

## CHAPTER 4

### ANALYSIS AND DESIGN

#### 4.1 Analysis

This project is to analyze a person's heart rate and body temperature while doing activities. Activity categories are divided into 3 types : No Activity, Low Activities Level, and Heavy Activities Level. From these 3 categories of activities, to see the difference in heart rate data when people do activities.

Through Pulse sensor to determine how big a person's heart rate is. The IR Thermometer sensor is to determine the condition of a person's body temperature in degrees Celsius. A person's heart rate and body temperature data will be recorded by a Pulse sensor and IR Thermometer sensor that have been installed in the glove someone is wearing.

Here are some steps that must be done in this project to obtain data, this project requires an Arduino Lilypad that is installed in a glove. Pulse sensor, IR Thermometer sensor and ESP8266 Wifi module are installed with Arduino Lilypad. This Arduino Lilypad functions as a microcontroller to run a heart rate sensor, IR Thermometer sensor, and ESP8266 Wifi module. Arduino Lilypad needs a battery as a power source for power.

The analysis was carried out by comparing the heart rate data from 3 categories of activities carried out by a person over a period of 1 hour. With graphic for each category of activities makes it easy to analyze the person's heart rate.

Table 4.1: Heart Rate Data

<b>No Activity</b>	<b>Low Activities Level</b>	<b>Heavy Activities Level</b>
80 BPM	118 BPM	127 BPM
85 BPM	116 BPM	129 BPM
84 BPM	115 BPM	133 BPM
79 BPM	102 BPM	132 BPM
79 BPM	102 BPM	130 BPM
80 BPM	106 BPM	131 BPM
82 BPM	113 BPM	133 BPM
80 BPM	109 BPM	128 BPM
80 BPM	102 BPM	124 BPM
80 BPM	102 BPM	126 BPM

Table 4.1 above is the ten sample data of a person's heart rate from MySQL database. When the Pulse sensor gets a BPM value, it will send directly into the MySQL database. In this table divided into 3 columns, to distinguish changes that occur in a person's heart rate against the activities being carried out.

Table 4.2: Heart Rate Data with Averaging of ten BPM Values

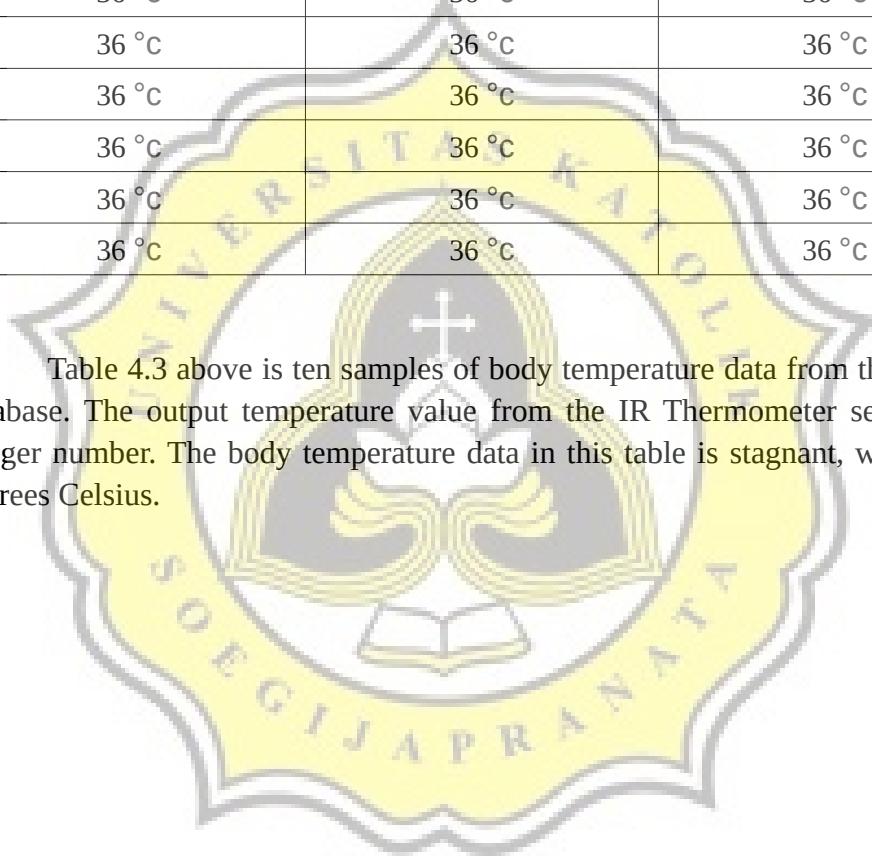
<b>No Activity</b>	<b>Low Activities Level</b>	<b>Heavy Activities Level</b>
81 BPM	109 BPM	125 BPM
81 BPM	109 BPM	126 BPM
80 BPM	109 BPM	127 BPM
80 BPM	110 BPM	128 BPM
81 BPM	108 BPM	130 BPM
81 BPM	108 BPM	130 BPM
80 BPM	107 BPM	128 BPM
81 BPM	109 BPM	127 BPM
80 BPM	108 BPM	127 BPM
80 BPM	108 BPM	125 BPM

