

## LAMPIRAN

### Codingan Arduino :

```
//include library Timer
#include <Timer.h>

//include library MAX30102
#include <Wire.h>
#include <MAX30105.h>
#include <heartRate.h>

//include library wifi
#include <ESP8266WiFi.h>
#include <ESP8266HTTPClient.h>

//sediakan variabel untuk SSID dan password wifi
char ssid[] = "amry";
char pass[] = "23102000a";

//buat sebuah object untuk sensor MAX30102
MAX30105 sensorOximeter ;

//buat variabel untuk menghitung detak jantung
const byte RATE_SIZE = 4 ;
byte rates[RATE_SIZE] ; //array detak jantung
byte rateSpot = 0;
long lastBeat = 0;

float beatPerMinute ;
int beatAvg ; //rata-rata denyut jantung per menit
```

```

//sediakan variabel object untuk timer
Timer t ;

//sediakan variabel penampung untuk data yang akan
dikirim
String datakirim ;

//sediakan variabel untuk IP address server
const char* server = "192.168.62.222";

void setup() {
  Serial.begin(115200);
  //jika sensor oximeter / MAX30102 tidak berjalan
dengan baik
  if(!sensorOximeter.begin(Wire, I2C_SPEED_FAST))
  {
    Serial.println("MAX30102 Tidak Ditemukan") ;
    while(1); // kunci supaya terus dilakukan
pengecekan
  }

  // kondisi apabila sensor terdeteksi dengan baik
  Serial.println("Silahkan letakkan Jari Anda di atas
sensor sambil ditekan sedikit");

  //setup sensor oximeter
  sensorOximeter.setup();
  sensorOximeter.setPulseAmplitudeRed(0x0A);
//mengaktifkan lampu warna merah pada sensor sebagai
indikasi sensor berjalan
  sensorOximeter.setPulseAmplitudeGreen(0); //matikan
lampu hijaunya

```

```

//setup koneksi wifi
WiFi.begin(ssid, pass);
//uji proses koneksi ke wifi
while(WiFi.status() != WL_CONNECTED) //selama
belum/tidak terkoneksi
{
    Serial.print(".");
    delay(500);
}
//apabila sudah terkoneksi
Serial.println("Terkoneksi ke WiFi");

//kirim data setiap 2 detik
t.every(2000, kirimdata);
}

void kirimdata ()
{
    //buat object client untuk terhubung ke webserver
    apache
    WiFiClient client ;
    int port = 80 ;
    //cek koneksi ke webserver 192.168.1.9
    if(!client.connect(server, port))
    {
        Serial.println("Koneksi ke server gagal");
        return ;
    }

    //kondisi apabila berhasil konek ke webserver
    //melakukan pengiriman data ke database
    String Link ;
    HTTPClient http ;

```

```

//ini variabel link dengan URL untuk mengeksekusi
penyimpanan nilai sensor ke database
Link = "http://" + String(server) +
"/DeteksiPenyakitJantung/kirimdata.php?data=" +
data kirim;
//eksekusi isi variabel Link
http.begin(client, Link);
http.GET() ;
String respon = http.getString();
Serial.println(respon);
http.end();
}

void loop() {
//update timer
t.update();

//baca sensor infrared untuk mengetahui ada jari atau
tidak 3.0.2
long irValue = sensorOximeter.getIR();
if(checkForBeat(irValue) == true)
{
//penggunaan millis
long delta = millis() - lastBeat ;
lastBeat = millis();

//hitung beat per menit
beatPerMinute = 60 / (delta / 1000.0) ;

//uji BPM
if(beatPerMinute < 255 && beatPerMinute > 20) //20
- 255

```

```

{
    rates[rateSpot++] = (byte)beatPerMinute ;
    rateSpot %= RATE_SIZE; //memecah variabel

    //baca rata-rata BPM
    beatAvg = 0;
    for(byte x = 0; x < RATE_SIZE; x++)
    {
        //total semua nilai BPM dalam array
        beatAvg += rates[x] ;
    }

    //hitung rata-rata
    beatAvg /= RATE_SIZE ;
}

//tampilkan nilai sensor
Serial.print("IR = " + String(irValue));
Serial.print(", BPM = " + String(beatPerMinute));
Serial.print(", AVG BPM = " + String(beatAvg));

//uji apakah ada finger / jadi pada sensor
if(irValue < 50000)
{
    Serial.print(", Letakkan Jari");
    data kirim = "LetakkanJari";
    beatPerMinute = 0;
    beatAvg = 0;
}
else
{
    data kirim = String(beatAvg);
}

