IOT BASED CONTACTLESS THERMOMETER

Project report submitted in partial fulfillment of the requirement for the degreeof

BACHELOR OF TECHNOLOGY

IN

ELECTRONICS AND COMMUNICATION ENGINEERING

By

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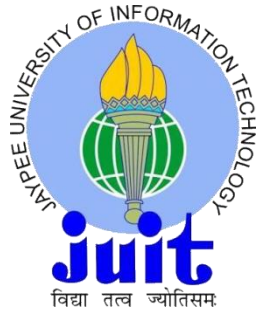
UNDER THE GUIDANCE OF

MR. MUNISH SOOD



JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

May, 2021

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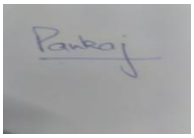
DECLARATION

We hereby declare that the work reported in the B.Tech Project Report entitled “IOT BASED CONTACTLESS THERMOMETER” submitted at Jaypee University of Information Technology, Waknaghat, India is an authentic record of our work carried out under the supervision of MR MUNISH SOOD We have not submitted this work elsewhere for any other degree or diploma.



PANKAJ RATHORE

171024

This is to certify that the above statement made by the candidates is correct to the best of my knowledge.

Mr. MUNISH SOOD
Date:
Head of the Department/Project Coordinator

ACKNOWLEDGEMENT

I'd like to express my heartfelt gratitude to my instructor, MR. Munish Sood, as well as our HOD, for providing us with the wonderful opportunity to work on this wonderful project on the topic of iot based contactless thermometer, which also assisted me in conducting extensive research and learning about many new items for which are really thankful. Second, I'd like to express my gratitude to my seniors and colleagues, who assisted me greatly in completing this project within the time constraints.

LIST OF FIGURES

ABSTRACT

In the online marketplace, there are a few cameras. Those are very promising items, but they are extremely expensive. In addition, someone must always stand and watch from a distance when holding the unit. We were all a little surprised when we saw the price and the limited options. quality of the commodity, as well as how easy it would be for anyone to purchase an expensive product and In addition, though surrounded by invisible microscopic threats, he had to stand to control the temperature. We felt compelled to do something to assist those who were most in need, as well as to support ourselves.It is my hope that by writing this, others can reconsider the available product design. We need to build a fully autonomous IR contactless temperature system that can be used anywhere. Mount it anywhere, such as a fence, apartment gates, or community halls, and it will monitor the temperature and send the data to any cloud BD. Alternatively, any incoming web hooks. The construction we did cost about 700 to 900 rupees and could prove to be a more cost-effective alternative.in comparison to other goods on the market

CHAPTER 1

INTRODUCTION

1.1 IOT

The concept of Internet of Things (IoT) started with communication devices.The devices that could be tracked, controlled or monitored using remote computers connected through web. IoT extends the use of Internet providing the communication with devices, and thus inter-network of the devices and physical objects. The two prominent words in IoT are "internet" and "things". Internet means a vast worldwide network of connected servers, computers, databases and Mobile phones using different protocols and connecting systems. Internet enables sending and receiving of information. Dictionary meaning of 'Thing' is a term used to reference to a physical object, an action or idea, situation or activity, in case when we do not wish to be precise. IoT, in general consists of inter-network of the devices and physical objects, number of objects can gather the data at a same locations and communicate to the units which are managing ,acquiring ,organizing and analyzes the data in different locations. It gave us a meaning of smart i.e. the devices which are traceable, controllable, and can be analyzed can be put under the category of smart device and does these things such as computing, sensing, and communicating by different objects through connectivity.

The scalable and robust feature of Cloud computing is allowing developers and host their applications on the cloud. Cloud acts as a friend for IoT as it acts as a platform where all the s data of sensors can be stored and accessed from different locations. These factors gave rise to the combination of both technologies thus leading to the formation of a new technology called Cloud of Things (IOT). In IOT nodes could be pervade, monitored and used from any remote location through the cloud. Due to high extensibility in cloud any number of nodes could be added to it In simple definition IoT can be explained from an equation stating:

Physical Object + (Controller, Sensor and Actuators) + Internet + Cloud = Internet of Things

1.2 **APPLICATION**

As we know in corona era we don't know whether any particular person is infected or not So at first step we check person body heat or we can say temperature (after that we do different scan) ,and to check Temperature we have different tool but to ensure maximum safety of both doctor and Normal person I think at first step we have to implement a contactless thermometer which just measures temperature and sent it to backend of processing unit .

some of the challenges that I think this project can erase are

1 At vaccination center – To check whether any person is infected or not before the Vaccine program.

2 Schools, college . – to reopen schools and college first schools have to check whether any child is infected or not to ensure maximum safety.

