CHAPTER 3

METHODOLOGY

This chapter will describe the method to be used for this project. The project consists of hardware and software design, both of part will be explained in detailed along with figure related. The flow chart below shows the steps that have been taken in doing this project.

3.1 PROJECT FLOWCHART

![Flowchart Image]

Figure 3.1: Overall project Implementation flowchart.
3.2 System Pre-Design

Before the fully system is developed several techniques had been used to achieve the complete system. Firstly, the part of the system is simulated using Proteus. In the first attempt using op-amp amplifier LM358 the output of the thermocouple has not fit to the thermocouple amplification and it found that this op-amp produce large signal noise. The amplification circuit of thermocouple is replaced with MAX 6675 module.

Secondly, the coding of signal between microcontroller and web server is developed to replicate the process of signal being transfer to web server using Arduino Uno, wamp server and web browser. In this process, wamp server is set up using php coding. The server fails to read data from serial port due to libraries limitation but can read the serial data on usb.

Finally, the system consisting arduino uno microcontroller, temperature sensor, computer is being integrated with readymade firmware and web application on “cloudduino.appspot.com” as shown in figure 3.2. In this stage, the web applications indicate the latency while using the serial communication over usb because the data need to process by computer before it sends to web graphical user interface. Due to this reason the project required microcontroller that directly connected to local network area and wide network area. The spark core microcontroller is used for next process.

Figure 3.2: Clouddunio Web Apps.
3.3 FRIMWARE PROGRAMMING

The firmware is the part in these devices where it provides the control program for the embedded system. Firmware is store in non-volatile memory devices such as flash memory, ROM or EPROM of the microcontroller.

![Spark DEV IDE](image1)

**Figure 3.3:** Spark DEV IDE.

The firmware is coded in c language using Spark Dev IDE shown in figure 3.2 and then the codes are being flashed into the microcontroller through USB or WIFI connection. The device needs to be claimed using its security token before the user can start the process of flashing the code.

3.4 HARDWARE DESIGN

3.3.1 Block Diagram.

![Block Diagram](image2)

**Figure 3.4:** Block Diagram of the remote monitoring system.