,2	0,7

Lampiran 2. Tabel Data Kalibrasi Pengukuran Suhu MLX90614 Dengan Thermogun

Sampel Ke	Data Pengukuran Suhu Tubuh		Nilai Error (%)
	MLX90614 (°C)	Thermogun (°C)	
1	32,4	32,5	0,32
2	33,1	33,2	0,30
3	34,7	34,7	0,00
4	35,7	35,8	0,27
5	36,2	36,2	0,00
6	37,5	37,4	0,26
7	38,7	38,7	0,00

Sampel Ke	Data Pengukuran Suhu Tubuh		Nilai Error (%)
	MLX90614 (°C)	Thermogun (°C)	
8	39,3	39,4	0,25
9	40,2	40,6	0,98
10	41,4	41,1	0,72
11	42,4	42,2	0,47
	Rata-rata nilai error		0,32

Lampiran 3. Tabel Data Kalibrasi Pengukuran Jumlah Kadar Oksigen MAX30102 Dibandingkan Dengan Pulse Oximeter

SpO2	OBJEK A		OBJEK B		OBJEK C		ERROR 1	ERROR 2	ERROR 3
	X	Y	X	Y	X	Y			
95			97	95	95	95		2,11	0,00
96	95	96	96	95	96	96	1,04	1,05	0,00
97	97	97	97	95	97	97	0,00	2,11	0,00
98	98	98	97	95	98	98	0,00	2,11	0,00
99	98	99	98	95			1,01	3,16	
Rata -rata nilai error							0,51	2,11	0,00

*X = MAX30102

*Y = Pulse Oximeter

**Lampiran 4. Tabel Data Kalibrasi Pengukuran Jumlah Nafas KY-037
Dibandingkan Dengan Metode Standar Medis**

Kondisi Pernapasan	GRAFIK 1		GRAFIK 2		GRAFIK 3		Error 1 (%)	Error 2 (%)	Error 3 (%)
	KY-037	MSM	KY-037	MSM	KY-037	MSM			
Sangat Lambat	10	10	11	11	11	11	0,00	0,00	0,00
Lambat	13	13	14	14	14	14	0,00	0,00	0,00
Normal	16	15	17	17	17	16	6,67	0,00	6,25
Cepat	19	19	20	19	18	18	0,00	5,26	0,00
Sangat Cepat	21	21	23	22	21	21	0,00	4,55	0,00
Rata-rata nilai error							1,33	1,96	1,25

Lampiran 5. Tabel Data Pengukuran Suhu Tubuh Manusia Melalui Websserver

PENGUKURAN SUHU 1 JAM			
WAKTU (s)	OBJEK A	OBJEK B	OBJEK C
1	36,95	36,25	37,63
2	36,91	36,21	37,63
3	36,99	36,27	37,55
4	36,91	36,27	37,61
5	36,95	36,29	37,11
6	37,03	36,27	36,01
7	36,91	36,29	36,27

WAKTU (s)	OBJEK A	OBJEK B	OBJEK C
8	36,99	36,27	36,57
9	36,99	36,29	36,83
10	36,99	36,39	36,77
11	36,99	36,33	36,71
12	37,05	36,21	36,71
13	36,99	36,25	36,89
14	37,05	36,19	36,83
15	37,05	36,19	36,35
16	36,99	36,19	36,53
17	37,05	36,19	36,53
18	36,91	36,15	36,57
19	36,95	36,13	36,55
20	36,97	36,11	36,53
21	37,03	36,11	36,53
22	36,91	36,13	36,53
23	36,99	36,05	36,43
24	36,95	36,15	36,43
25	36,99	36,19	36,53
26	37,03	36,19	36,53
27	37,05	36,15	36,53
28	37,05	36,29	36,53
29	36,95	36,01	36,53
30	36,97	35,97	36,55
31	36,99	36,01	36,61
32	36,95	36,15	36,57
33	36,97	36,29	36,55
34	36,99	36,27	36,53
35	37,03	36,35	36,53

Seterusnya hingga 3600 baris

Lampiran 6. Tabel Data Pengukuran Pengukuran Kadar Oksigen MAX30102 Melalui Webservice