```

```
}  
  
Serial.println();  
}
```

### **Codingan Website Deteksi Penyakit Jantung :**

```
<?php  
include 'fuzzifikasi.php';  
include 'get_rules.php';  
include 'inferensi.php';  
include 'defuzzyfikasi.php';  
?>  
  
<!DOCTYPE html>  
<html lang="en">  
  <head>  
    <!-- Required meta tags -->  
    <meta charset="utf-8" />  
    <meta  
      name="viewport"  
      content="width=device-width, initial-scale=1,  
shrink-to-fit=no"  
    />  
  
    <!-- Bootstrap CSS -->  
    <link  
      rel="stylesheet"  
  
href="https://cdn.jsdelivr.net/npm/bootstrap@4.6.1/dist  
/css/bootstrap.min.css"  
      integrity="sha384-  
zCbKRCUGaJDkqS1kPbPd7TveP5iyJE0EjAuZQTgFLD2ylzuqKfdKlfg  
/eSrtxUkn"
```

```

        crossorigin="anonymous"
    />

    <!-- Style CSS -->
    <link href="style.css" rel="stylesheet" />
    <link rel="shortcut icon" href="img/Logo.jpg" />

    <script src="jquery/jquery.min.js"></script>

    <script type="text/javascript">
        $(document).ready(function() {
            setInterval(function() {
                $("#cekdetakjantung").load('cekdetakjantung.php');
                $("#cekstatus").load('cekstatus.php');
            }, 1000) ;
        }) ;
    </script>

    <title>Deteksi Penyakit Jantung</title>
</head>
<body>
    <div class="px-5">
        <nav class="navbar navbar-expand-lg navbar-light">
            <a class="navbar-brand" href="index.php">
                </a>
                <div class="collapse navbar-collapse">
                    <ul class="navbar-nav mr-auto">
                        <li class="nav-item">
                            <a class="nav-link"
href="rules.php">Rules Fuzzy</a>
                        </li>
                        <li class="navbar-nav mr-auto">

```

```

        <a class="nav-link"
href="panduan.php">Panduan Penggunaan</a>
    </li>
</ul>
</div>
</nav>
</div>
<div class="jumbotron jumbotron-fluid mb-5">
    <div class="container p-5">
        <h1 class="display-5">Deteksi Penyakit Jantung
Dini</h1>
        <p class="lead">
            Terdapat beberapa gejala yang harus diisi
            untuk menentukan penyakit jantung dini.
        </p>
    </div>
</div>
<div class="container mt-5">
    <form action="deteksi.php" method="POST">
        <div style="justify-content: center; display:
flex;">
            <div class="card" style ="width: 50%; text-align:
center;">
                <div class="card-header">
                    <label for="inlineFormInputGroup">Detak
Jantung :</label>
                </div>
                <div class="card-body">
                    <h1 style="font-size: 30px; font-weight:
bold">

```



```

        <span
id="cekdetakjantung">LetakkanJari</span> <span
style="font-size: 20px">BPM</span></h1>
    </div>
    <div class="card-footer">
        <div class="input-group mb-4">
            <input
                type="number"
                name="detakjantung"
                class="form-control"
                id="inlineFormInputGroup"
                placeholder="Masukkan Pengukuran 30 -
200 Bpm"
                required/>
            <div class="input-group-prepend">
                <div class="input-group-text">Bpm</div>
            </div>
        </div>
    </div>
</div><br>
    <div class="row">
        <div class="col-md-6">
            <label for="inlineFormInputGroup">Kadar
Gula Darah :</label>
            <div class="input-group mb-4">
                <input
                    type="number"
                    min="30"
                    max="500"
                    name="kadargula"
                    class="form-control"
                    id="inlineFormInputGroup"

```

```

placeholder="Masukkan Pengukuran 30 -
500 mg/dL"
    required/>
    <div class="input-group-prepend">
        <div class="input-group-
text">mg/dL</div>
    </div>
</div>
<label for="inlineFormInputGroup">Tekanan
Darah :</label>
<div class="input-group mb-4">
<input
    type="number"
        min="30"
        max="300"
        name="tekanandarah"
        class="form-control"
        id="inlineFormInputGroup"
        placeholder="Masukkan Pengukuran 30 -
300 mmHg"
    required/>
    <div class="input-group-prepend">
        <div class="input-group-
text">mmHg</div>
    </div>
</div>
</div>
<div class="col-md-6">
    <label for="inlineFormInputGroup">Kolestrol
:</label>
    <div class="input-group mb-4">
        <input
            type="number"