3 Long queue - As we know , India is most populous country in the world and in India you Can normally see long queue anywhere such as bank , hospitals , governme -nt agency, ration shops etc so there also you can implement our project for Maximum safety of the crowd and we can stop this virus.

Fig1.1

IOT design essentially consists of three tiers

TIER1 : Devices

TIER 2 : Edge gateway

TIER 3: Cloud

Devices are basically smart devices which users purchases from market which are controllable andCan be monitored and connect to any system.Devices include networked things, such as the sensors and actuators found in IoT equipment, particularly those that use protocols such as Coap, Zigbee, ,Wlan to connect to edge gateways that provides functionality like processing of information, securing connectivity to cloud, using systems such as Web Sockets, the event hub and in some big cases fog computing and edge computing is also used . The third tier includes the cloud Application built for devices using services such as polyglot ,and very secure such as HTTPS/OAuth

It includes various database systems that store sensor data, such as time series databases or Asset stores using backend data storage. The cloud section is the most important as it Handles Communication between two nodes .Some specialist classified the three- tiers inthe IoT system as edge, platform, and enterprise and these are connected by proximity network, Access network and service network, respectively. The web of things is design for the Application layer of the IOT it simply ends your data form Iot devices to applications to Make totally different cases

1.4 Technical approach

Atoms are travelling inside anything that temperature. The Thetemperature has a Direct relationship with the travel speed. The faster it is, the higher the temperature is.

molecules. These moving molecules emit infrared radiation, which is a source of energy. This form of radiation has a longer wavelength than visible light. As a result, we are unable to see it through our eyes. When an object becomes too hot, however, radiation may leap to the visible spectrum. A vibrant red

. Infrared thermometers calculate the temperature of objects at this temperature. Infrared light can be focused, reflected, or absorbed in the same way as visible light can. Alensfocusesinfrared light from an object onto a thermopile detector in infrared thermometers.

Thermocouples linked in series or similarly form a thermopileAs infrared radiation strikes a thermopile's surface, it reaches and converts to heat. Electrical emissions are generated in proportion to the incident's infrared power. This output is used by the detector to determine the temperature that appears on the screen While the entire procedure can appear to be lengthy, An infrared thermometer only takes a few seconds to record a temperature.

Factors to consider when choosing an IR Thermometer

Precision

The accuracy of a thermometer is the most important thing to consider. The accuracy of infrared thermometers is determined by their area distribution (D / S ratio). The maximum distance is indicated by this metric.which the thermometer may use to measure a specific area If you need to calculate something, for example, The maximum distance from where you can reliably record the temperature with an IR thermometer with an 8:1 D/S ratio and a 4 inch area temperature is 32 inches (8: 1 x 4). It means that greater ratios can be used to determine temperature from a long distance. Nonetheless,With rising distances, the surface area would also increase.

Fun

The game demonstrates how much power the thermometer can produce at any given time. IR thermometers with close to 1.00 emissivity will learn more than those with a low utility value. To minimise the amount of infrared energy, choose a thermometer with a constant range of motion.emitted, as well as to compensate for the energy implied by the temperature calculating.

Temperature Range

The job you can do with an infrared thermometer is influenced by its temperature range. You might want to invest in a wide-range IR thermometer to keep track of various processes at various temperatures. An infrared thermometer with a lower temperature range, on the other hand, is preferable.where higher resolutions are needed to ensure that a process' temperature is properly controlled.

Response Time or Reading Speed

After beginning the thermometer learning process, the learning speed is the time it takes for the

thermometer to give an accurate reading. When determining the temperature of a body, this element is critical.a moving object, or in situations where objects are heated more quickly.

Conceptualization

A rough design is needed for industrial IR thermometers. Fresnel lenses and no-lens thermometer last longer due to their polymer structure, which keeps them safe. While, Mica lens thermometers require solid shell that lasts a long shell and a carrying box embedded in its structure to prevent the lens from cracking.

So after choosing the best ir sensor we can now move to our next components which are our Lcd display which shows result to the user and then the same data will be send to the cloud using Thinkspeak application

.