PENGUKURAN KADAR OKSIGEN 10 Menit			
WAKTU (s)	OBJEK A	OBJEK B	OBJEK C
1	97	96	97
2	97	96	97
3	97	96	97
4	97	91	98
5	97	91	98
6	97	91	95
7	94	92	95
8	94	92	95
9	97	97	95
10	97	97	95
11	97	97	94
12	96	90	94
13	96	90	94
14	96	90	91
15	96	90	91
16	96	90	96
17	95	90	96
18	95	96	96
19	95	96	96
20	95	97	96
21	95	97	96
22	95	97	96
23	95	95	96
24	95	95	96
25	95	95	96

Seterusnya hingga 600 baris

Lampiran 7. Tabel Data Pengukuran Pengukuran Jumlah Nafas Melalui Websriver

Waktu (s)	OBJEK A	
	MIKRO	WEBSITE
1	0	0
2	0	1
3	1	1
4	1	1
5	1	2
6	1	2
7	2	2
8	2	3
9	2	3
10	2	3
11	3	3
12	3	4
13	3	4
14	3	4
15	4	4
16	4	5
17	4	5
18	5	6
19	5	6
20	5	6
21	6	6
22	6	7
23	6	7
24	7	7
25	7	8
26	7	8
27	7	8
28	8	9
29	8	9

30	9	9
31	9	9
32	9	10
33	9	10
34	10	10
35	10	10
36	10	11
37	11	11
38	11	12
39	11	12
40	12	12
41	12	12
42	12	13
43	12	13
44	13	13
45	13	14
46	13	14
47	14	14
48	14	15
49	14	15
50	15	15
51	15	15
52	15	16
53	16	16
54	16	16
55	16	17
56	17	17
57	17	17
58	17	18
59	18	18
60	18	18

Lampiran 8. Program Arduino 1

```
//pin volt = 5 volt
//pin ground = gnd
//pin AO = A3
//Including the necessary libraries
#include <Wire.h>
#include <Adafruit_MLX90614.h>
int adc;
int sampling;
long tahan;
unsigned long time_up, time_down, time_down_no, tick_no;
unsigned long tick_yes;
int hold;
const byte zero_sound = 22; //kondisi adc tanpa suara
int count;
//Defining the object for mlx
Adafruit_MLX90614 mlx = Adafruit_MLX90614();
//defining all_data
//int n = 0;
//float all_data = 0;
void setup() {
  // put your setup code here, to run once:
  Serial.begin (9600);
  count = -1;
  mlx.begin();          //Initializing the MLX90614 sensor
}
void loop() {
  // put your main code here, to run repeatedly:
  //float suhu = mlx.readObjectTempC() + 5;
  if ((millis() - tahan) > 1000) {
    Serial.print (count);
```

```

Serial.print(F("|"));
Serial.println(mlx.readObjectTempC() + 5);
tahan = millis();
}
baca_suara();
//Serial.print("X: "); Serial.print(tick_yes); Serial.print(" "); //tampilkan sinyal
panjang nafas
//Serial.print("Y: "); Serial.print(tick_no); Serial.println(" "); // tampilkan sinyal
ada atau tidak ada nafas
//Serial.print("Jumlah nafas: ");
//Serial.println(count);
//Serial.println(tick_no);
delay(150);//bit rate sampling adc per 150 milli seconds
}
void baca_suara() { //fungsi baca suara
adc = analogRead(A3);
delay (20);
if (adc != zerro_sound) { //ambil waktu per micros ketika ada nafas
time_up = micros();
tick_yes = time_up - time_down_no;//kurangkan
} else { // ketika tidak ada nafas
time_down_no = micros();
tick_no = time_down_no - time_up;
if (tick_no > 200000) {
tick_no = 0;
if (hold == false) {
count++;
hold = true;
}
} else {
hold = false;
}
}
}

```

Lampiran 9. Program Arduino 2

```

// pin vin ; 3,3v
//pin gnd ; gnd
//pin scl ; pin A5
//pin sda ; PIN A4
#include <Wire.h>
#include "MAX30105.h"
#include "spo2_algorithm.h"
MAX30105 particleSensor;
#define MAX_BRIGHTNESS 255
#if defined(__AVR_ATmega328P__) || defined(__AVR_ATmega168__)
//Arduino Uno doesn't have enough SRAM to store 100 samples of IR led data
and red led data in 32-bit format
//To solve this problem, 16-bit MSB of the sampled data will be truncated.
Samples become 16-bit data.
uint16_t irBuffer[100]; //infrared LED sensor data
uint16_t redBuffer[100]; //red LED sensor data
#else
uint32_t irBuffer[100]; //infrared LED sensor data
uint32_t redBuffer[100]; //red LED sensor data
#endif

int32_t bufferLength; //data length
int32_t spo2; //SPO2 value
int8_t validSPO2; //indicator to show if the SPO2 calculation is valid
int32_t heartRate; //heart rate value
int8_t validHeartRate; //indicator to show if the heart rate calculation is valid

byte pulseLED = 11; //Must be on PWM pin
byte readLED = 13; //Blinks with each data read
long tahan;