```

```

        min="50"
        max="400"
        name="kolestrol"
        class="form-control"
        id="inlineFormInputGroup"
        placeholder="Masukkan Pengukuran 50 -
280 mg/dL"

        required/>
<div class="input-group-prepend">
    <div class="input-group-
text">mg/dL</div>
</div>
</div>
<label for="inlineFormInputGroup">Berat
Badan (Index Massa Tubuh) :</label>
<div class="input-group justify-content-
between">
    <div class="sm-2">
        <div class="input-group-prepend">
            <input
                type="number"
                name="beratbadan"
                class="form-control"
                id="inlineFormInputGroup"
                placeholder="Berat Badan"
            >
            required/>
        <div class="input-group-text">kg</div>
    </div>
</div>
<div class="sm-2">
    <div class="input-group-prepend">
        <input
            type="text"

```

```

        name="tinggibadan"
        class="form-control"
        id="inlineFormInputGroup"
        placeholder="Tinggi Badan"
        required/>
    <div class="input-group-text">cm</div>
</div>
</div>
</div>
</div>
<div class="col-md-6">
    <button type="submit" name="submit_detail"
value="submit_detail" class="btn btn-
primary">Submit</button>
</div>
</div>
</div>
</form>
<br>
<br>
<?php if (isset($_POST['submit_detail'])) : ?>
    <?php
        $temp_detakjantung = $_POST['detakjantung'];
        $temp_kadargula = $_POST['kadargula'];
        $temp_tekanandarah = $_POST['tekanandarah'];
        $temp_kolestrol = $_POST['kolestrol'];
        $temp_beratbadan = $_POST['beratbadan'] / pow
($_POST['tinggibadan'], 2);
        $detakjantung = detakjantung($temp_detakjantung);
        $kadargula = kadargula($temp_kadargula);
        $tekanandarah = tekanandarah($temp_tekanandarah);
        $kolestrol = kolestrol($temp_kolestrol);

```

```

    $beratbadan = beratbadan($temp_beratbadan);?>
<div class="container-md">
    <div class="card border-info">
        <div class="card-header header-elements-inline">
            <h5 class="card-title font-weight-bold">Nilai
Input</h5>
            <div class="header-elements">
                <div class="list-icons">
                    <a class="list-icons-item" data-
action="collapse"></a>
                </div>
            </div>
            <div class="card-body">
                <div class="table-responsive">
                    <table class="table table-striped">
                        <thead>
                            <tr>
                                <th class="text-uppercace
font-weight-bold">Detak Jantung</th>
                                <th class="text-uppercace
font-weight-bold">Kadar Gula</th>
                                <th class="text-uppercace
font-weight-bold">Tekanan Darah</th>
                                <th class="text-uppercace
font-weight-bold">Kolestrol</th>
                                <th class="text-uppercace
font-weight-bold">Berat Badan</th>
                            </tr>
                        </thead>
                        <tbody>
                            <tr>
                                <td><?= $temp_detakjantung ?></td>

```

```

        <td><?= $temp_kadargula ?></td>
        <td><?= $temp_tekanandarah ?></td>
        <td><?= $temp_kolestrol ?></td>
        <td><?= $temp_beratbadan ?></td>
    </tr>
</tbody>
</table>
</div>
</div>
<br><br>
<!-- Nilai Fuzzyfikasi -->
<div class="card border-info">
    <div class="card-header header-elements-inline">
        <h5 class="card-title font-weight-bold">Nilai
Fuzzyfikasi</h5>
        <div class="header-elements">
            <div class="list-icons">
                <a class="list-icons-item" data-
action="collapse"></a>
            </div>
        </div>
    </div>
</div>
<div class="card-body">
    <div class="row">
        <div class="col-lg-4">
            <div class="table-responsive">
                <table class="table table-striped">
                    <p class="text-uppercase text-
center font-weight-bold">Detak Jantung</p>
                    <thead>
                        <tr>

```

```

                <th class="text-uppercase
font-weight-bold">NILAI</th>
                <th class="text-uppercase
font-weight-bold">KETERANGAN</th>
            </tr>
        </thead>
        <tbody>
            <?php $no = 1;
            foreach ($detakjantung as $vals) : ?>
                <tr>
                    <td class="text-uppercase"><?=
$vals['nilai'] ?></td>
                    <td class="text-uppercase"><?=
$vals['kategori'] ?></td>
                </tr>
            <?php endforeach; ?>
        </tbody>
    </table>
</div>
</div>
<div class="col-lg-4">
    <div class="table-responsive">
        <table class="table table-striped">
            <p class="text-uppercase text-center
font-weight-bold">Kadar Gula</p>
            <thead>
                <tr>
                    <th class="text-uppercase font-
weight-bold">NILAI</th>
                    <th class="text-uppercase font-
weight-bold">KETERANGAN</th>
                </tr>
            </thead>

