

AUTOMATIC TEMPERATURE AND MASK SPOTTER

Submitted in partial fulfilment of the requirements for the award of
Bachelor of Engineering degree in
Electronics and Communication Engineering

By

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION
ENGINEERING

SCHOOL OF ELECTRICAL AND ELECTRONICS ENGINEERING

SATHYABAMA

INSTITUTE OF SCIENCE AND TECHNOLOGY

(DEEMED TO BE UNIVERSITY)

Accredited with Grade "A" by NAAC

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BONAFIDE CERTIFICATE

This is to certify that this Project Report is the bonafide work of VAISHNAVI.S (37130421) who carried out the project entitled "**Automatic Temperature and Mask Spotter**" under the supervision of Dr.M.R..Ebenezer Jebarani M.E.,Ph.D., from Dec 2020 to March 2021.

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2.

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LIST OF ABBREVIATIONS:

Sl.No	Abbreviation	Definition	Page
1	COVID-19	Corona Virus Disease 2019	1
2	IoT	Internet of Things	3
3	OpenCV	Open-Source Computer Vision	6
4	API	Application Programming Interface	7
5	WSN	Wireless Sensor Networks	8
6	GMR	Giant Magneto-Resistance	9
7	SWSHM	Smart Wearable System for Health Monitoring	10
8	Arduino IDE	Arduino Integrated Development Environment	22

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ABSTRACT

At present the entire world is fighting against an invisible enemy COVID-19 which has brought a sequence of unexpected changes to our lifestyle. COVID-19 has pushed our entire humanity to a green danger situation mainly because of its easy spread nature. But technology has proved human with a few simple changes in lifestyle and good practice of hygiene can help fight against the fast spread of disease. Some of the things that should be followed are using hand sanitizer, wearing a mask, washing hand with soap regularly. Reports indicate that wearing face masks while going out reduces the risks of transmission. This project is on health monitor and face identification for mask when people go to a mall or shopping complex or a super market. One can see people standing at the entrance to spray sanitizer and check people body temperature. But when a large amount of crowd approaches, it is really a tedious process to check each one of them individually. So instead of checking individually use automatic checker is preferred which can be easily installed anywhere and can be monitored from a distance to check body temperature, pressure, heart rate and scan whether the person is wearing a mask simultaneously. By this process, monitoring large group of people in a crowded atmosphere like airports, Malls, Railway station, Bus stand becomes simple. This device helps to save manpower and rushing in a crowd. Ultimate goal is to identify whether the person on the image is wearing a mask or not and can sense the body temperature of the person at the same time.

CHAPTER 1: INTRODUCTION

INTRODUCTION

COVID-19 is the most recent epidemic virus to strike human health in the twentieth century. COVID-19 is a global health problem due to its fast spread.

COVID-19 infected over five million people in less than six months all over the world. There are 188 countries in the world. In crowded and overcrowded areas, the virus spreads by close contact. The corona virus outbreak has sparked an unprecedented level of global concern. Science collaboration Artificial Intelligence is built using deep machine learning. In a number of ways, we can fight against Covid-19. Researchers and doctors can use machine learning to solve problems and to analyse large amounts of data in order to predict COVID-19 spread, serve as an early warning system for pandemic and lock downs, and identify the spread over the world.

EMBEDDED SYSTEM

It's mostly found as a larger device that includes components like hardware and software integrated in some chips. Many modern devices are controlled by embedded systems. About 98% microprocessors are designed to be used as part of an embedded device.

As compared to general-purpose computers, typical embedded computers have many advantages that include low cost, low power consumption. This is how it

functions. Electrical device with a low per-unit cost, and also with real-time consumption of embedded systems computing constraints.

Many modern devices are controlled by embedded systems. Embedded device microprocessors account for 98 percent microprocessors generated. This comes at the cost of limited computing resources, which makes programming and interacting with them even more difficult.

By building intelligence mechanisms on top of the hardware, taking advantage of optimise available resources at the device and network levels, as well as provide augmented functions well beyond what is currently available. Intelligent strategies, for example, can be configured to control power.

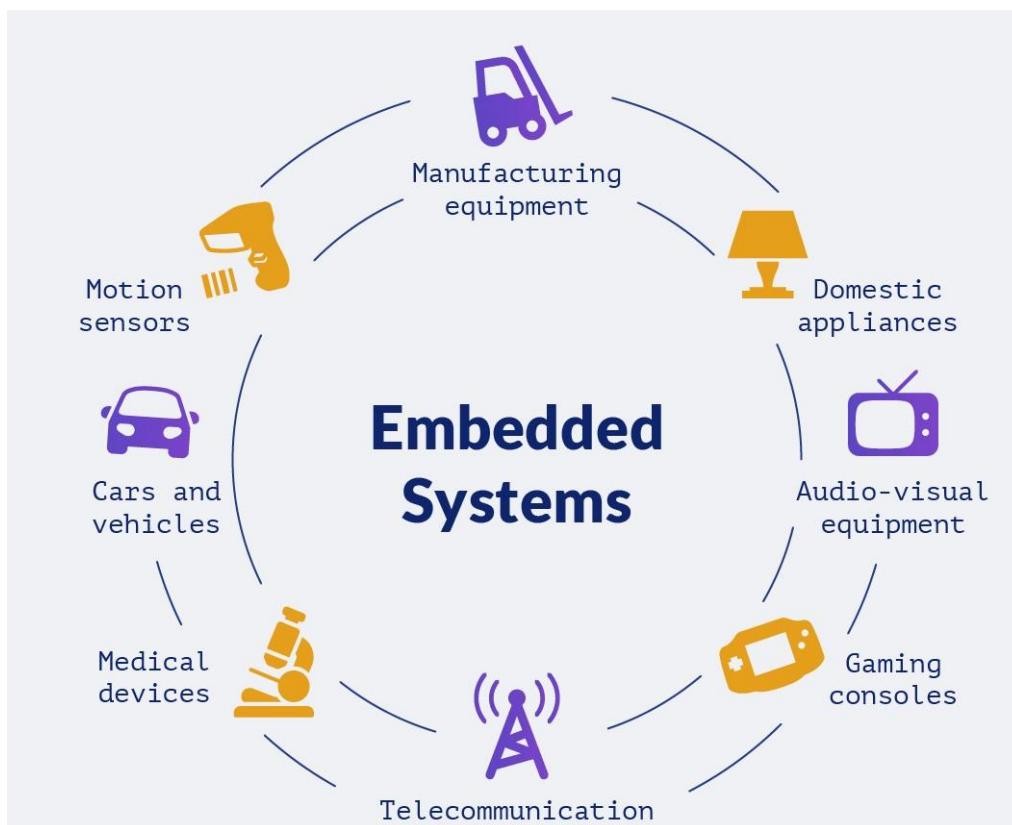


Figure 1.1 Embedded systems

1.1.1 CLASSIFICATIONS OF EMBEDDED SYSTEMS

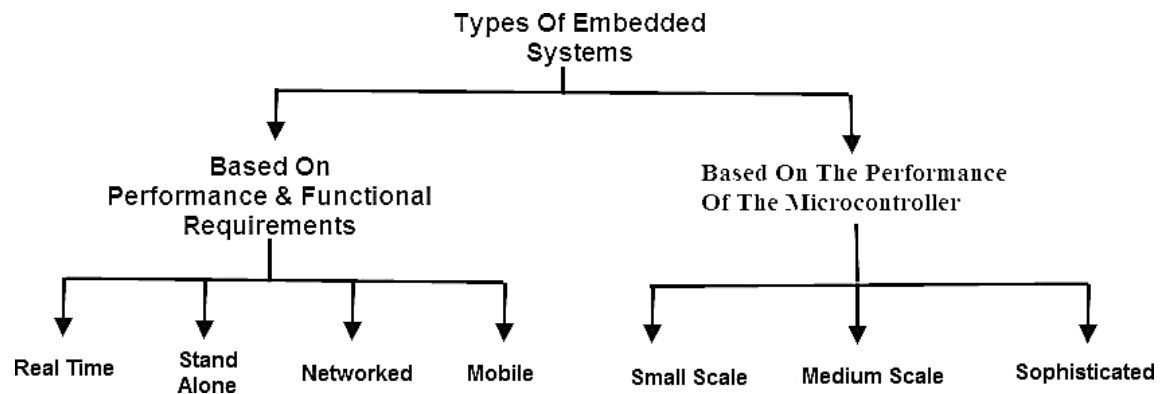


Figure 1.2 Types of ES

1.1.2 BLOCK DIAGRAM OF AN EMBEDDED SYSTEM

Embedded processor is typically found in a device. Embedded devices are used in many digital appliances, such as microwaves, VCRs, and vehicles. An operating system can be used in some embedded systems. Others are extremely specialised, resulting in a single application An implementing the entire logic. T

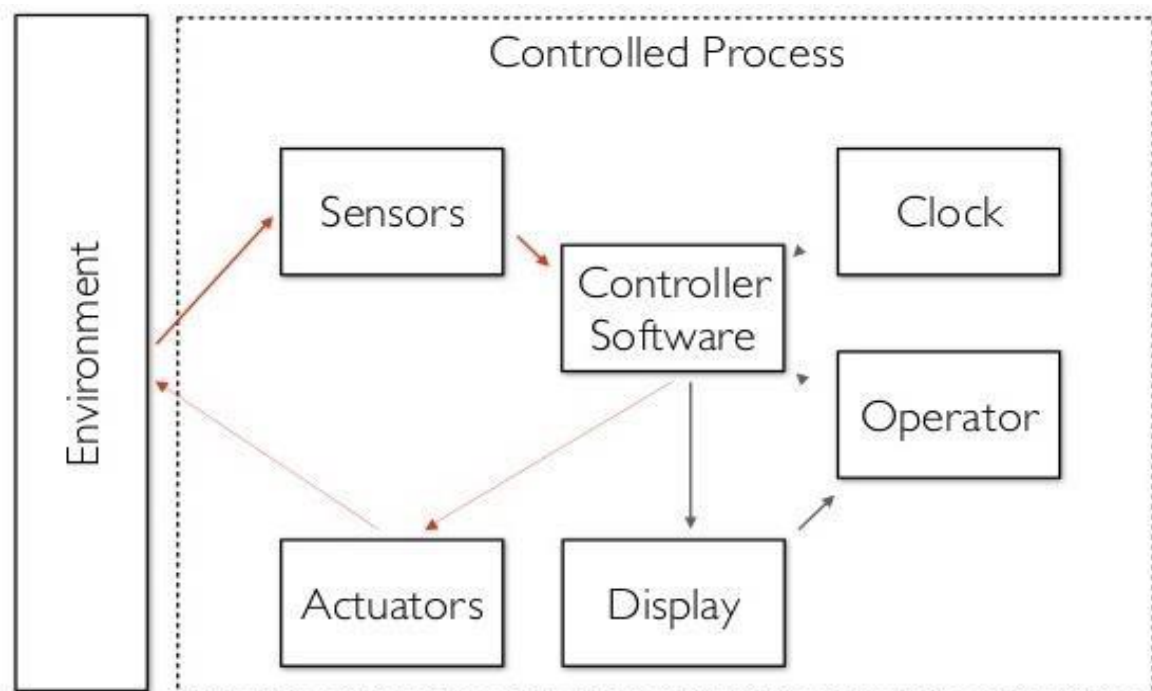


Figure 1.3 Block diagram of ES

EMBEDDED SYSTEMS APPLICATIONS:

They are used in automotive embedded systems

- Networking, mobile computing, and wireless communications, for example, are examples of embedded systems in telecommunications.
- Banking, telecommunications, and surveillance systems are also included in applications.
- Defence, communication, and aerospace systems are all embedded in satellites and missiles.
- In digital consumer electronics, embedded systems provide setup boxes, DVD's and other electronic devices.

1.2 MACHINE LEARNING

It consists of many applications in which it creates a mathematical type model which is called training data to make predictions without specifically used for. Artificial Intelligence is also a part of it. This is used in mathematical problem reduction since it contains techniques, theory and applications. A related data to this is Data Mining used in data analysis.

Based on either signal or feedback the methods are historically divided into these following categories:

Depending on the essence of the "signal" or "feedback" available to the learning system, machine learning methods are historically divided into three different categories:

- Knowledge learning: With the aim of learning a general rule that maps inputs to outputs, a "teacher" provides the system with example inputs and ideal outputs.
- Unsupervised learning: The main aim is to learn algorithm of hidden pattern present in data learning.

- Reinforcement learning is the point at which a PC program speaks with an intricate world to accomplish a particular goal (like driving a vehicle or playing a game against a rival). The product is taken care of information as it explores its concern room which it attempts to amplify. Different techniques have been set up that don't perfectly find a way into this three-overlay arrangement, and an AI framework can utilize multiple purpose.



Figure 1.4 Machine Learning

1.3 OpenCV

OpenCV is a free programming library for computer vision and artificial intelligence. OpenCV was created to provide a shared foundation for PC vision applications and to assist businesses in fusing computer data more quickly. Since OpenCV is a BSD-approved programming, it is simple for businesses to use and modify the code. Open CV is used by all website and company like Microsoft and other leading companies.

When the MMX and SSE directions are available, OpenCV strongly favours continuous vision applications. At the moment, a fully highlighted CUDA and OpenCL interface is being created.

1.4 TENSORFLOW

. It's a representative number related library that is likewise utilized in neural organizations and other AI applications which is utilized for both exploration and creationTensor Flow takes its name from the operations that these neural networks perform on multidimensional data arrays known as tensors. In June 2016, Jeff Dean announced at the Google I/O Conference that there were 1,500 GitHub repositories mentioning TensorFlow.

1.5 KERAS

Keras is a human-centric API, not a machine-centric one. Keras adheres to best practises for reducing cognitive load, such as providing consistent and straightforward APIs, reducing the number of user actions needed for common use cases, and providing transparent and actionable error messages.

François Chollet, a Google engineer, created and maintains Keras based on guiding principles:

- **Modularity:** A model may be viewed as a single sequence or graph. A deep learning model's problems are all discrete components that can be combined in any way.
- **Minimalism:** The library offers just what is necessary to accomplish a goal, with no unnecessary frills and a focus on readability.
- **Extensibility:** New modules are designed to be simple to incorporate and use within the system, allowing researchers to experiment with new innovatons.

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CHAPTER 2

LITERATURE SURVEY

2.1 E-HEALTH SENSORS AND CLOUD:

A SMART SYSTEM CONNECTING E-HEALTH SENSORS AND THE CLOUD

This technique is intended to reduce the delayed carriage of patient's medical records to health professionals, especially In accidents and emergency situations, eliminating physical data entry and increasing bed capacity, especially in the course of large-scale public events. The system's design is focused on medical sensors which uses wireless sensor networks to calculate patient's physical parameters. These sensors analyze the body and send data to cloud through wireless network. Patient's can receive high-quality care as a result of the e-health smart system's support for medical professionals, which includes real-time data collection, the elimination of physical data acquisition and tracking of large group of people affected.

2.2 BODY CLOUD:

INTEGRATION OF CLOUD COMPUTING AND BODY SENSOR NETWORKS

Vast volumes of contextual data are produced due to the body sensors used by a large population of people, which necessitates a scalable storage and processing solution. Body sensor data streams can be analyzed and mined both online and offline using cloud computing's efficient, scalable storage and processing infrastructure.

2.3 HEART RATE MONITOR SYSTEM:

NON-INVASIVE HEART RATE MONITORING SYSTEM USING GIANT MAGNETO RESISTANCE SENSOR

This paper presents a elementary heart rate monitoring device that was designed and augmented using Giant Magneto-Resistance sensor, which is worn on the wrist. Simple analogue and digital instrumentation stages process this signal to produce a heart rate indication. The system have been prototyped and the test results from 10 volunteers have been taken. The system's heart rate estimate error is just 2 beat per minute. The system's output is examined when a coating of fabric is present between human body and the sensor. Experimentation has also been used to prove the system's capability as an HR variability estimator.

2.4 HEALTH MATE: (SWSHM)

SMART WEARABLE SYSTEM FOR HEALTH MONITORING (SWSHM)

It's a valuable tool that's been around for a while. They're a pair of end-to-end connected source and sink (aggregator) nodes that can interact locally or remotely with each other. On the other hand, a number of these sensors can be used in Wireless Body Area Networks (WBAN), a modern type of health monitoring. Patients' preferences for an advanced, low-cost, and flexible system that allows them to be aware of changes in their physiological and non-physiological body parameters has been influenced by technology. The Health Mate system, which is based on a Smart Wearable System for Health Monitoring, is proposed as a solution for real-time health monitoring to fulfil this requirement. The Health Mate system, which is based on a Smart Wearable System for Health Monitoring, is proposed as a real-time health monitoring solution to fulfil this requirement (SWSHM). The aim of this paper is to create a health monitoring system that allows patients to measure their body parameters using e-Health sensors on their smartphones while also allowing doctors to remotely check on their patients' health status in their bodies.

2.5 IMAGE-BASED FACE DETECTION AND RECOGNITION

In biometrics science, face recognition from a picture or video is a hot subject. Surveillance cameras for video recording are commonly used in public places, and these cameras have proven to be of great benefit in terms of protection. Face detection is a difficult problem in computer vision since the person's face is a complex systems because it does not require the cooperation of the object entity with a high level in appearance. The accuracy and speed of identification are critical in this area.

CHAPTER 3 EXISTING SYSTEM

3.1 EXISTING SYSTEMS

- Comprehensive healthcare is required in both developed countries, where healthcare costs are high and protection and privacy are critical concerns, and developing countries, such as India, where hospitals must accommodate a large number of patients and robust healthcare procedures are required.
- Doctors can visit and check on the patient on a regular basis. It is possible that a nurse may make an error when recording the study.
- Haar-like features are used in the face detection process, and the region of interest is reset to minimise the variable of appearance changes. The FER method extracts HOG features from each facial area, and then uses a support vector machine to characterise the final facial expression.

3.2 DISADVANTAGES:

Data collected will not be available immediately.

- This machine is not connected to the internet, and its efficiency is poor.
- Doctors can check on the patient on a regular basis.
- It's possible that a situation arises in which a nurse makes a mistake when recording the study.
- A decrease in productivity is caused by poor picture quality.

CHAPTER 4 PROPOSED SYSTEM

4.1 METHODS OF APPROACH

The proposed system consists of two types one is the face mask detection using python and the health monitor system using Arduino. The python code is used to identify whether the person is using a mask for face or not and the health monitor system is used to measure the human temperature, heart rate and pressure.

Primarily the python code consists of tensor flow, KERAS library and open CV to implement face mask detection and gives the accuracy report.

- Methodology:
 1. Develop a deep learning model (MobileNetV2)
 2. Use a mask detector to detect objects in photographs or a live video stream.
- A possible Internet of Things (IoT) technology in healthcare and physical distance tracking for pandemic situations.
- A practical method for storing patient data across several servers. The most significant contribution is the safe distribution of patient data across several data servers.
- The hardware element consists of two parts one is receiver and another one is transmitter. In the transmitter part the data are collected from the sensors such as temperature sensor, Heart rate sensor and pressure sensor. The sensor data as a fed as input into the Arduino board and from the Arduino board the input is sent into ZigBee transmitter by the Bluetooth connection. The transmitted data is then collected in the receiver end where ZigBee Receiver is located.

At the receiver end the data is processed and displayed in the webpage.

4.2 FACE MASK DETECTION & HEALTH MONITORING

The procedure is as follows:

1. Look for COVID-19 face masks in photos.
2. Scan real-time video streams for face masks

During the first phase in the python code first the script is trained to check whether the person is using a face mask or not by uploading a dataset and this system acts as a detector.

1) Training phase

In this training phase the dataset consists of with mask and without mask photographs is uploaded to the python script which is stored in the disc. Using the dataset, the python script is trained to detect whether the person is wearing a mask or not

2) Implementation phase

In the implementation phase while after completing all the training of the dataset the facemask detector is used to identify each face in the live video stream or in the image that is externally loaded from the user and displays the result with the rectangular box around the face may have red or green color specifying that red is for no mask and green is for with mask photographs. This analysis was done by comparing the live captured image with the dataset image and analyzing the result to be displayed.

