APPENDIX

CODING PEHITUNGAN

```
#include <PulseSensorPlayground.h>
#include <Adafruit_MLX90614.h>

LiquidCrystal_I2C lcd(0x27,20,4);


Adafruit_MLX90614 mlx = Adafruit_MLX90614();

const int PulseWire = 0;        // PulseSensor PURPLE WIRE connected to ANALOG PIN 0
int Threshold = 550;
int trig = 11;           // membuat varibel trig yang di set ke-pin 3
int echo = 12;            // membuat variabel echo yang di set ke-pin 2
int relay = 6;
long durasi, jarak;     // membuat variabel durasi dan jarak
PulseSensorPlayground pulseSensor;

float nadi, suhu;
float A, B;

float udingin[] = {30, 30, 35};
float unormal[] = {34, 36, 38};
float upanas[] = {38, 40, 40};

float ulambat[] = {50, 50, 60};
float usedang[] = {59, 60, 101};
float ucepat[] = {101, 120, 120};

float sakit = 0;
float ks = 0.5;
float sehat = 1;

float minr[10];
float Rule[10];
```

CODING FUZZYFIKASI

```
float fudingin()
{
  if (suhu < udingin[1])
  {
    return 1;
  }
  else if (suhu >= udingin[1] && suhu <= udingin[2])
  {
    return (udingin[2] - suhu) / (udingin[2] - udingin[1]);
  }
  else if (suhu > udingin[2])
  {
    return 0;
```

```
47   }
48 }
49
50 float funormal()
51 {
52   if (suhu < unormal[0])
53   {
54     return 0;
55   }
56   else if (suhu >= unormal[0] && suhu <= unormal[1])
57   {
58     return (suhu - unormal[0]) / (unormal[1] - unormal[0]);
59   }
60   else if (suhu >= unormal[1] && suhu < unormal[2])
61   {
62     return (unormal[2] - suhu) / (unormal[2] - unormal[1]);
63   }
64   else if (suhu > unormal[2])
65   {
66     return 0;
67   }
68 }
69
70 float fupanas()
71 {
72   if (suhu < upanas[0])
73   {
74     return 0;
75   }
76   else if (suhu >= upanas[0] && suhu <= upanas[1])
77   {
78     return (suhu - upanas[0]) / (upanas[1] - upanas[0]);
79   }
80   else if (suhu > upanas[1])
81   {
82     return 1;
83   }
84 }
85
86     float fulambat()
87 {
88   if (nadi < ulambat[1])
89   {
90     return 1;
91   }
92   else if (nadi >= ulambat[1] && nadi <= ulambat[2])
93   {
94     return (ulambat[2] - nadi) / (ulambat[2] - ulambat[1]);
95   }
96   else if (nadi > ulambat[2])
97   {
98     return 0;
99   }
100      }
101
102      float fusedang()
103      {
104        if (nadi < usedang[0])
105        {
```

```
106           return 0;
107         }
108         else if (nadi >= usedang[0] && nadi <= usedang[1])
109         {
110           return (nadi - usedang[0]) / (usedang[1] - usedang[0]);
111         }
112         else if (nadi >= usedang[1] && nadi <= usedang[2])
113         {
114           return (usedang[2] - nadi) / (usedang[2] - usedang[1]);
115         }
116         else if (nadi > usedang[2])
117         {
118           return 0;
119         }
120       }
121
122       float fucepat()
123       {
124         if (nadi <= ucepat[0])
125         {
126           return 0;
127         }
128         else if (nadi > ucepat[0] && nadi < ucepat[1])
129         {
130           return (nadi - ucepat[0]) / (ucepat[1] - ucepat[0]);
131         }
132         else if (nadi >= ucepat[1])
133         {
134           return 1;
135         }
136       }
137
138       float Min(float a, float b)
139       {
140         if (a < b)
141         {
142           return a;
143         }
144         else if (b < a)
145         {
146           return b;
147         }
148         else
149         {
150           return a;
151         }
152       }
```

CODING RULES

```
153     void rule()
154     {
155       // if suhu dingin and nadi lambat then kurang sehat
156       minr[1] = Min(fudingin(), fulambat());
157       Rule[1] = ks;
158       // if suhu dingin and nadi sedang then kurang sehat
159       minr[2] = Min(fudingin(), fusedang());
160       Rule[2] = ks;
161       // if suhu dingin and nadi cepat then sakit
162       minr[3] = Min(fudingin(), fucepat());
163       Rule[3] = sakit;
164       // if suhu normal and nadi lambat then kurang sehat
165       minr[4] = Min(funormal(), fulambat());
166       Rule[4] = ks;
167       // if suhu normal and nadi sedang then sehat
168       minr[5] = Min(funormal(), fusedang());
169       Rule[5] = sehat;
170       // if suhu normal and nadi cepat then kurang sehat
171       minr[6] = Min(funormal(), fucepat());
172       Rule[6] = ks;
173       // if suhu panas and nadi lambat then kurangg sehat
174       minr[7] = Min(fupanas(), fulambat());
175       Rule[7] = ks;
176       // if suhu panas and nadi sedang then kurang sehat
177       minr[8] = Min(fupanas(), fusedang());
178       Rule[8] = ks;
179       // if suhu panas and nadi cepat then kurang sehat
180       minr[9] = Min(fupanas(), fucepat());
181       Rule[9] = ks;
182     }
```

