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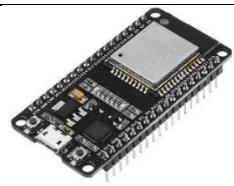
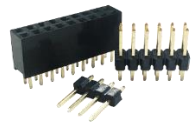
LAMPIRAN

Lampiran 1. Peralatan Penelitian

No	Nama Peralatan	Gambar
1.	Sensor ECG AD8232	
2.	Sensor *flex* 4.5”	
3.	Arduino Uno	
4.	ESP32	
5.	Pulse oximeter	
6.	Mistar busur	
7.	Elektroda sensor ECG	
8.	Resistor 22k	

9.	Kabel jumper	
10.	Terminal blok	
11.	*Print Circuit Board* (PCB)	
12.	Laptop	
13.	Pin header	
14.	Sarung tangan	

Lampiran 2. Data kalibrasi sensor ECG AD8232

Pulse Fingertip **(bpm)**	**Sensor ECG (bpm)**	**Erorr (%)**
90	90	0
90	90	0
89	85	-4,7
88	89	1,1
90	91	1,0
93	90	-3,3
83	83	0
91	93	2,1
78	81	3,7
76	75	-1,3
70	71	1,4
73	73	0
70	73	4,1
72	72	0
74	76	2,6
Rata – rata e*rorr*		**0,4**
Nilai akurasi		**99,6 %**

Lampiran 3. Data kalibrasi sensor sensor *flex* 1

Penggaris Busur (°)	Sensor Flex (°)	Erorr (%)
0	-0,76	0,00
5	5,65	12,92
10	10,05	0,47
15	15,21	1,42
20	19,52	-2,41
25	24,88	-0,50
30	30,23	0,78
35	35,11	0,32
40	39,99	-0,02
45	45,06	0,14
50	50,04	0,07
55	55,30	0,54
60	60,75	1,25
65	65,06	0,09
70	69,74	-0,36
75	73,48	-2,03
80	81,03	1,29
85	84,57	-0,50
90	90,03	0,03
Rata – rata e*rorr*		**0,71**
Nilai akurasi		**99,29 %**

Lampiran 4. Data kalibrasi sensor sensor *flex* 2

Penggaris Busur (°)	Sensor Flex (°)	Erorr (%)
0	-2,75	0,00
5	5,58	11,68
10	11,06	10,64
15	15,23	1,55
20	20,36	1,78
25	25,78	3,10
30	30,30	1,01
35	34,77	-0,66
40	40,96	2,41
45	43,46	-3,41
50	50,85	1,70
55	55,50	0,90
60	60,56	0,93
65	65,80	1,23
70	69,25	-1,07
75	74,44	-0,75
80	80,09	0,12
85	84,74	-0,31
90	89,27	-0,82
Rata – rata e*rorr*		**1,58**
Nilai akurasi		**98,42 %**

Lampiran 5. Data pengujian QoS pada ruang tertutup

Jarak (m)	Delay (ms)
0	133
2	134
4	136
6	139
8	254
Rata-rata	**159,2**

Lampiran 6. Data pengujian QoS pada ruang terbuka

Jarak (m)	Delay (ms)
0	134
2	135
4	135
6	135
8	135
10	136
12	136
14	136
16	136
18	137
20	137
22	137
24	139
26	139
28	141
30	149
Rata-rata	**137,3**

Lampiran 7. Data hasil pengukuran pada pasien A

Waktu (min)	Detak Jantung (bpm)	Flex Kanan (°)	Flex Kiri (°)
1	81	0	11
2	71	5	28
3	78	3	28
4	57	0	0
5	67	47	1
6	52	18	18
7	54	37	32
8	53	29	47
9	48	37	64
10	52	96	80
11	52	4	1
12	53	39	21
13	47	29	14
14	47	23	14
15	51	35	18
16	54	22	10
17	68	9	4
18	68	17	9
19	59	15	12
20	54	9	4
21	51	21	9
22	56	13	9
23	55	24	5
24	51	20	13
25	46	14	4
26	53	19	13
27	53	27	13
28	52	22	12
29	47	25	7
30	51	20	12
31	58	25	7
32	48	20	12
33	45	14	8
34	53	14	3
35	45	12	5
36	52	18	6
37	57	17	9
38	50	28	49
39	50	56	34
40	51	58	41
41	52	0	10
42	51	15	0
43	49	0	0
44	52	0	0

dst.

Lampiran 8. Data hasil pengukuran pada pasien B

Waktu (min)	Detak Jantung (bpm)	Flex Kanan (°)	Flex Kiri (°)
1	70	2	1
2	72	3	2
3	67	1	3
4	62	14	13
5	64	14	15
6	66	16	13
7	66	14	14
8	66	2	2
9	61	4	3
10	69	2	3
11	60	3	1
12	55	14	12
13	53	0	14
14	53	0	0
15	54	0	0
16	55	0	0
17	60	0	0
18	51	0	0
19	53	0	0
20	53	0	0
21	54	0	0
22	54	0	0
23	67	0	0
24	58	0	0
25	60	0	0
26	60	0	0
27	59	0	0
28	57	0	0
29	57	0	0
30	56	0	0
31	56	0	0
32	56	0	0
33	55	0	0
34	62	0	0
35	57	0	0
36	57	0	0
37	65	0	0
38	61	0	0
39	61	0	0
40	62	0	0
41	59	0	0
42	59	0	0
43	58	0	0
44	60	0	0

dst.