4.3 FLOW CHART

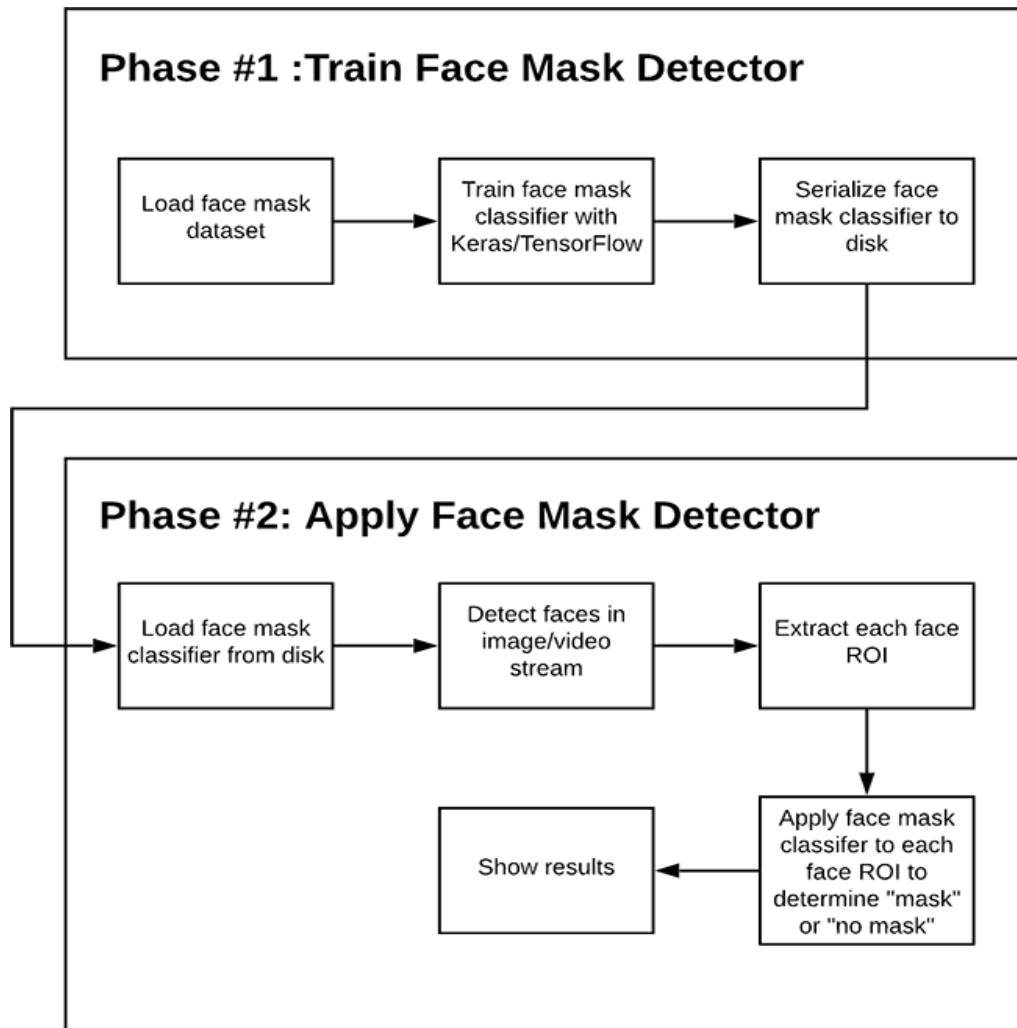


Figure 4.1 Flowchart

Face mask classifier detects faces in images/videos and applies them to real-time video sources.

- Identifying and extracting each human face
- Using our face mask classification system

4.4 PREPROCESSING PROCEDURES

ACQUISITION OF IMAGES

The photos for face mask detection were taken from the “kaggle website” for two LABELLING a Image.

The 'Labellmg' programme, which is a python-based graphical image annotation application, is used to mark the images collected. Labellmg creates a graphical user interface with Qt (an open-source widget toolkit).

(ii) ATTRIBUTES IN AN XML FILE

The marked images are stored in PASCAL VOC format as 'XML' files. This dataset can be used as ground truth for Face mask images, as well as for future analysis.

RESIZE

When you resize an image, you're adjusting the size of the image without changing the amount of data in it. Resizing an image without resampling increases the actual scale of the image without altering the pixel dimensions. During the resizing process, no data is added or removed from the image.

CONTRAST ENHANCEMENT

Until processing, image enhancement is the method of enhancing the image quality and information content of raw data. In order to increase contrast, contrast manipulations include changing the range of values in an image.

4.5 ALGORITHM

4.5.1 MOBILENETV2

In the MobilenetV2 algorithm is derived from mobilenetV1 which uses the concept of convolution.

- i) Layer bottleneck in a linear fashion
- ii) Links between bottlenecks that aren't as long.

Below is a diagram of the basic structure.

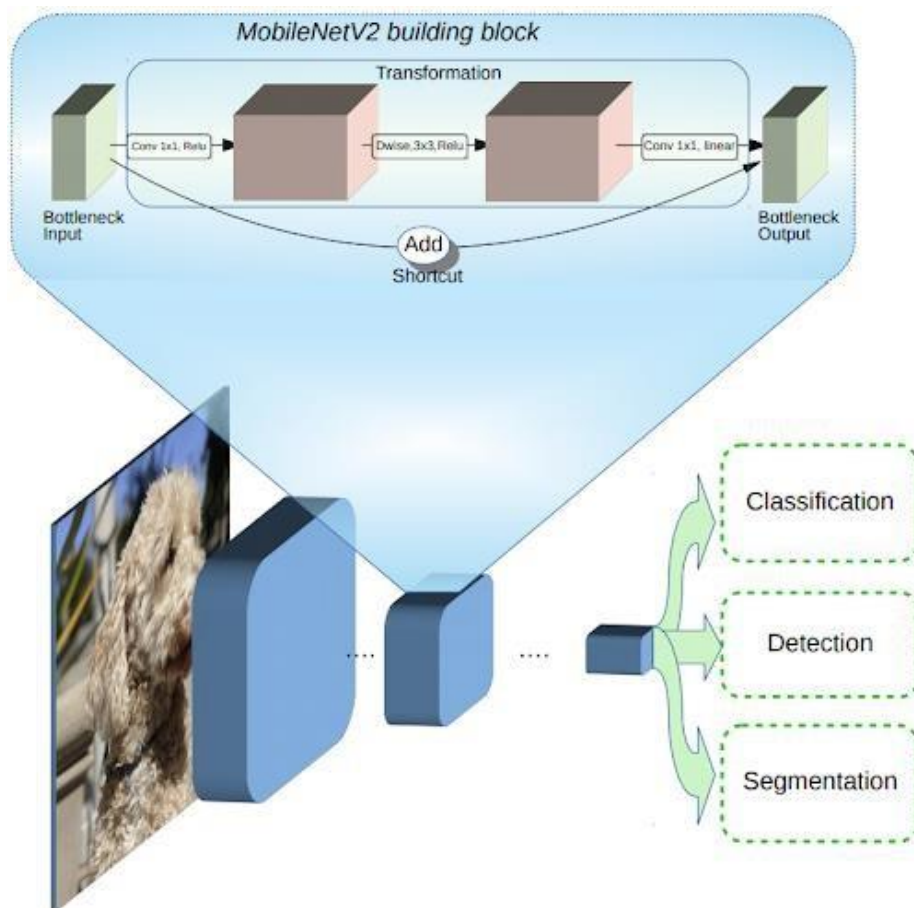
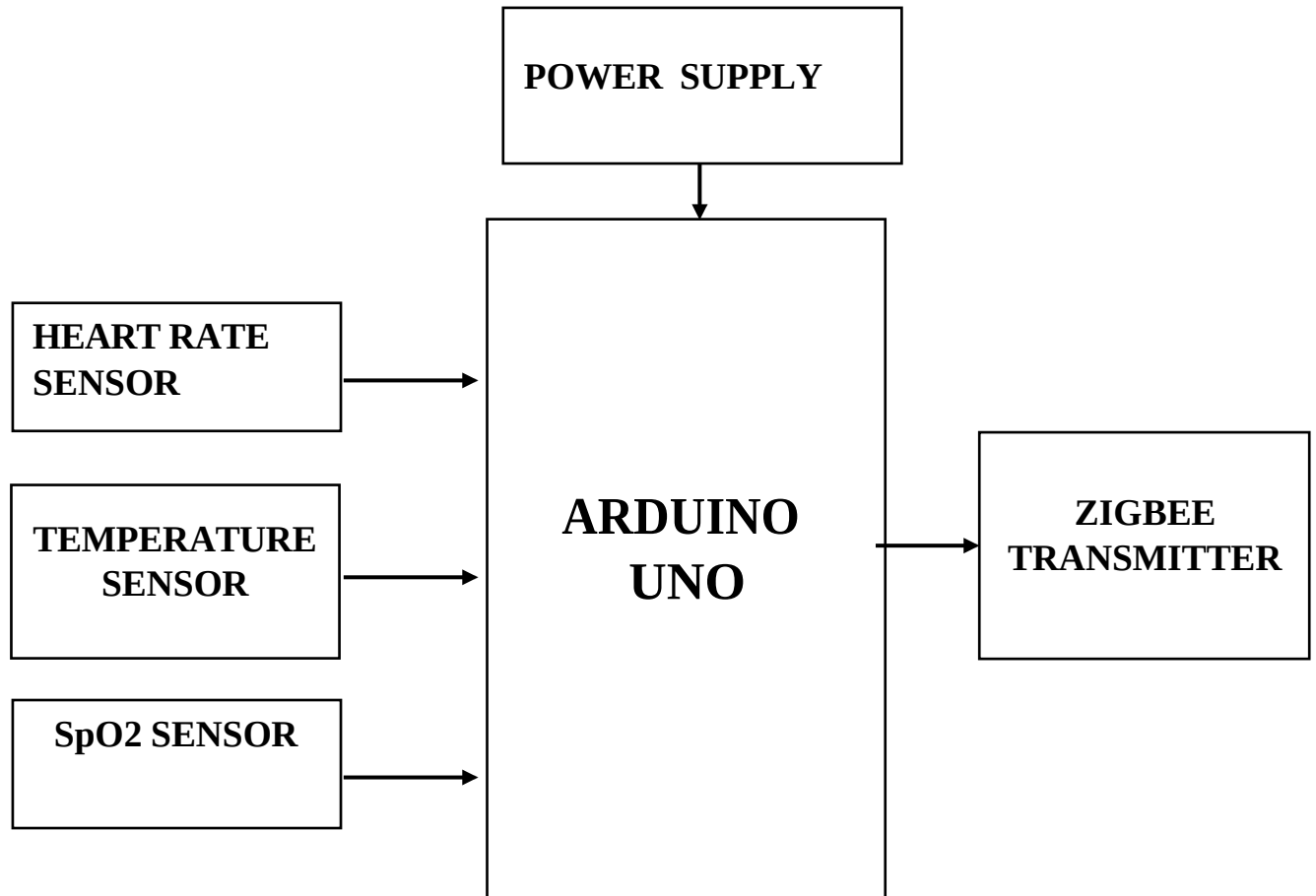