Chapter 2
HARDWARE

2.1 ARDUINO

The Arduino platform has become very popular with those just getting started with physics, and with good reason: unlike most previous programmable circuit boards, the Arduino does not need a separate piece of hardware to load.new code has been added to the board.you are able to To use the Arduino IDE, all you need is a USB cable.makes use of a simpler version of c++ to make it easier to use.finally Arduino provide a customary type issue that breaks out the function of micro controller into a lot of accessible packages .

Pin Name Details

FIG 2.1

(input) Power Vin, 3.3V, 5V, GND Vin: Input voltage to Arduino when using an external source

5V: Regulated power supply used to power microcontroller and other components on Uno .

3.3V: 3.3V supply generated by on-board voltage regulator. Maximum current draw is 50 mA.

GND: ground pins.

Reset : Reset Resets the microcontroller.

Analog pins A0-A5 used to provide analog input in the range of 0-5V.

Input/output Pins Digital Pins 0 - 13 Can be used as input or output pins.

Serial 0(Rx),1(TX) used to receive and transmit TTl serial data..

External Interrupts 2, 3 To trigger an interrupt.

PWM 3,5,6,9,11 provides 8 bit pwm output.

Inbuilt led 13 to un the inbuilt led.

TWIA4(SDA),A5(SCA) used for TWI communication.

AREF: to provide references voltage for inout voltages

2.2 ESP8266

Fig 2.2

Espressif Systems in Shanghai, China, produces the ESP8266, a low-cost Wi-Fi microchip with complete tcp/ip and microcontroller microcontroller capability.In August 2014, the ESP-01 module brought the chip to the attention of Western manufacturers for the first time. Ai -Thinker, a third-party manufacturer, produced it. This small module allows microcontrollers to communicate with each other.link to a Wi-Fi network and perform basic tasksHayes-style commands are used to create TCP/IP connections. However, there was very little English-language documentation on the chip and the commands it acknowledged at first. The low cost and the fact that there were few external factors components on the module, implying that it will be very cheap in the future Many hackers were drawn to the module and chip because of its sheer size., and the software on it, as well as to translate the Chinese documentation.

2.3 BREADBOARD

A breadboard is a building foundation for electronics prototyping. Originally, the term referred to a polished piece of wood that was used for slicing bread. Solderless breadboards (also known as plugboards or terminal array boards) became popular in the 1970s, and the word"breadboard" is now widely used to refer to them.Since the solderless breadboard does not require any soldering. This makes it easy to use for making temporary prototypes and circuit design experiments. As a result, solderless breadboards are becoming increasingly common among students and in technical education. This was not a feature of older breadboard styles. Astripboard (Veroboard) is a form of prototyping printed circuit board used to create semi

-permanent soldered prototypes.

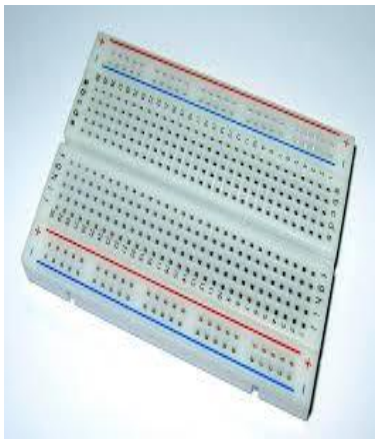


Fig2.3fig

printed Circuit boards used to build semi-permanent soldered prototypes or one-offs are difficult to reuse. Breadboards can be used to prototype a wide range of electronic systems, from small analogue and digital circuits to full central processing units (CPUs)

JUMPER WIRE.

FIG 2.4

A jump wire (also known as a jumper wire or a jumper) is a wire (or a group of wires in a cable) with a connector or pin at each end (or sometimes without – simply "tinned") that is usually used to interconnect the components of a breadboard or other prototype or test circuit, internally or with other equipment or components, without soldering.

Individual jump wires are linked by slipping their "end connectors" into slots on a breadboard, a circuit board's header connector, or a piece of test equipment.