```

```

void setup()
{
  Serial.begin(9600); // initialize serial communication at 115200 bits per second:
  pinMode(pulseLED, OUTPUT);
  pinMode(readLED, OUTPUT);
  // Initialize sensor
  if (!particleSensor.begin(Wire, I2C_SPEED_FAST)) //Use default I2C port,
400kHz speed
  {
    Serial.println(F("MAX30105 was not found. Please check wiring/power."));
    while (1);
  } {
    Serial.read();
    byte ledBrightness = 60; //Options: 0=Off to 255=50mA
    byte sampleAverage = 4; //Options: 1, 2, 4, 8, 16, 32
    byte ledMode = 2; //Options: 1 = Red only, 2 = Red + IR, 3 = Red + IR + Green
    byte sampleRate = 100; //Options: 50, 100, 200, 400, 800, 1000, 1600, 3200
    int pulseWidth = 411; //Options: 69, 118, 215, 411
    int adcRange = 4096; //Options: 2048, 4096, 8192, 16384

    particleSensor.setup(ledBrightness, sampleAverage, ledMode, sampleRate,
pulseWidth, adcRange); //Configure sensor with these settings
  }
}
void loop()
{ bufferLength = 100; //buffer length of 100 stores 4 seconds of samples running
at 25sps

  //read the first 100 samples, and determine the signal range
  for (byte i = 0 ; i < bufferLength ; i++)
    { while (particleSensor.available() == false) //do we have new data?

```

```

    particleSensor.check(); //Check the sensor for new data
    redBuffer[i] = particleSensor.getRed();
    irBuffer[i] = particleSensor.getIR();
    particleSensor.nextSample(); //We're finished with this sample so move to next
sample
    //Serial.print(F("red="));
    //Serial.print(redBuffer[i], DEC);
    //Serial.print(F(", ir="));
    //Serial.println(irBuffer[i], DEC);
    Serial.println("wait a moment");
}
//calculate heart rate and SpO2 after first 100 samples (first 4 seconds of
samples)
    maxim_heart_rate_and_oxygen_saturation(irBuffer, bufferLength, redBuffer,
&spo2, &validSPO2, &heartRate, &validHeartRate);
    //Continuously taking samples from MAX30102. Heart rate and SpO2 are
calculated every 1 second
    while (1)
    { //dumping the first 25 sets of samples in the memory and shift the last 75 sets
of samples to the top
        for (byte i = 25; i < 100; i++)
        {
            redBuffer[i - 25] = redBuffer[i];
            irBuffer[i - 25] = irBuffer[i];
        }
        //take 25 sets of samples before calculating the heart rate.
        for (byte i = 75; i < 100; i++)
        { while (particleSensor.available() == false) //do we have new data?
            particleSensor.check(); //Check the sensor for new data
            digitalWrite(readLED, !digitalRead(readLED)); //Blink onboard LED with
every data read

```

```

redBuffer[i] = particleSensor.getRed();
irBuffer[i] = particleSensor.getIR();
particleSensor.nextSample(); //We're finished with this sample so move to
next sample
//send samples and calculation result to terminal program through UART
//Serial.print(F("red="));
//Serial.print(redBuffer[i], DEC);
//Serial.print(F(", ir="));
//Serial.print(irBuffer[i], DEC);
//Serial.print(F(", HR="));
//Serial.println(heartRate, DEC);
//Serial.print(F(", HRvalid="));
//Serial.print(validHeartRate, DEC);
if ((millis() - tahan) > 1000) {
  Serial.print(F(" "));
  Serial.println(spo2 - 2, DEC);
  tahan = millis();
}
//Serial.print(F(", SPO2Valid="));
//Serial.print(validSPO2, DEC);
//delay(1000);
} //After gathering 25 new samples recalculate HR and SP02
maxim_heart_rate_and_oxygen_saturation(irBuffer, bufferLength, redBuffer,
&spo2, &validSPO2, &heartRate, &validHeartRate);
}
}