Figure 4.2 MobileNetV2

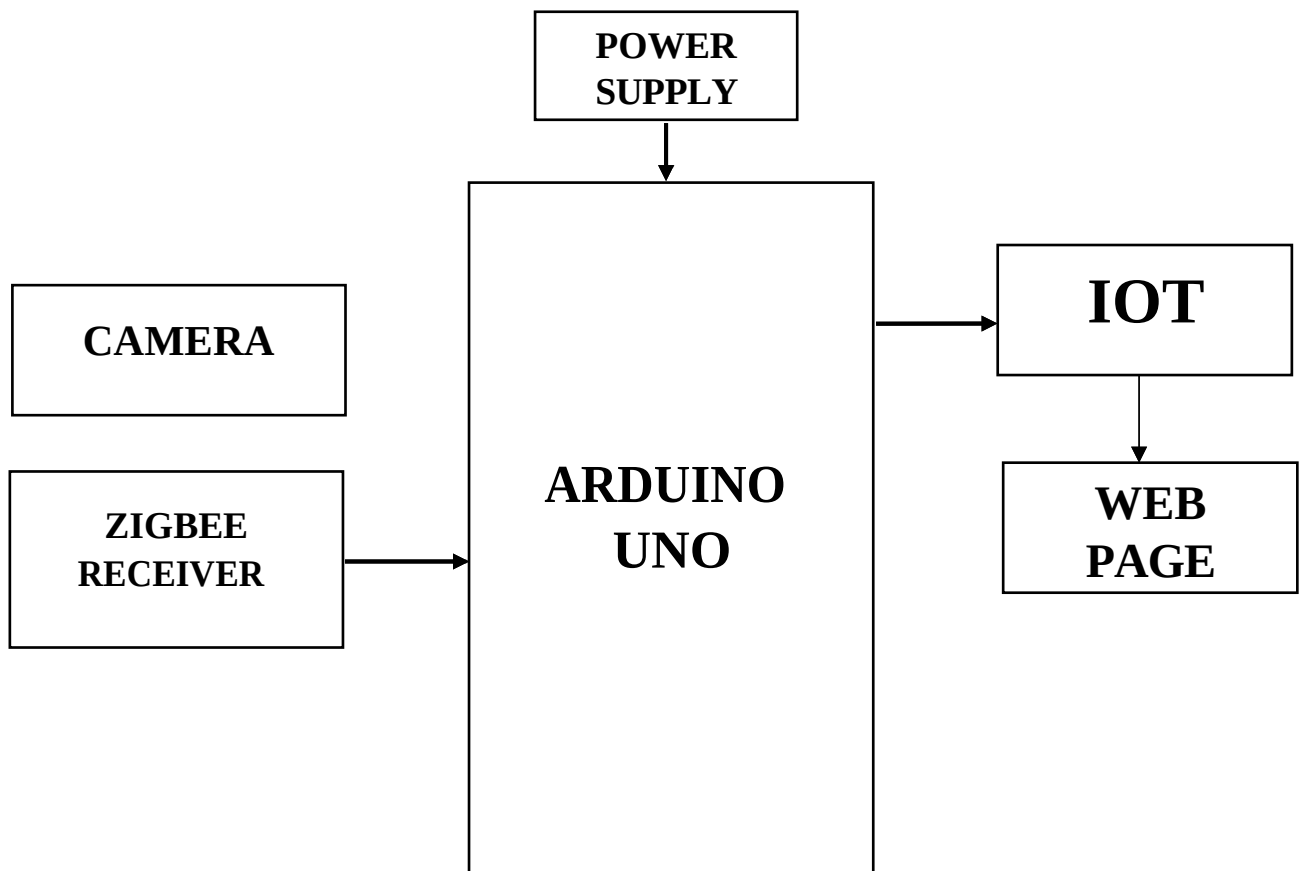
The layers in a typical MobilenetV2 architecture are described below. The ImageNet dataset is used to determine the weights of each layer. The algorithm MobileNetV2 was chosen to create a model that could be implemented on a mobile device.

4.6 HEALTH MONITORING

4.6.1 TRANSMITTER SECTION



4.6.2 RECEIVER SECTION



4.7 HARDWARE REQUIREMENTS:

- Arduino uno
- Temperature sensor
- Heart rate sensor
- Pressure sensor
- Zigbee transmitter
- Zigbee receiver
- IOT module

4.8 SOFTWARE REQUIREMENTS:

- Arduino IDE
- Embedded C
- PHP

4.9 HARDWARE TERMINOLOGIES

4.9.1 ARDUINO UNO:

This is a microcontroller integrated with 14 digital pins of input and output. The analog pins consist of only 6 pins containing everything to support microcontroller.



Figure 4.3 Arduino UNO

(i) POWER:

There are four types of power supply pins in arduino

- **VIN**

VIN pin is used to connect the power supply which is provided externally by the user its voltage is 5V. One can access this by using Power jack connector.

- **5V**

The 5V is given from board regulator. The DC power has 7-12V.

- **3V3**

3V3 pin is named because it supply the voltage of 3.3 volt supply to the Arduino.

- **GND**

GND is abbreviated as ground pin . To terminate the negative end it is used.

(ii) MEMORY

ATmega328 has 32 KB of memory. There is memory storing capacity of 2KB(kilo byte) of SRAM and 1KB of EEPROM on arduino board.

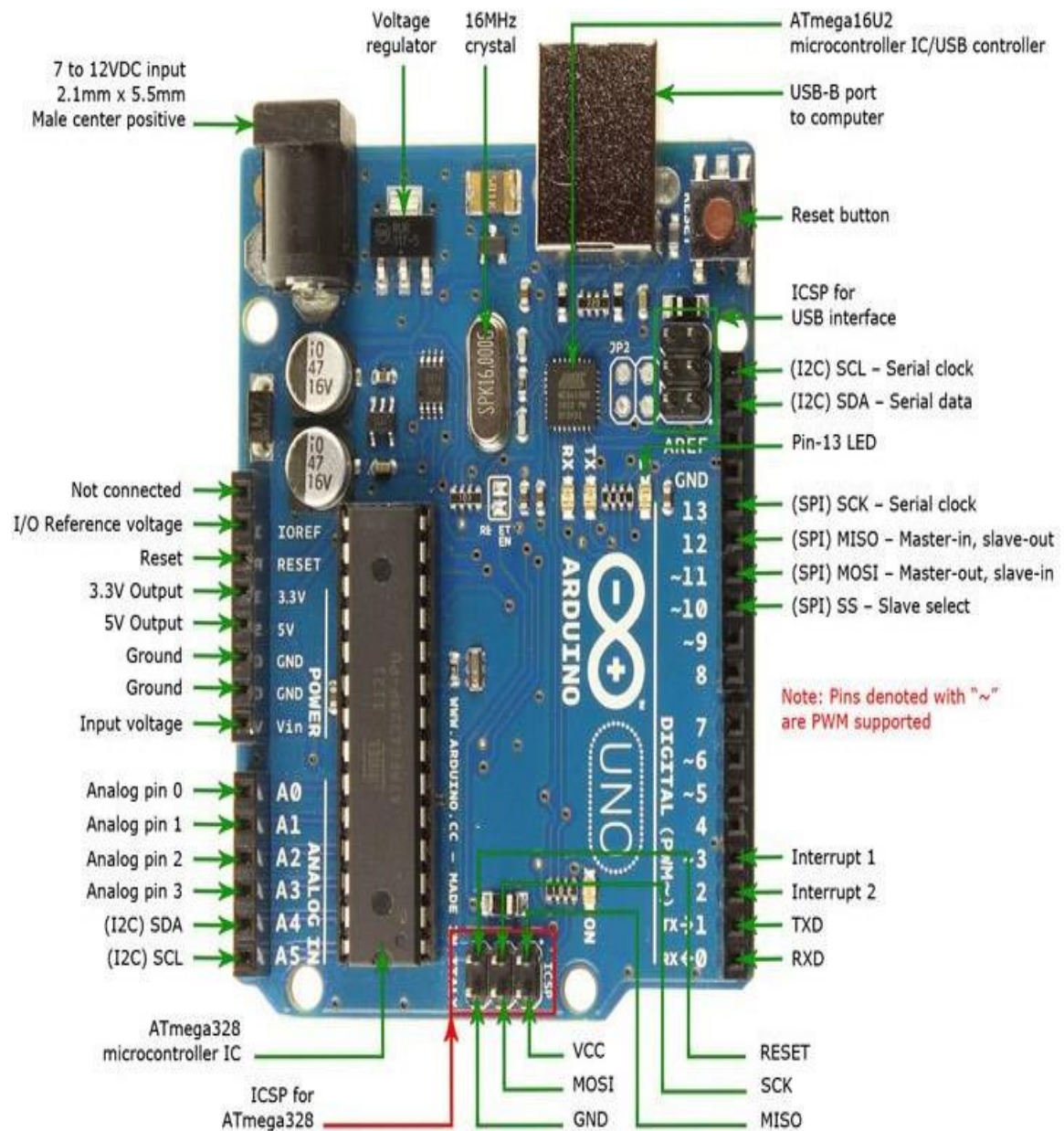


Figure 4.4 Arduino Pins

(iii) USB Overcurrent Protection

For protection purpose the fuse is added as a security layer. If more current is supplied it breaks off the link if exceeds 500mA is done using the USB port.