LCD DISPLAY

FIG 2.5

A liquid crystal display (LCD) is a flat-panel display or other electronic device that employs the fluorescent illumination properties of liquid crystals in conjunction with polarizers. Instead of emitting direct light, liquid crystals use a backlight or signal to produce colour or monochrome images Illegal images (such as those seen on a typical computer-generated display)or manipulated images with low-resolution, obscured or hidden content may be displayed on LCDs. Pre-programmed sentences, numbers, and seven-component displays, such as a digital clock, are all examples of this.tools for displaying They both make use of the same basic technology, but the tempting images are shown differently. Other screens have larger features and are made with a matrix of small pixels. Depending on the polarizer configuration, LCDs may be open (positive) or closed (negative). A good example is a characteristic LCD with background light will have black backlight color, while a negative LCD character will have a dark background and characters will be the same color as the backlight. Visual filters are added to white on blue LCDs to give them their own look.

MLX90614

FIG 2.6

The MLX90614 is an infrared thermometer that measures temperature without touching it. The signal conditioning ASIC and the IR sensitive thermopile detector chip are both incorporated in the TO-39 can be found in the same place. A low noise amplifier, a 17-bit ADC, and a low-noise amplifier are all built into the MLX90614's design.

The thermometer achieves high precision and resolution thanks to its powerful DSP unit.
The thermometer is factory calibrated with a digital SMBus output that allows direct access to the measured temperature across the entire temperature range(s) with a 0.02°C resolution.
The digital output can be set to pulse width modulation by the consumer (PWM). As a baseline,the 10-bit PWM is configured to continuously transmit the measured temperature inrange of -20to 120°C, with an output resolution of 0.14°C.

Chapter 3

CLOUD

What is cloud actually? Why do we need it and why is it so famous nowadays? Yes, it is same as we see in our surroundings skies but just as Water droplets these cloud contains data in it. Now What type of Data do they have ,they contain all the files, software , important resources photos and many other things which in earlier times were stored in either our memory cards, phone memory or in our pen drives but why is it advantageous than the other memory storage devices present. It is more advantageous to us than the other memory storage device because of the fact that you can access it from any part of the world as it is like a virtual space which is present on the internet

FIG 3.1

CHARACTERISTICS OF CLOUD COMPUTING

- Independent of resource and location
- On demand service(eg paid version of Google photos)
- Globally accessible
- Usage should be recorded and monitored
- Infinite resources
- Portable
- Efficient resource utilization(eg Google photos)
- Low maintenance cost
- More security than any other resources
- Publish
  subscribe model

COMPONENTS OF CLOUD COMPUTIN

- Clients/end users: Thick,Thin,,mobilε
- Services: Products & solutions(identity, mapping ,search etc)
- Applications: webapps etc
- Platform: apps/ webhosting usingPass
- Storage:database,data-storage as a service
  Infrastructure:virtualization,iaas,

SERVICE MODELS

1. Software as a service(SAAS)- In this facility for the consumer to execute service provider applications at users end and application is used as a service and can be accessed through different varieties of client devices(example web browser app)
2. Platform as a service (PAAS)-facility for the consumers to execute consumer created or acquired apps on the cloudinfrastructure.
3. Infrastructureasaservice(iaas)-facilitytogathercomputingresourcessuchasnetworkstorage and operating system.

Cloud used in our project(thinkspeak)

FIG 3.2

"ThingSpeak is an open source Internet (IoT) Internet application and API for storing and retrieving data on HTTP and MQTT protocols via the Internet or Local Area Network.

ThingSpeak enables application development login, location tracking apps, and a social network with status updates ".

ThingSpeak was originally launched by ioBridge in 2010 as a support service for IoT

The MATLAB numerical computing programme from MathWorks has been incorporated into ThingSpeak. ThingSpeak users can now analyse and visualise data entered using Matlab thanks to MathWorks.without the need to buy a Mathworks Matlab licenceMathworks, Inc. and ThingSpeak have a close working relationship. In reality, all ThingSpeak documents are in this format. embedded in the Matlab site of Mathworks, and allow Mathworks user accounts that are For the ThingSpeak website, these credentials have been registered as valid login credentials. Service terms and conditionsThe ThingSpeak.com privacy policy is a contract between the consumer and Mathworks, Inc.