```

Lampiran 10. Program Raspberry Pi

```

import time
import serial
import firebase_admin

```



```

from firebase_admin import credentials
from firebase_admin import db
import time
from datetime import datetime
ser1 = serial.Serial('/dev/ttyACM0', baudrate = 9600, timeout=1)
ser = serial.Serial('/dev/ttyACM1', baudrate = 9600, timeout=1)
# Fetch the service account key JSON file contents
cred = credentials.Certificate('/home/pi/Downloads/credential.json')
# # Initialize the app with a service account, granting admin privileges
firebase_admin.initialize_app(cred, {
    'databaseURL': 'https://mlx90614-project-default-rtdb.asia-
southeast1.firebaseio.com'
})
# # As an admin, the app has access to read and write all data, regardless of
Security Rules
ref = db.reference("")
while True:
    saturasi = str(ser.readline().strip())
    saturasi = saturasi[2:-1]
    if saturasi != "wait a moment":
        nafas_suhu = str(ser1.readline().strip())
        nafas_suhu1 = nafas_suhu[2:-1]
        try:
            nafas, suhu = nafas_suhu1.split("|")
            print(nafas)
            users_ref = ref.child('data')
            users_ref.set({
                'kadar_o2' : saturasi,
                'temperature' : suhu,
                'jumlah_nafas' : nafas,
            })

```

```

    alls_ref = ref.child('realtime_data')
    now = datetime.now()
    dt_string = now.strftime("%d-%m-%Y %H:%M:%S")
    date, time = dt_string.split(" ")
    alls_ref.child(date).child(time).set({
        'kadar_o2' : saturasi,
        'temperature' : suhu,
        'jumlah_nafas' : nafas,
    })
except Exception as e:
    print(e)
else:
    print("wait a moment")

```

Lampiran 11. Program Website

```

{% load static % }
<!DOCTYPE html>
<html lang="en">
  <head>
    <meta charset="utf-8" />
    <meta name="viewport" content="width=device-width, initial-scale=1,
shrink-to-fit=no" />
    <meta name="description" content="" />
    <meta name="author" content="" />
    <meta http-equiv="refresh" content="{{ time }}" />
    <title>Business Frontpage - Start Bootstrap Template</title>
    <!-- Bootstrap icons-->
    <link href="https://cdn.jsdelivr.net/npm/bootstrap-
icons@1.4.1/font/bootstrap-icons.css" rel="stylesheet" />
    <!-- Core theme CSS (includes Bootstrap)-->
    <link href="../static/admin/css/styles.css" rel="stylesheet" />