4.9.2 HARDWARE ZIGBEE MODULE TRANSMITTER & RECEIVER:

- - Zigbee consist of two types transmitter and receiver ZIGBEE is most common commonly used because of its advantages some of the advantages of using zigbee are it works under Bluetooth, it is low-cost, it can be operated in low power supply also.
 - It has a line of sight of 10 m 200 m it can be varied on the power supply that is connected in the output
 - It is most commonly implemented in the application which acquires data and also a high battery life.
- Its chips are typically combined with radios and microcontrollers with flash memory ranging from 60 to 256 KB.



Figure 4.5 ZigBee Module

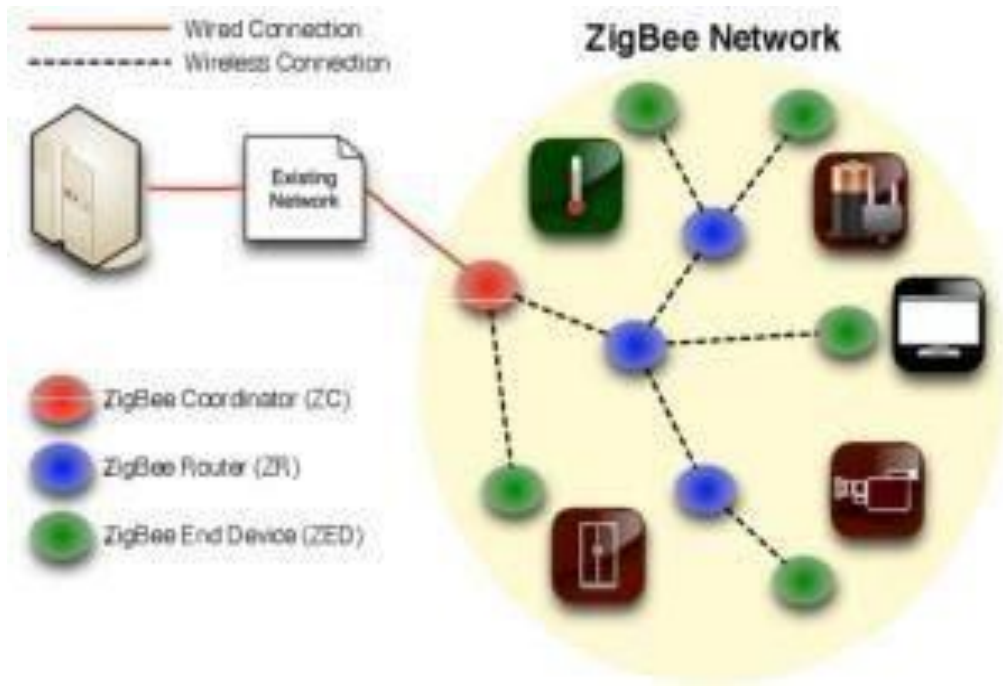


Figure 4.6 ZigBee Network

4.9.4 HEART RATE SENSOR

The optical power difference as light is scattered or absorbed during its journey through the blood as the heart beat shifts may be used to calculate heart rate.

The heart rate is calculated by using the formula the number of times when heart beat beats per minute that is 60 seconds.

The heartbeat is the sound of the heart's valves contracting or expanding as they force blood from one place to another. The photo plethysmography concept is used to power the heartbeat sensor

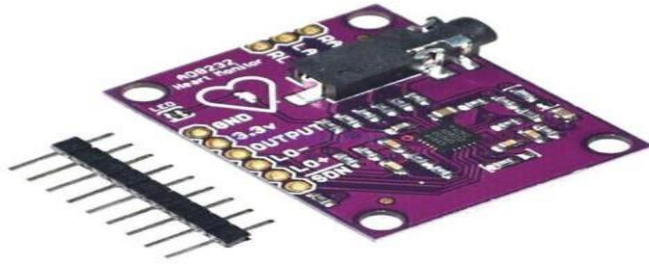


Figure 4.7 Heart rate Sensor

Each heart beat produces a different detector signal. The signal from the different detectors is transfer its form into an electrical pulse signal, which are referred to as a pulse. Via an amplifier, this electrical signal is amplified and activated.

Ways to Measure a Heartbeat

- **Manual Way:**

Heart rate can also be measured manually by a doctor. Commonly people have the heart beat in the left hand wrist or in the neck region. The heartbeat that is in the hand is called radial pulse. The pulse in the region is called neck pulse. One can calculate the heart rate by placing the two fingers one was in X and another one middle finger on the hand for 30 to 60 seconds to generate the actual heart rate per minute (60 seconds).

- With a sensor:

With the help of the sensor the heart rate is calculated when the blood flowing through the hand the difference between the light while blood flowing which is scattered inside the skin and absorbing the difference in light to determine the heartrate.

The optical power difference when light is scattered or absorbed along its journey through the blood as the heart beat shifts may be used to determine heart rate.

Heartbeat Sensor used practically

- Heart Rate Sensor is an example of a practical heartbeat sensor. It's made up of an infrared led and a light-emitting diode (LED) embedded in a clip-like structure. The detector part of the clip is attached to the flesh and is attached to the organ (earlobe or finger).



Figure 4.8 Practical heartbeat sensor

Pin1: To provide power to the LED, pins 2 and 3 are grounded. The output is pin 4. Pin 1 is also the enable pin, and pulling it high activates the Light Emitting Diode and activates the sensor device. It's built into a wristband, and the output can be transmitted wirelessly (via Bluetooth) to a computer for processing.

4.9.5 TEMPERATURE SENSOR:

A temperature sensor senses the temperature of each person and is calculated in degrees.

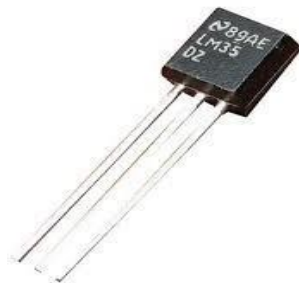


Figure 4.9 Temperature Sensor

Basically there are two types of temperature since they are:

- Contact
- Non-Contact

4.9.6 PRESSURE SENSOR.

Pressure sensors are used in thousands of daily applications for control and monitoring. Other variables such as fluid/gas flow, speed, water level, and altitude can be measured indirectly using pressure sensors. Pressure sensors are also known as pressure transducers, pressure transmitters, and pressure sensors. Pressure sensors differ greatly in terms of technology, design, efficiency, applicability, and cost. Pressure sensors are made by over 50 inventions and at least 300 companies around the world, according to a conservative estimate.

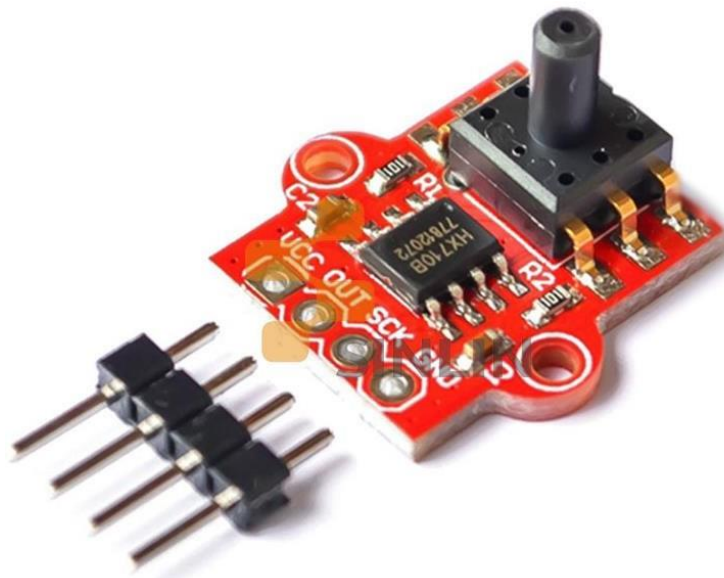


Figure 4.10 Pressure Sensor

There is also a type of pressure sensor that is designed to measure in a dynamic mode in order to capture very fast pressure changes. This type of sensor could be used to measure combustion pressure in an engine cylinder or a gas turbine, for example. Piezoelectric materials, such as quartz, are widely used to make these sensors.

Some pressure sensors are pressure switches that turn on or off when a certain amount of pressure is applied. A pressure switch, for example, will control a water pump so that it starts when water is released from the system, lowering the pressure in a reservoir.

(i) Operating Principles

When the diaphragm is bent due to an external force, the semiconductor piezo-resistance dispersion pressure sensor has a semiconductor distortion gauge formed on the diaphragm's surface, and it uses the piezo-resistance effect to translate changes in electrical resistance into an electrical signal (pressure).

Typical model:E8F2

A static capacitance pressure sensor is made up of a capacitor with a static glass electrode and an opposing movable silicon electrode that converts changes in static capacitance induced by an external force (pressure) into an electrical signal.

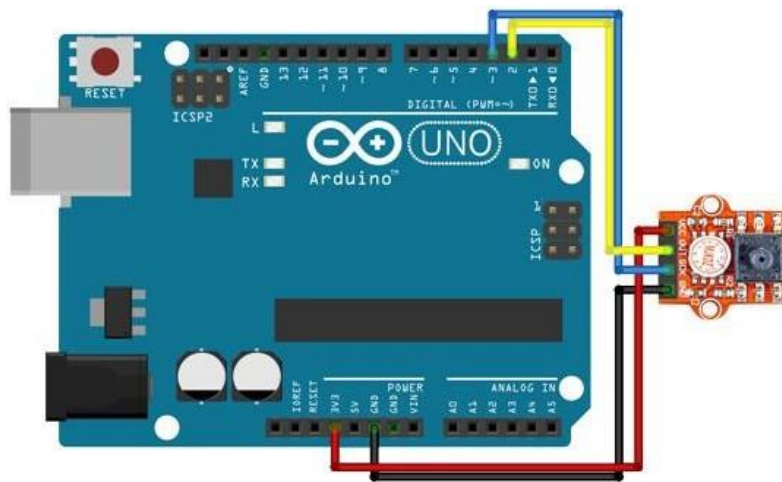


Figure 4.11 Arduino Operation

4.9.7 IOT MODULE

The ESP8266 WiFi Module is a self-contained SOC with an integrated TCP/IP protocol stack that can provide WiFi connectivity to any microcontroller. The ESP8266 can either host an application or offload all WiFi networking functions to a separate application processor. Each ESP8266 module is pre-programmed with AT command set firmware, so you can simply connect it to an Arduino computer and

get about as much WiFi functionality as a WiFi Shield (right out of the box)! The ESP8266 module is a low-cost board with a large, and rapidly growing, community.