CHAPTER 4

CODES AND CIRCUIT DIAGRAM

4.1 MAIN CODE USED IN ARDUINO

```
String ssid     = "Simulator Wifi";  // SSID to connect to
String password = ""; // Our virtual wifi has no password
String host     = "api.thingspeak.com"; // Open Weather Map API
const int httpPort   = 80;
String uri     = "/update?api_key=5SXNU1Q3CXE33SAD&field1=";

int setupESP8266(void) {
  // Start our ESP8266 Serial Communication
  Serial.begin(115200);   // Serial connection over USB to comput
  Serial.println("AT");   // Serial connection on Tx / Rx port to
  delay(10);        // Wait a little for the ESP to respond
  if (!Serial.find("OK")) return 1;

  // Connect to 123D Circuits Simulator Wifi
  Serial.println("AT+CWJAP=\"" + ssid + "\",\"" + password + "\"
  delay(10);        // Wait a little for the ESP to respond
  if (!Serial.find("OK")) return 2;

  // Open TCP connection to the host:
  Serial.println("AT+CIPSTART=\"TCP\",\"" + host + "\"," + httpPo
```

FIG 4.1

```
  delay(50);        // Wait a little for the ESP to respond
  if (!Serial.find("OK")) return 3;

  return 0;
}

void anydata(void) {

  int temp = map(analogRead(A0),20,358,-40,125);

  // Construct our HTTP call
  String httpPacket = "GET " + uri + String(temp) + " HTTP/1.1\r\
  int length = httpPacket.length();

  // Send our message length
  Serial.print("AT+CIPSEND=");
  Serial.println(length);
  delay(10); // Wait a little for the ESP to respond if (!Serial.

  // Send our http request
```

FIG 4.2

```
  // Send our http request
  Serial.print(httpPacket);
  delay(10); // Wait a little for the ESP to respond
  if (!Serial.find("SEND OK\r\n")) return;


}


void setup() {

  setupESP8266();

}

void loop() {

 anydata();

  delay(10000);
}
```