```

```

<link href="../../static/vendor/css/button.css" rel="stylesheet" />
<link rel="stylesheet" href="https://use.typekit.net/rnz2bks.css">
  <script>document.documentElement.className="js";var
supportsCssVars=function(){var e,t=document.createElement("style");return
t.innerHTML="root: { --tmp-var: bold;
}";document.head.appendChild(t),e=!(window.CSS&&window.CSS.supports&&
window.CSS.supports("font-weight","var(--tmp-
var)")),t.parentNode.removeChild(t),e};supportsCssVars()||alert("Please view this
demo in a modern browser that supports CSS Variables.");</script>
  <script
src="//tympanus.net/codrops/adpacks/analytics.js"></script>
  <style>
      body #cdawrap {
          border: 1px solid #000;
          --cda-bottom: auto;
          --cda-right: 3.5rem;
          --cda-left: auto;
          --cda-text-align: right;
          --cda-width: 370px;
          border-radius: 6px;
          padding: 0.75rem 1rem 1rem;
          --footer-align: end;
          --cda-text-size: 0.875rem;
          --cda-footer-fontsize: 0.785rem;
          --cda-text-color: #000;
          position: absolute;
          transform: translateY(-150%);
      }
      @media screen and (max-width: 800px){
          body #cdawrap {
              transform: none;

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        border-radius: 0px;
    }
}
</style>
</head>
<body>
  <!-- Responsive navbar-->
  <nav class="navbar navbar-expand-lg navbar-dark bg-dark">
    <div class="container px-5">
      <a class="navbar-brand" href="#">Fadlan Bahar (H021171009)</a>
      <button class="navbar-toggler" type="button" data-bs-
toggle="collapse" data-bs-target="#navbarSupportedContent" aria-
controls="navbarSupportedContent" aria-expanded="false" aria-label="Toggle
navigation"><span class="navbar-toggler-icon"></span></button>
      <div class="collapse navbar-collapse" id="navbarSupportedContent">
        <ul class="navbar-nav ms-auto mb-2 mb-lg-0">
          <li class="nav-item"><a class="nav-link active" aria-
current="page" href="#">Home</a></li>
        </ul>
      </div>
    </div>
  </nav>
  <!-- Header-->
  <header class="bg-dark py-5">
    <div class="container px-5">
      <div class="row gx-5 justify-content-center">
        <div class="col-lg-6">
          <div class="text-center my-5">
            <h1 class="display-5 fw-bolder text-white mb-2">MADICINE
</h1>

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        <h1 class="display-5 fw-bolder text-white mb-2"> Caring your
health </h1>
        </div>
    </div>
</div>
</div>
</header>
<!-- Features section-->
<section class="py-3 border-bottom" id="features">
    <div class="container px-5">
        <p>Tanggal/Waktu: <span id="tanggalwaktu"></span></p>
        <div class="row mb-2 text-center justify-content-center">
            <div class="col-md-3">
                <a href="{% url 'base' 99999999 %}" class="text-white">
                    <button class="button button--mimas">
                        <span>Do No Refresh</span>
                    </button>
                </a>
            </div>
            <div class="col-md-3">
                <a href="{% url 'base' 1 %}" class="text-white">
                    <button class="button button--mimas">
                        <span>Refresh</span>
                    </button>
                </a>
            </div>
        </div>
        <div class="row gx-5">
            <div class="col-lg-4 mb-5 mb-lg-0">
                <div class="feature bg-primary bg-gradient text-white rounded-3
mb-3">

```

```

        <i class="bi bi-wind"></i>
    </div>
    <h1>{{jumlah_nafas}} RPM</h1>
    <h2 class="h4 fw-bolder">Jumlah Nafas</h2>
    <p>Some Description</p>
    <p>Frekuensi jumlah pernapasan manusia dewasa normal dan
sehat berkisar di 12-20 kali permenit</p>
    <a class="text-decoration-none" href="{% url 'redirect' %}">
        Call to action
        <i class="bi bi-arrow-right"></i>
    </a>
</div>
<div class="col-lg-4 mb-5 mb-lg-0">
    <div class="feature bg-primary bg-gradient text-white rounded-3
mb-3"><i class="bi bi-thermometer-half"></i></div>
    <h1>{{temp}} &deg;C</h1>
    <h2 class="h4 fw-bolder">Suhu</h2>
    <p>Some Description</p>
    <p>suhu normal tubuh manusia berada pada rentang 36,5-37,5
°C</p>
    <a class="text-decoration-none" href="#">
        Call to action
        <i class="bi bi-arrow-right"></i>
    </a>
</div>
<div class="col-lg-4">
    <div class="feature bg-primary bg-gradient text-white rounded-3
mb-3"><i class="bi bi-suit-heart"></i></div>
    <h1>{{kadar_o2}}%</h1>
    <h2 class="h4 fw-bolder">Kadar Oksigen</h2>
    <p>Some Description</p>

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    <p>Kadar oksigen manusia normal dan sehat berada di sekitar 95-
100%</p>
    <a class="text-decoration-none" href="#">
      Call to action
      <i class="bi bi-arrow-right"></i>
    </a>
  </div>
</div>
</div>
</section>
<!-- Footer-->
<footer class="py-5 bg-dark">
  <div class="container px-5"><p class="m-0 text-center text-
white">Copyright &copy; Panjang Umur Orang Baik</p></div>
</footer>
<!-- Bootstrap core JS-->
<script
src="https://cdn.jsdelivr.net/npm/bootstrap@5.1.3/dist/js/bootstrap.bundle.min.js"
></script>
<!-- Core theme JS-->
<script src="../static/vendor/js/scripts.js"></script>
<!-- * * * * *
*-->
<!-- * *
          SB Forms JS
          * *-->
<!-- * * Activate your form at https://startbootstrap.com/solution/contact-
forms * *-->
<!-- * * * * *
*-->

```