Table 4.2 above is ten samples of a person's heart rate data after averaging from a MySQL database. Pulse Sensor will loop ten times to get ten BPM values, then calculate the total ten BPM values and divide by ten as the average BPM value. After getting the average BPM value, the data will be sent into the MySQL database. This table is still divided into 3 columns, to distinguish the changes that occur in a person's heartbeat against the activities carried out.

Table 4.3: Body Temperature Data

<b>No Activity</b>	<b>Low Activities Level</b>	<b>Heavy Activities Level</b>
36 °C	36 °C	36 °C
36 °C	36 °C	36 °C
36 °C	36 °C	36 °C
36 °C	36 °C	36 °C
36 °C	36 °C	36 °C
36 °C	36 °C	36 °C
36 °C	36 °C	36 °C
36 °C	36 °C	36 °C
36 °C	36 °C	36 °C
36 °C	36 °C	36 °C

Table 4.3 above is ten samples of body temperature data from the MySQL database. The output temperature value from the IR Thermometer sensor is an integer number. The body temperature data in this table is stagnant, which is 36 degrees Celsius.



## 4.2 Design

In this subchapter explains using images about the design of sensors placement and the flowchart of a running process. This is a series of sensors and Arduino used in this project:

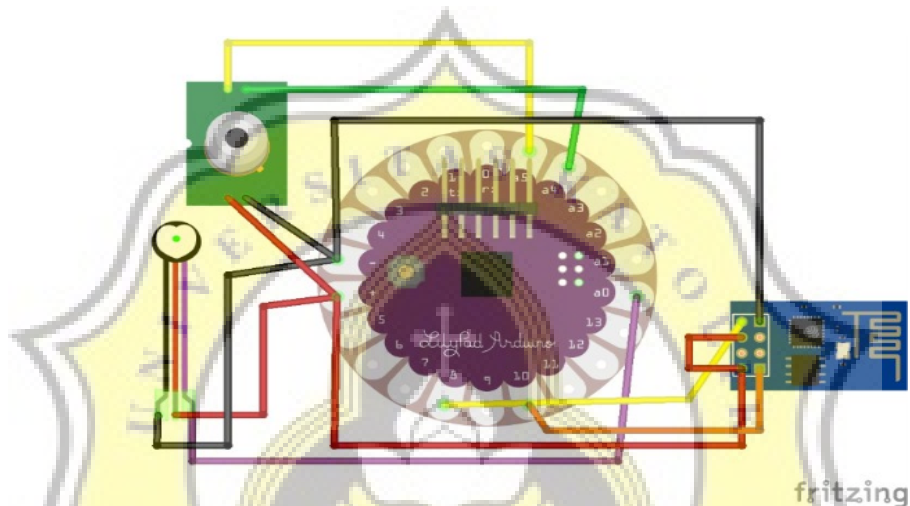


Illustration 4.1: Arduino Lilypad and Sensors Scheme