FIG 4.3

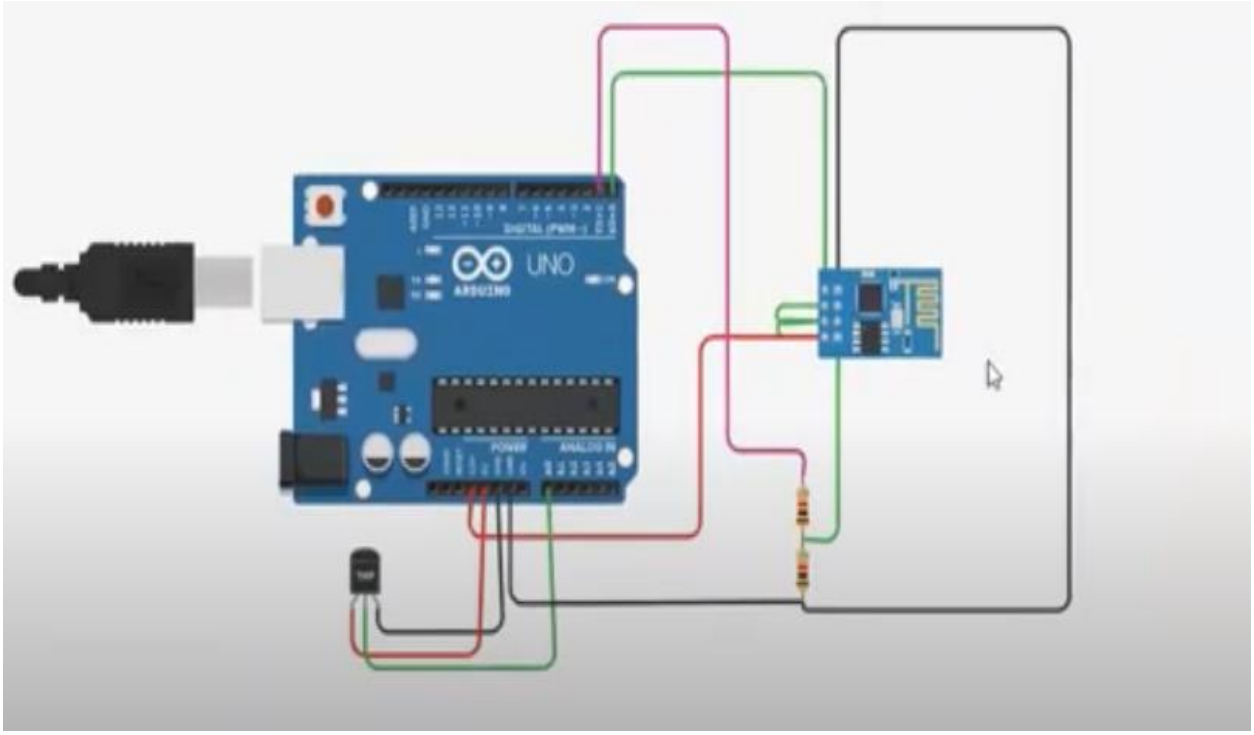


FIG 4.4

SYSTEM ARCHITECTURE

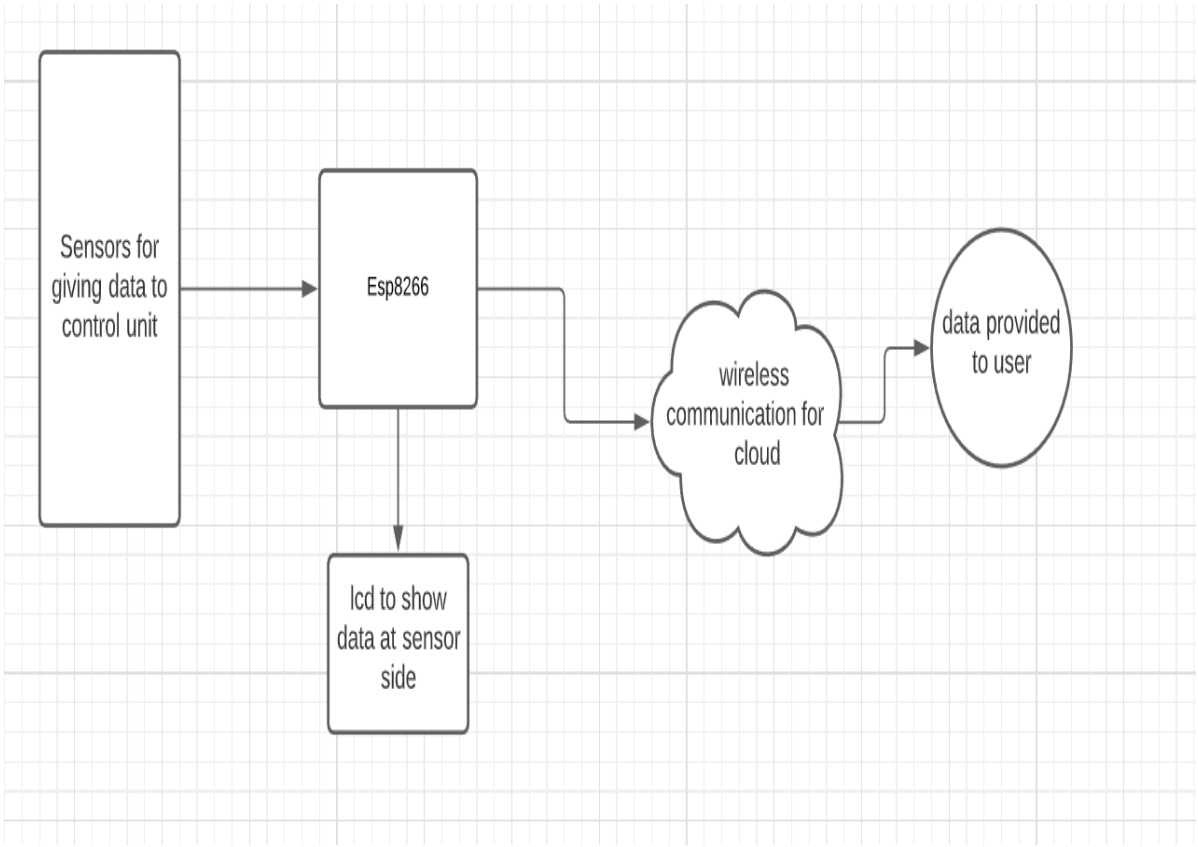


FIG 4.5

Chapter 5
CONCLUSION

5.1

The use of tympanic thermometry was confirmed by the findings of six non-randomized studies and two SRs. The findings of one analysis and one SR did not support its accuracy. The proof then points to tympanic thermometers being accurate. The precision of Three research recommended handheld infrared skin thermometers, but none recommended them.three studies. Four studies concluded that thermal scanners can be used to detect fevers, while one study concluded that this type of technology is unsuitable for this purpose. Although the findings of an SR were of poor quality, they did illustrate the lack of empirical evidence.