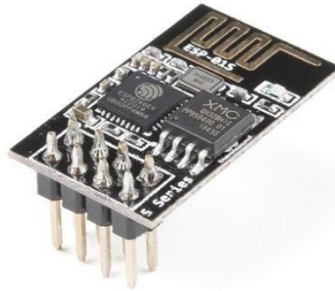


Figure 4.12 IoT Module

4.9.8 EMBEDDED C:

Embedded C is the most widely used programming language in the software industry for creating electronic devices. Embedded software is connected with each processor used in an electronic device.

Embedded C programming is important for the processor to perform specific tasks. We use a variety of electronic devices in our daily lives, such as a cell phone, a washing machine, a digital camera, and so on. All of the devices are controlled by a microcontroller that is programmed in embedded C.

The Embedded C code in the block diagram above is used to blink the LED connected to the microcontroller's Port0.

C code is favoured over other languages in embedded machine programming. Because of the following factors:

- Easy to comprehend
- Exceptional Reliability
- Convenience
- Scalability is essential.

A programming language is a set of one or more functions that are used to perform a specific task. A function is a collection of statements that are used to perform a specific task. Application software, which provides functionality on a device, is common to the majority of consumers. Embedded software, on the other hand, is less apparent but no less complex. Embedded software, unlike application software, has set hardware specifications and features, and the addition of third-party hardware or software is strictly controlled. Embedded software must contain all necessary device drivers at the time of manufacture, and device drivers are written specifically for the hardware.

The programme is extremely reliant on the CPU and the specific chips used. Most embedded software engineers have a basic understanding of reading schematics and component data sheets to assess register and communication system use. Bit manipulation and conversion between decimal, hexadecimal, and binary are both useful. While XML files and other output may be transferred to a computer for display, web applications are seldom used. SQL databases, as well as file systems with directories, are usually not present.

A cross compiler, which runs on a computer but produces executable code for the target device, is needed for software development. An in-circuit emulator, such as JTAG or SWD, is needed for debugging. The source code for the kernel (OS) is often available to software developers.

4.9.9 ARDUINO IDE

Arduino which is a microcontroller commonly known as open-source framework which can be applicable to create electronic projects. Arduino is made up of a PPC board abbreviated as “physical programmable circuit board” (microcontroller) and software, known as an IDE (Integrated Development Environment), which runs on the PC and where one can upload and write computer coding to the physical board which is PPC.

The Arduino IDE which is called as integrated development environment platform has risen in popularity with human who are just getting started with electronics, and with good reason. On the hardware specification of Arduino, it is free from piece of additional hardware it is connect to PC via USB cable. Furthermore, the Arduino IDE makes programming simpler by using a non-complex version of C++. Finally, Arduino offers a regular form factor that separates the microcontroller's functions into a more manageable kit.

For some example of any Designers, hackers, Artists, newbies, hobbyists, and anyone involved in building interactive objects will benefit from the Arduino software and hardware. Buttons, Light emitting diodes LEDs, generators, motors, loud speakers, Global positioning system GPS , phone and digital cameras, the telephone, and even your smartphone or television can all be regulated by Arduino. Because of this simplicity, as well as the fact that the Arduino software is free, the hardware boards are relatively inexpensive, and both the software and hardware are simple to learn, a broad group of users has contributed code and published instructions for the wide variety of Arduino-based projects.

Arduino comes in a different specification of shapes and sizes, each of which can be applied for a particular purpose. While some boards which vary from the one shown below, the majority of these components are found on all Arduinos.



Figure 4.13 Arduino Code

4.9.10 INTERNET OF THINGS:

- IoT -The Internet of Things applies to situations in which network communication and computing capabilities are extended to objects, sensors, and everyday items that aren't usually thought of as computers, enabling these devices to produce, share, and consume data with minimal human interference. There is no single, standardised description, however.
- Enabling Technologies: Computers, sensors, and networks have all been used to track and manage devices for decades. However, a recent convergence of many technology industry developments is taking the IoT reachable to mainstream adoption. Ubiquitous Connectivity, Widespread Use of IP-based Networking, and Commuting are among them.
- Connectivity Models: Various technological communications models are used in IoT implementations. Device-to-Cloud, Device-to-Gateway, Device-to-Device, and Back-End Data-transferring are four common communication models defined through the board called as Internet Architecture.

Two types of units both the software and hardware components are applied to construct IoT devices. To build the connection with the world and to perform more computationally complex tasks, given to the hardware components are used. Software that stops the inputs and controls the device is run on microcontrollers. The functions of both the software and hardware elements in the device are discussed in this module. The functions of popular hardware components are defined, and also the software-hardware interface provided by the microcontroller. The interaction between the programme and the microcontroller is often supported by an operating system in IoT devices. We'll discuss the role of an operating system in an IoT device and how it differs from a standard operating system.

An IoT ecosystem is building block of web-enabled smart devices which are implemented by embedded processors, sensors, and communication hardware to collect, distribute, and act on data from their surroundings. IoT devices can share sensor data with an Internet of Things gateway or other side node, which can then be transfer to the IoT cloud for analysis or analysed locally. These devices may sometimes interact with one another and take action based on the data they collect. Humans can communicate with devices to connect with them up using internet, support them with the directions, or access data, on the other hand the IoT devices do the most of the work themselves.

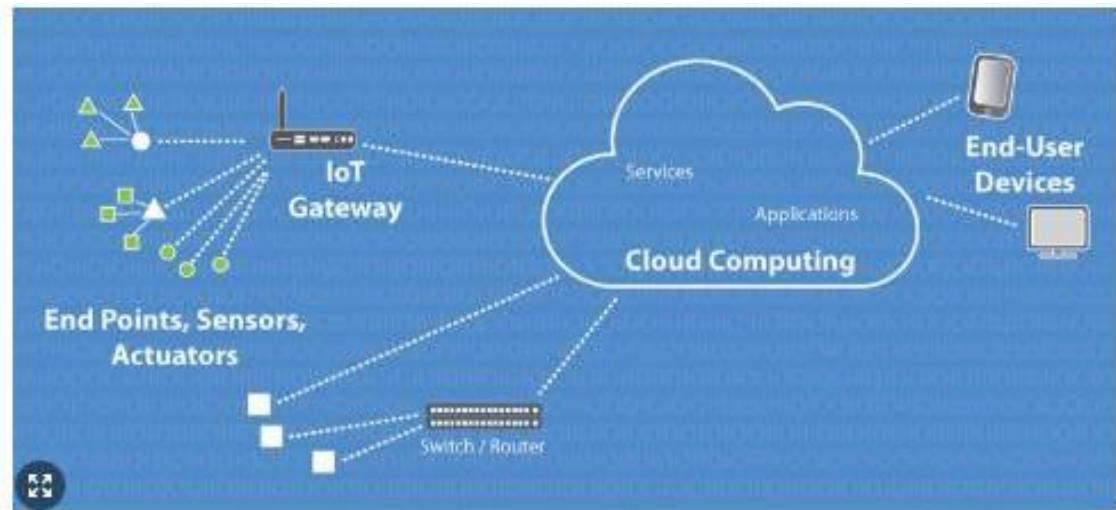


Figure 4.14 Cloud Computing

An IoT ecosystem is made up of web-enabled smart devices that use embedded processors, sensors, and communication hardware to collect, distribute, and act on data from their surroundings. IoT devices can share sensor data with an IoT gateway or other edge node, which can then be sent to the cloud for analysis or analysed locally. These devices may sometimes interact with one another and take action based on the data they collect. Humans can communicate with devices to set them up, give them directions, or access data, but the devices do the majority of the work themselves.

Internet of Things (IoT) Advantages

The internet of things provides companies with a range of advantages, including the ability to:

- track their overall business processes;
- enhance customer satisfaction;
- save both time and money;
- increase worker productivity;
- combining and adapting business models;
- make more informed business decisions;
- Increase your sales.