From Illustration 4.1 above, this project uses Arduino Lilypad, Pulse sensor, IR Thermometer sensor, and ESP8266 Wifi module. Arduino Lilypad is useful as a microcontroller for all sensors installed and provides a voltage (+) (-) for the sensor. Pulse sensor function to detect a person's heart rate. Pulse sensor requires a voltage of 5V. IR Thermometer sensor function to measure a person's body temperature. IR Thermometer sensor requires a voltage of 5V. And ESP8266 Wifi module function to connect Arduino Lilypad to WIFI network and make TCP/IP connections. ESP8266 Wifi module requires a voltage of 3.3V. Using the Lipo RC JJRC H36 battery with 3.7V to turn on the Arduino Lilypad and provide voltage to all sensors.

Here is the flowchart of the running process to get heart rate data and body temperature data :

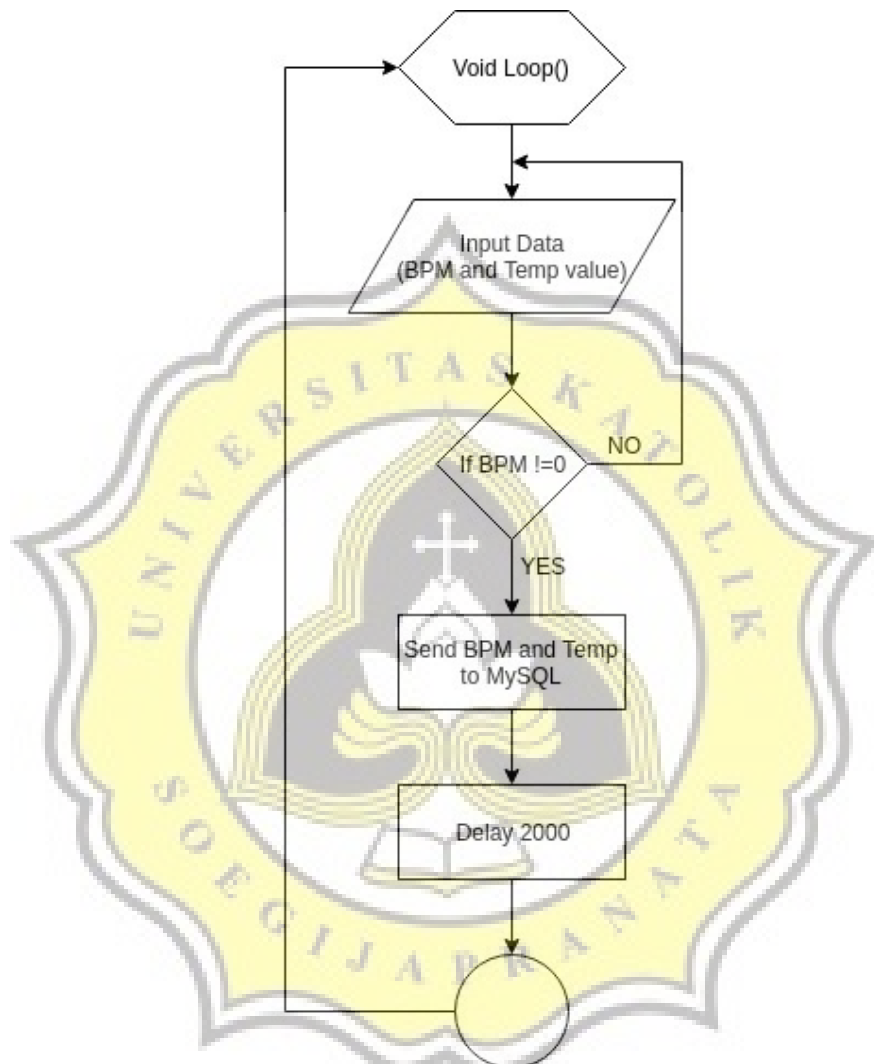


Illustration 4.2: Flowchart of Running Process

Flowchart on the Illustration 4.2 explains the data extract process from Pulse sensor and IR Thermometer sensor into MySQL database. First is reading data from the Pulse sensor and IR Thermometer sensor as input data, then get the BPM and Temperature value. When successfully obtaining a BPM and Temperature value, it will be sent to the MySQL database and interval for 2 seconds to return to the beginning again.