```

```

        <tbody>
        <?php $no = 1;
        foreach ($kadargula as $vals) : ?>
        <tr>
            <td class="text-uppercse"><?=$vals['nilai'] ?></td>
            <td class="text-uppercse"><?=$vals['kategori'] ?></td>
        </tr>
        <?php endforeach; ?>
    </tbody>
</table>
</div>
</div>
<div class="col-lg-4">
    <div class="table-responsive">
        <table class="table table-striped">
            <p class="text-uppercse text-center font-weight-bold">Tekanan Darah</p>
            <thead>
            <tr>
                <th class="text-uppercse font-weight-bold">NILAI</th>
                <th class="text-uppercse font-weight-bold">KETERANGAN</th>
            </tr>
            </thead>
            <tbody>
            <?php $no = 1;
            foreach ($tekanandarah as $vals) : ?>
            <tr>
                <td class="text-uppercse"><?=$vals['nilai'] ?></td>

```



```

                <td class="text-uppercasse"><?=
$vals['kategori'] ?></td>
            </tr>
        <?php endforeach; ?>
    </tbody>
</table>
</div>
</div>
<div class="col-lg-6">
    <div class="table-responsive">
        <table class="table table-striped">
            <p class="text-uppercasse text-center
font-weight-bold">Kolestrol</p>
            <thead>
                <tr>
                    <th class="text-uppercasse font-
weight-bold">NILAI</th>
                    <th class="text-uppercasse font-
weight-bold">KETERANGAN</th>
                </tr>
            </thead>
            <tbody>
                <?php $no = 1;
foreach ($kolestrol as $vals) : ?>
                <tr>
                    <td class="text-uppercasse"><?=
$vals['nilai'] ?></td>
                    <td class="text-uppercasse"><?=
$vals['kategori'] ?></td>
                </tr>
                <?php endforeach; ?>
            </tbody>
        </table>
    </div>
</div>

```

```

        </div>
</div>
    <div class="col-lg-6">
        <div class="table-responsive">
            <table class="table table-striped">
                <p class="text-uppercase text-center font-weight-bold">Berat Badan</p>
                <thead>
                    <tr>
                        <th class="text-uppercase font-weight-bold">NILAI</th>
                        <th class="text-uppercase font-weight-bold">KETERANGAN</th>
                    </tr>
                </thead>
                <tbody>
                    <?php $no = 1;
                    foreach ($beratbadan as $vals) : ?>
                        <tr>
                            <td class="text-uppercase"><?=$vals['nilai'] ?></td>
                            <td class="text-uppercase"><?=$vals['kategori'] ?></td>
                        </tr>
                    <?php endforeach; ?>
                </tbody>
            </table>
        </div>
    </div>
</div>
<!-- Rules yang digunakan -->
    <div class="card border-info">

```

```

<div class="card-header header-elements-
inline">
    <h5 class="card-title font-weight-
bold">Rules Yang Digunakan</h5>
    <div class="header-elements">
        <div class="list-icons">
            <a class="list-icons-item"
data-action="collapse"></a>
        </div>
    </div>
</div>
<div class="card-body">
    <div id="tabel">
        <div class="table-responsive" >
            <table class="table table-striped">
                <thead>
                    <tr>
                        <th class="text-uppercase
font-weight-bold">#</th>
                        <th class="text-uppercase
font-weight-bold">Detak Jantung</th>
                        <th class="text-uppercase
font-weight-bold">Kadar Gula</th>
                        <th class="text-uppercase
font-weight-bold">Tekanan Darah</th>
                        <th class="text-uppercase
font-weight-bold">Kolestrol</th>
                        <th class="text-uppercase
font-weight-bold">Berat Badan</th>
                        <th class="text-uppercase
font-weight-bold">Output</th>
                    </tr>
                </thead>

```

```

        <tbody>
            <?php $tabel =
inferensi($detakjantung, $kadargula,$tekanandarah,
$kolestrol, $beratbadan);
            ?>
        </tbody>
    </table>
</div>
</div>

<!-- Nilai Terindikasi -->
<div class="card border-success">
    <div class="card-header header-elements-inline">
        <h5 class="card-title font-weight-bold">Nilai
Output / Defuzzifikasi</h5>
        <div class="header-elements">
            <div class="list-icons">
                <a class="list-icons-item" data-
action="collapse"></a>
            </div>
        </div>
    </div>
    <div class="card-body">
        <h4 class=" text-uppercase font-weight-bold"><?php
$def = defuzzifikasil($tabel); ?></h4>
    </div>
</div>
<?php endif; ?>
</div>
</body>
</html>

```