Lampiran 9. Data hasil pengukuran pada pasien C

Waktu (min)	Detak Jantung (bpm)	Flex Kanan (°)	Flex Kiri (°)
1	65	13	8
2	62	17	15
3	63	33	27
4	62	33	27
5	70	39	36
6	61	28	25
7	61	26	24
8	66	33	26
9	79	33	26
10	64	14	13
11	77	32	24
12	89	39	31
13	68	42	32
14	65	38	31
15	67	35	28
16	69	35	27
17	70	41	32
18	70	25	16
19	69	40	29
20	71	42	31
21	78	39	31
22	67	24	17
23	61	45	30
24	60	44	31
25	60	43	29
26	60	43	31
27	62	0	0
28	63	9	2
29	63	0	0
30	62	0	0
31	62	0	0
32	63	0	0
33	63	0	0
34	62	0	0
35	61	0	0
36	61	0	0
37	61	0	0
38	60	0	0
39	61	0	0
40	63	0	0
41	56	49	8
42	56	0	0
43	56	0	5
44	55	0	0

dst.

Lampiran 10. Program Arduino IDE pada Arduino Uno

```
// ecg
const int ecgPin = A0; // Pin analog untuk sensor ECG
const int threshold = disesuaikan; // Ambang batas deteksi detak
jantung
const int interval = disesuaikan; // Interval waktu antara detak
jantung
// Variabel
unsigned long previousMillis = 0;
int bpm = 0;

void setup() {
  Serial.begin(9600);
}
void loop() {
  if (Serial.available() > 0) {
    char request = Serial.read();
    if (request == 'R') { // 'R' is the request code for data
      // Baca nilai analog dari sensor
  int ecgValue = analogRead(ecgPin);

  // Dapatkan waktu saat ini
  unsigned long currentMillis = millis();

  // Jika nilai sensor melebihi ambang batas dan interval waktu
cukup
  if (ecgValue > threshold && (currentMillis - previousMillis >
interval)) {
    // Hitung BPM
    bpm = 60000 / (currentMillis - previousMillis);

    // Simpan waktu saat ini sebagai waktu sebelumnya
    previousMillis = currentMillis;
    // Tampilkan BPM
    Serial.println(bpm);
  }
  delay(1);
    }
  }
}
```

Lampiran 11. Program Arduino IDE pada ESP32

```
#define RXp2 16
#define TXp2 17

#define BLYNK_PRINT Serial
#define BLYNK_TEMPLATE_ID     "Template ID"
#define BLYNK_TEMPLATE_NAME   "Nama Template"

#include <WiFi.h>
#include <BlynkSimpleEsp32.h>

char auth[] = "auth token";
char ssid[] = "nama hotspot";
char pass[] = "password";

//Sensor Flex
int Sensorflex1 = 35;
int Sensorflex2 = 34;

// Nilai kalibrasi berdasarkan hasil pengukuran
const int MIN_ADC_VALUE1 = disesuaikan;  // Nilai ADC saat
sensor lurus
const int MAX_ADC_VALUE1 = disesuaikan;  // Nilai ADC saat
sensor ditekuk penuh

const int MIN_ADC_VALUE2 = disesuaikan;  // Nilai ADC saat
sensor lurus
const int MAX_ADC_VALUE2 = disesuaikan;  // Nilai ADC saat
sensor ditekuk penuh

void setup() {
  Serial.begin(115200);
  Serial2.begin(9600, SERIAL_8N1, RXp2, TXp2);
  pinMode(Sensorflex1, INPUT);
  pinMode(Sensorflex2, INPUT);

  // Initialize Blynk
  Blynk.begin(auth, ssid, pass);
}
```

```
void loop() {
  // Run Blynk
  Blynk.run();

  // Send request for data
  Serial2.print('R'); // 'R' is the request code for data
  delay(1); // Wait for Arduino to process and respond

  // Check if there is data available from Arduino
  if (Serial2.available() > 0) {
   // Baca string yang masuk sampai karakter newline
    String receivedData = Serial2.readStringUntil('\n');
    // Konversi string menjadi integer
    int receivedInt = receivedData.toInt();

  //Sensor Flex
  int Value1 = analogRead(Sensorflex1);
  int Value2 = analogRead(Sensorflex2);

  // Mengubah nilai ADC ke derajat (0-180)
  int Degree1 = map(Value1, MIN_ADC_VALUE1, MAX_ADC_VALUE1, 0,
180);
  Degree1 = constrain(Degree1, 0, 180); // Memastikan nilai
tetap dalam rentang 0-180

  // Mengubah nilai ADC ke derajat (0-180)
  int Degree2 = map(Value2, MIN_ADC_VALUE2, MAX_ADC_VALUE2, 0,
180);
  Degree2 = constrain(Degree2, 0, 180); // Memastikan nilai
tetap dalam rentang 0-180


    // Cetak data yang diterima ke Serial monitor
//    Serial.println(receivedInt);
    Serial.print("(Degrees1): ");
    Serial.print(Degree1);
    Serial.print(",");
    Serial.print("(Degrees2): ");
    Serial.println(Degree2);
```

```
    Blynk.virtualWrite(V0, receivedInt);
    Blynk.virtualWrite(V3, Degree1);
    Blynk.virtualWrite(V4, Degree2);

  }
  // Tambahkan sedikit delay untuk mencegah overload pada Serial
monitor
  delay(1);
}
```