There is evidence to support the use of infrared skin thermometers and thermal scanners for a large-scale screening There is proof that thermometers is equivocal whereas it is somehow in favor of the accuracy of thermal scanners. Sweat, gender, age, the temperature range, the rater, physical activity, the use of antipyretic drugs, and emotional state were all listed as possible confounders for temperature measurement in the retrieved studies. In the real world, these variables are much more vulnerable to change. conditions than those used in a clinical trial . Furthermore, the various device brands, models, and modes It's difficult to draw broad conclusions about a group of thermometers because of the methods used. In addition, the current study included a significant number of paediatric studies, reducing the generalizability of their findings.

The amount of measurements to be taken varies depending on the context of use (hospital vs. border).

It could be impractical depending on the work performed and the age of the individual to be assessed.

Thermometers are preferred over more precise and/or intrusive thermometers. As a result, in some cases, tympanic thermometers and thermal scanners may be the only useful and precise instruments for detecting fever. However, it's important to remember the screening for Fever and virus testing are two separate things.

In conclusion, data from sixteen non-randomized trials and four systematic reviews supports tympanic thermometer accuracy and, more cautiously, thermal scanner accuracy. The evidence for the accuracy of infrared skin thermometers is ambiguous, and further research is required. More investigation is needed. The evidence's generalizability, however, is debatable.

Although IR thermometers are a convenient way to calculate the surface temperature of any material, it is critical to choose the right device for your application to ensure temperature accuracy. recitations Infrared thermometers are available. specially made for long-range measurements. Likewise, there are IR thermometer explicitly built for reading high temperatures from a limited distance but with better accuracy.

Chapter 6

Future Scope

6.1 Future Scope

I think that my project has huge scope in future if we replace our contactless thermometer With tympanic thermometrs it can do wonders but at this time we can take use of Infrared temperature sensor in the project .Some of the places which I think after corona it will Be used become the normal living for human beings to prevent them from ceratin disease are

1 Hospitals

2 Schools

3 Atms

4 Vaccination center along with rfid tag

5 long queues

Although infrared thermometers are a handy way to calculate the temperature of anyobject's surface,To ensure consistency in your application, it's critical to choose the right type of unit. readings of the temperature There are infrared thermometers designed specifically for long-range use.the measurements Similarly, there are IR thermometers designed specifically for reading high temperatures. from a limited distance but with better accuracy.

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APPENDIX

Code used

```
String ssid     = "Simulator Wifi";  // SSID to connect to

String password = ""; // Our virtual wifi has no password

String host     = "api.thingspeak.com"; // Open Weather Map API

const int httpPort   = 80;

String uri     = "/update?api_key=5SXNU1Q3CXE33SAD&field1=";

int setupESP8266(void) {
  // Start our ESP8266 Serial Communication

  Serial.begin(115200);   // Serial connection over USB to computer

  Serial.println("AT");   // Serial connection on Tx / Rx port to ESP8266

  delay(10);        // Wait a little for the ESP to respond

  if (!Serial.find("OK")) return 1;

  // Connect to 123D Circuits Simulator Wifi

  Serial.println("AT+CWJAP=\"" + ssid + "\",\"" + password + "\"");

  delay(10);        // Wait a little for the ESP to respond

  if (!Serial.find("OK")) return 2;

  // Open TCP connection to the host:

  Serial.println("AT+CIPSTART=\"TCP\",\"" + host + "\"," + httpPort);

  delay(50);        // Wait a little for the ESP to respond

  if (!Serial.find("OK")) return 3;

  return 0;
}

void anydata(void) {
```

```
  int temp = map(analogRead(A0),20,358,-40,125);
  // Construct our HTTP call
  String httpPacket = "GET " + uri + String(temp) + " HTTP/1.1\r\nHost: " + host + "\r\n\r\n";
  int length = httpPacket.length();
  // Send our message length
  Serial.print("AT+CIPSEND=");
  Serial.println(length);
  delay(10); // Wait a little for the ESP to respond if (!Serial.find(">")) return -1;
  // Send our http request
  Serial.print(httpPacket);
  delay(10); // Wait a little for the ESP to respond
  if (!Serial.find("SEND OK\r\n")) return;

}

void setup() {
  setupESP8266();
}
void loop() {
 anydata();
  delay(10000);
}
```

SIGNATURE