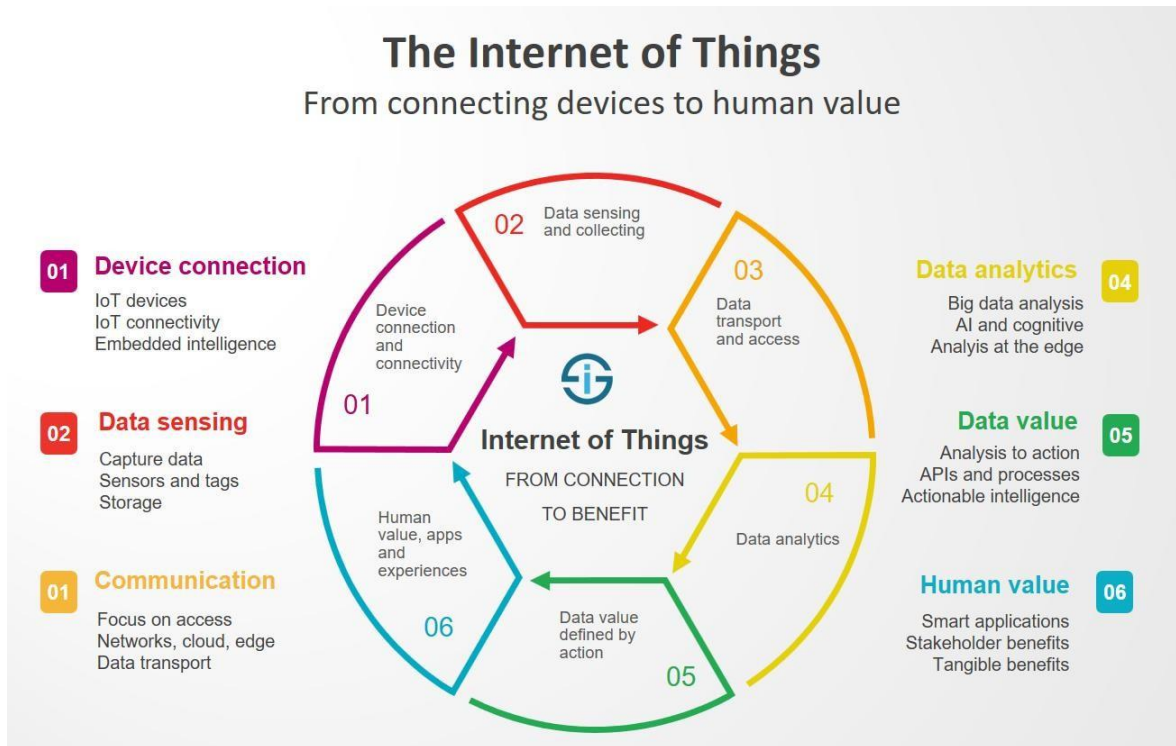


Figure 4.15 IoT

CHAPTER 5 RESULTS AND DISCUSSION

5.1 CONFIGURATION

TRANSMITTER END

The hardware consists of two sections namely transmitting and receiving section. The transmitting section has all sensors with the power supply. The pressure sensor, heart rate and temperature sensors are connected with the Arduino Uno in the analog pins. The sensors are connected in a common board which is connected to the zigbee transmitter.

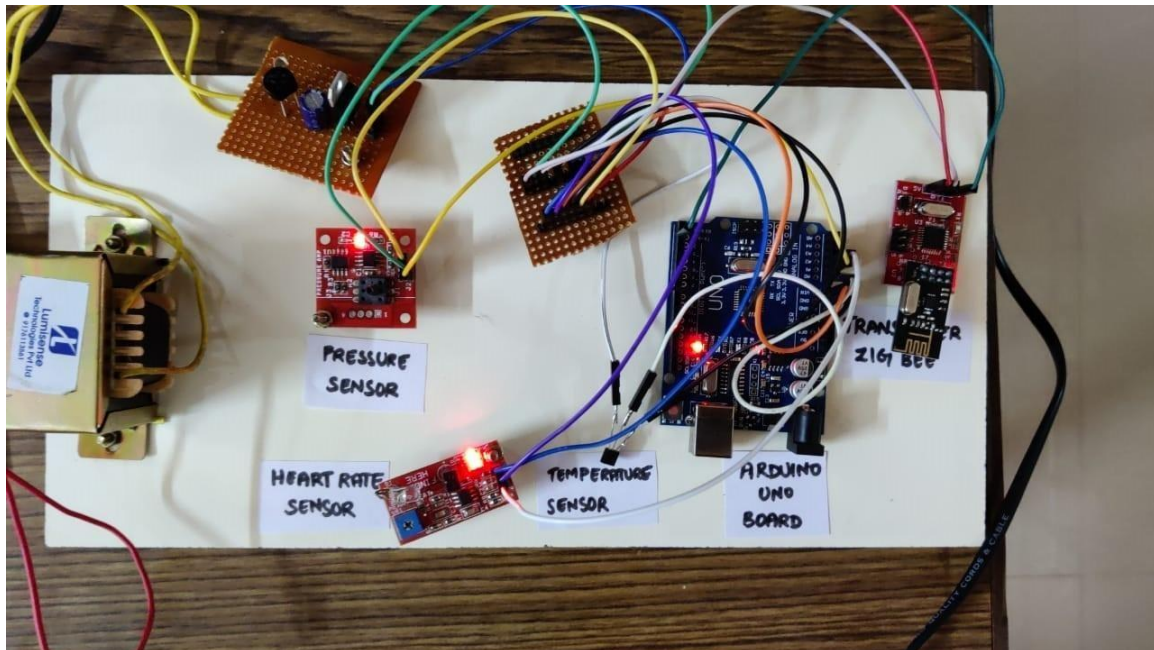


Figure 5.1 Transmitter Connection

RECEIVER END

The transmitter section collects all sensor data and transmits the data through the zigbee transmitter to zigbee receiver by the optical source. Now all the data is stored in the IoT module and the output is displayed in the webpage. The webpage shows the output of each person's pressure rate, heart rate and temperature. Simultaneously it also detects mask wearing person and not wearing person.

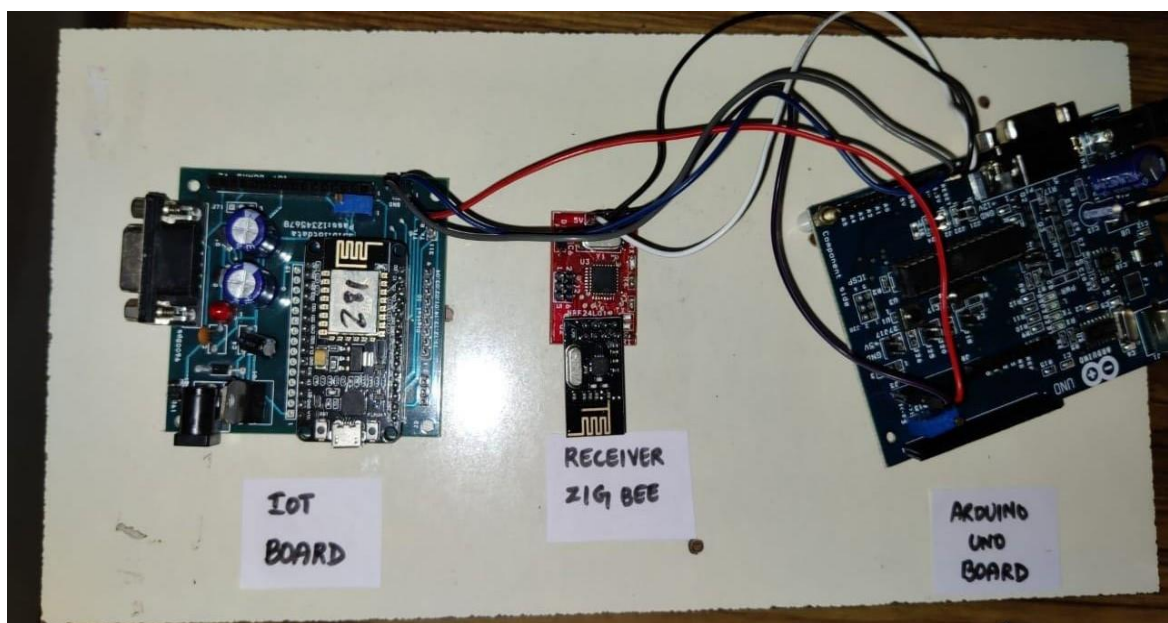


Figure 5.2 Receiver Connection

5.2 DATASET

5.2.1 WITHOUT MASK

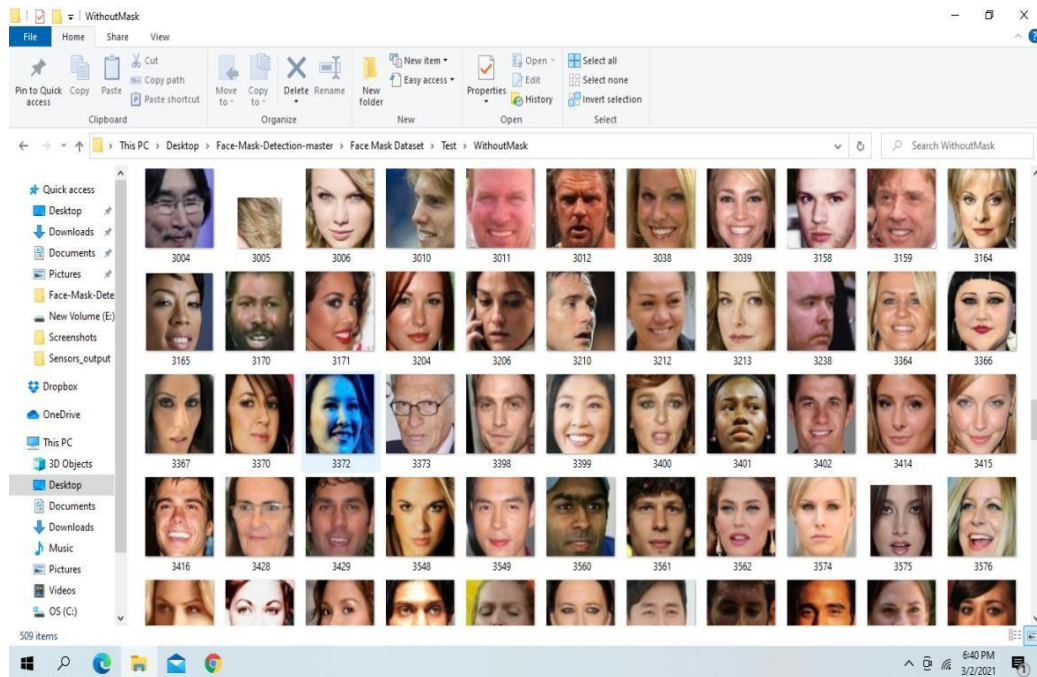


Figure 5.3 Dataset without mask

These are some of the dataset collected for references of how a person will not wear a mask so that it can detect the person and say that “No Mask”.