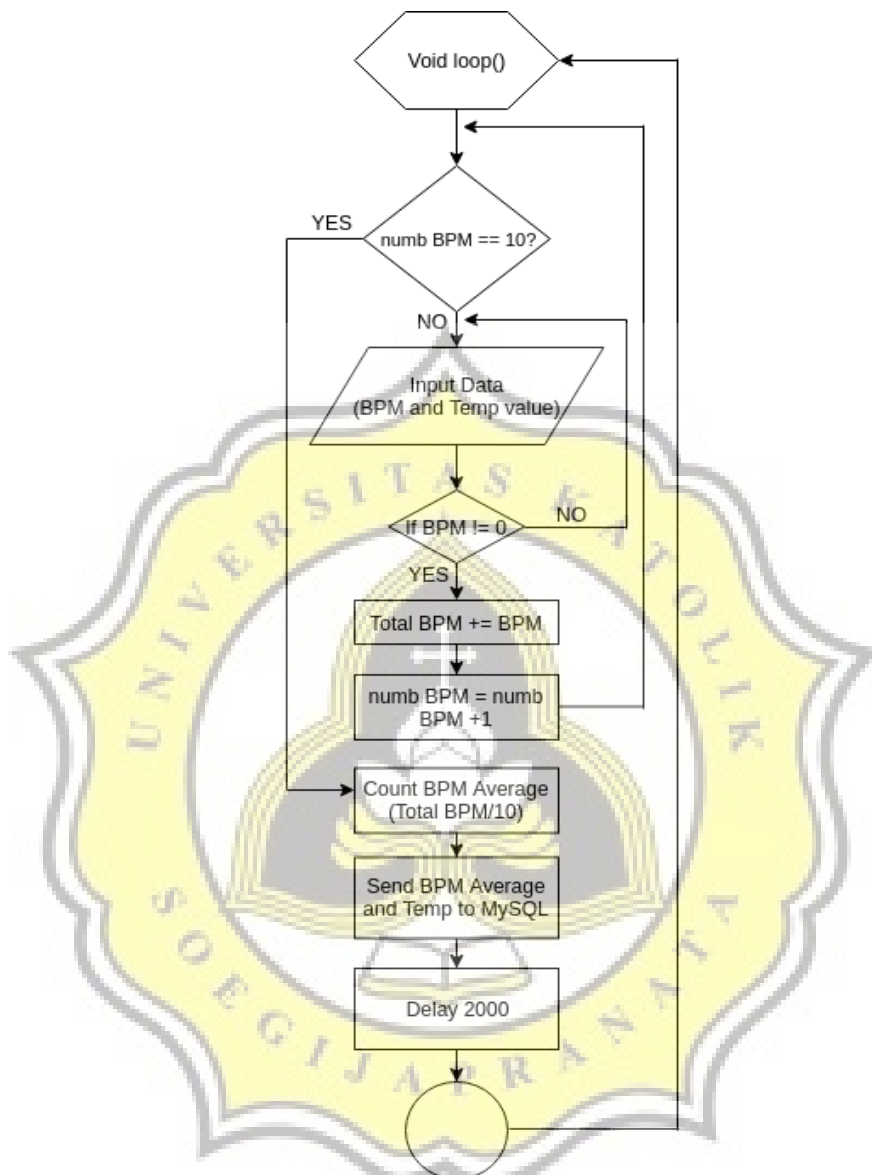


Illustration 4.3: Flowchart of Running Process with Averaging of ten BPM Values

From Illustration 4.3, first is reading data from the Pulse sensor and IR Thermometer sensor as input data, then get the BPM and Temperature value. When successfully obtaining a BPM and Temperature value, the BPM value will be looped and added continuously with a new BPM value of 10 times. After getting a total of 10 BPM values, then it will be divided by 10 to get an average

value of one BPM. Then it will be sent to the MySQL database and interval for 2 seconds to return to the beginning again.