CODING DEFUZZYFIKASI

```
183     float defuzzyfikasi()
184     {
185       rule();
186       A = 0;
187       B = 0;
188
189       for (int i = 1; i <= 9; i++)
190       {
191         // printf("Rule ke %d = %f\n", i, Rule[i]);
192         // printf("Min ke %d = %f\n", i, minr[i]);
193         A += Rule[i] * minr[i];
194         B += minr[i];
195       }
196       // printf("Hasil A : %f\n", A);
197       // printf("Hasil B : %f\n", B);
198       return A / B;
199     }
```

CODING SETUP

```
200      void setup() {
201        Serial.begin(9600);
202        lcd.init();
203        pinMode(trig, OUTPUT);    // set pin trig menjadi OUTPUT
204        pinMode(echo, INPUT);     // set pin echo menjadi INPUT
205        pinMode(relay, OUTPUT);
206
207          if (!mlx.begin()) {
208              Serial.println("Error connecting to MLX sensor. Check
             wiring.");
209            while (1);
210          };
211
212        pulseSensor.analogInput(PulseWire);
213        pulseSensor.setThreshold(Threshold);
214
215          if (pulseSensor.begin()) {
216
217            lcd.backlight();
218            lcd.setCursor(0,0);
219            lcd.print("Silahkan Cek");
220            lcd.setCursor(0,1);
221            lcd.print("Suhu & Nadi");
222            Serial.println("== Cek Suhu Tubuh && Nadi ==");
223          }
224      }
```

CODING LOOP

```
225      void loop()
226      {
227      suhu    =    -0.015*mlx.readObjectTempC()*mlx.readObjectTempC()
         +1.815*mlx.readObjectTempC()-7.861;
228      int myBPM = pulseSensor.getBeatsPerMinute();
229
230        if (pulseSensor.sawStartOfBeat()) {
231        nadi = myBPM;
232
233        //suhu = 37;
234        //nadi = 70;
235        lcd.clear();
236        lcd.backlight();
237        lcd.setCursor(0,0);
238        lcd.print("Suhu:");
239        lcd.print(suhu);
240        Serial.print("Suhu :");
241        Serial.print(suhu);
242        lcd.setCursor(0,1);
243        lcd.print("Nadi:");
244        lcd.println(nadi);
245        Serial.print("\tNadi : ");
246        Serial.print(nadi);
247        delay(5000);
248
```

```
249         float keputusan = defuzzyfikasi();
250         String msg;
251 
252         Serial.print("Hasil Defuzzyfikasi : ");
253         Serial.println(keputusan);
254         lcd.clear();
255         lcd.setCursor(0,0);
256         lcd.print("Kondisi Anda");
257 
258 
259         if (keputusan == 0) {
260           msg = "Sakit";
261         } else if (keputusan == 0.5) {
262           msg = "Kurang Sehat";
263         } else if (keputusan == 1) {
264           msg = "Sehat";
265         }
266         Serial.println(msg);
267         lcd.setCursor(0,1);
268         lcd.print(" ");
269         lcd.print(msg);
270         delay(5000);
271         }
272 
273         digitalWrite(trig, LOW);
274         delayMicroseconds(8);
275         digitalWrite(trig, HIGH);
276         delayMicroseconds(8);
277         digitalWrite(trig, LOW);
278         delayMicroseconds(8);
279 
280         durasi = pulseIn(echo, HIGH); // menerima suara ultrasonic
281         jarak = (durasi / 2) / 29.1;
282 
283         if(jarak < 5)
284         {
285           digitalWrite (relay, LOW);
286           delay(1000); digitalWrite(relay, HIGH);
287         }
288 
289 
290       }
```

PLAGIARISM CHECK.ORG

8.46% PLAGIARISM APPROXIMATELY

1.99% IN QUOTES

Report #14119671

INTRODUCTION Background Maintaining a healthy body is the duty of each of us, both young and old. To maintain a healthy body can be done in various ways such as exercise and eating healthy foods. Health according to the World Health Organization (WHO) is perfect health, physically fit, free from disease and disability, and spiritually and socially healthy. A person's health can be determined through many factors. To find out whether the health intensity has been reached, an indicator of pulse rate and body temperature that is healthy and in accordance with normal human standards can be used. To know a person's health, one can measure the pulse in certain parts such as the wrist, but this is not necessarily effective and accurate. So body temperature is a vital condition that must be monitored to avoid hypothermia and hyperthermia. The health monitoring system is a system designed to determine the user's health condition by measuring the pulse and body temperature which is then used as a decision-making