5.2.2 WITH MASK

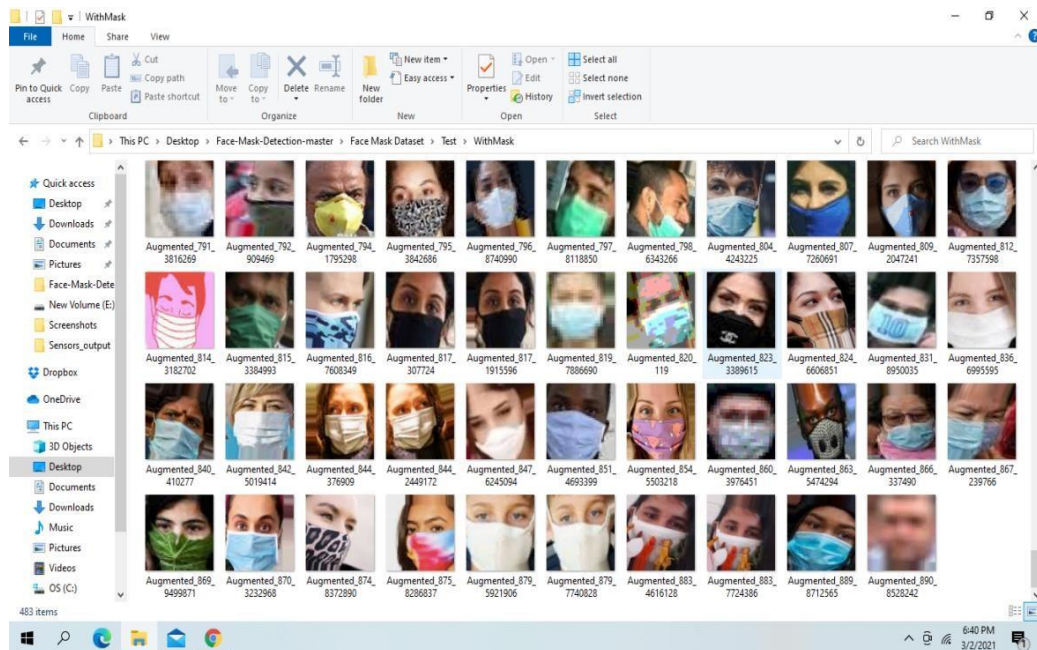


Figure 5.4 Dataset with mask

These are some of the dataset used for detecting the person with mask. During detection if the person has any kind of this position of wearing a mask then the result shows that "Mask" with accuracy level highlighted in green frame.

5.3 OUTPUT

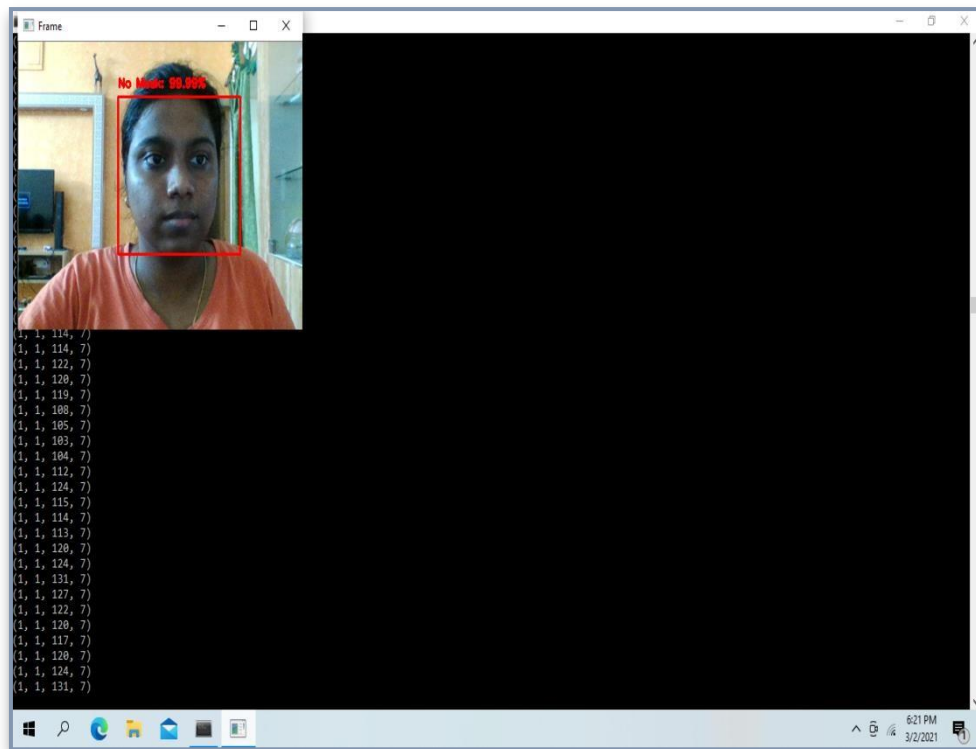


Figure 5.5 Output without mask

This result will occur when we do not wear a mask indicating the face in a red frame meaning no mask with accuracy level.

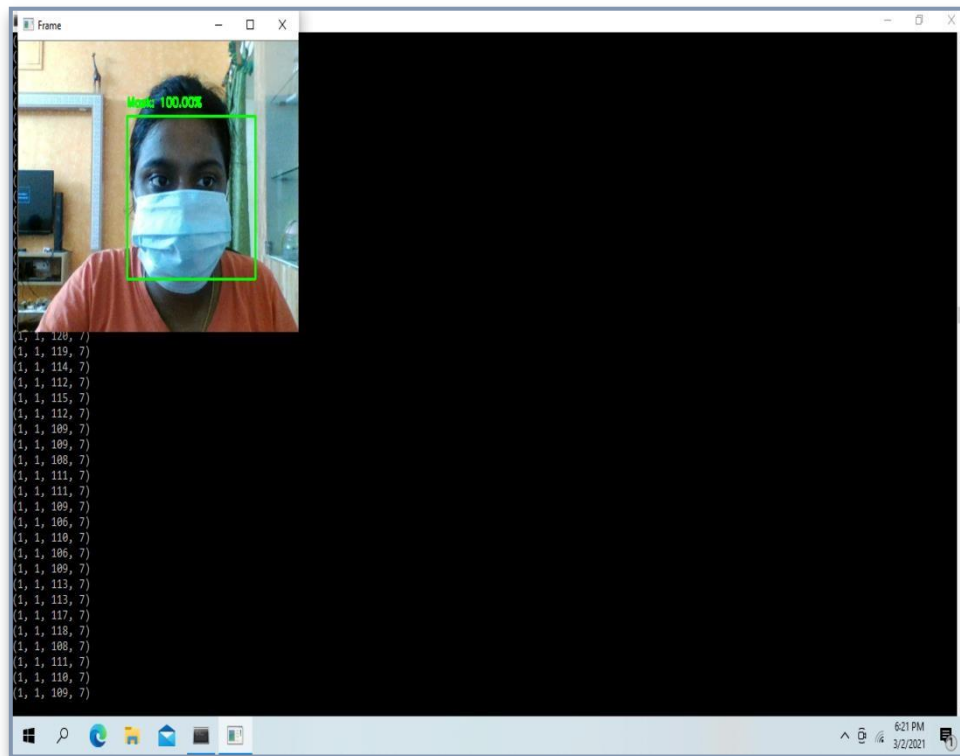


Figure 5.6 Output with mask

If the detected person wears a mask properly, it shows the person's face within the green frame indicating that mask is worn.

← → X Not secure | iotclouddata.com/20log/281/home.php

HOME

- Data Log
- Analog Log
- Digital Output
- Digital Input

DataLogs

Click Here To Delete Logs

LogID	DATA	Logdate	LogTime
1	heart_rate=_80Temperature=_36	03/02/2021	17:17:22
2	heart_rate=_88Temperature=_35Pressure=_53	03/02/2021	17:29:11
3	Pressure=_45heart_rate=_84Temperature=_36Pressure=_55	03/02/2021	17:30:11
5	heart_rate=_76Temperature=_36Pressure=_0	03/02/2021	17:30:35
6	heart_rate=_84Temperature=_36Pressure=_55	03/02/2021	17:33:19
7	heart_rate=_76Temperature=_36Pressure=_0heart_rate=_88Temperature=_35Pressure=_53	03/02/2021	17:33:48
8	heart_rate=_80Temperature=_36Pressure=_44	03/02/2021	17:34:05
9	heart_rate=_92Temperature=_36Pressure=_45	03/02/2021	17:34:24
10	heart_rate=_84Temperature=_36	03/02/2021	17:34:47

Figure 5.7 data logs

These are some of the data logs which is obtained from the hardware section. We have to press the pressure sensor and place our finger in between the sensor and

LED of heart rate sensor. The output is stored in the IoT module and is shown in the web page.

5.4 RESULT

When a person is subjected to screening, it first detects if mask is worn and then uses sensors equipped with ZigBee transmitters and receivers to feel the person's temperature, pressure, and heart rate. The data is obtained by the ZigBee transmitter and sent to the ZigBee receiver via the optical source. By connecting the mobile hotspot to the IoT module, the data is now stored in the IoT module, and the data log is shown on the webpage. The webpage will then show all of the results.

5.5 Geo Tagged Photos: Circuit &Outputs

The screenshot displays a web application interface. The top section shows a table with sensor data logs. The table has columns for LogID, DATA, Logdate, and LogTime. The data rows show various sensor readings such as heart_rate, Temperature, and Pressure. Below the table, there is a pagination bar indicating 'Showing 161 to 170 of 175 entries' and a set of navigation buttons. The bottom section of the screenshot shows a Google Maps interface with a red location pin. The map is labeled 'RADAP.M'. To the right of the map, the location details are displayed: 'Chennai, Tamil Nadu, India', '65/21, Varadapuram, Kotturpuram, Chennai, Tamil Nadu 600085, India', 'Lat N 13° 1' 1.3476"', 'Long E 80° 14' 52.0872"', and '15/04/21 09:53 PM'.

LogID	DATA	Logdate	LogTime
199	heart_rate=_84Temperature=_36Pressure=_55	04/15/2021	19:02:52
201	heart_rate=_76Temperature=_36Pressure=_0	04/15/2021	19:03:15
203	heart_rate=_88Temperature=_35Pressure=_53	04/15/2021	19:03:41
204	heart_rate=_80Temperature=_36Pressure=_44	04/15/2021	19:03:59
205	heart_rate=_92	04/15/2021	19:04:12
206	Temperature=_36Pressure=_45	04/15/2021	19:04:26
207	heart_rate=_84Temperature=_36	04/15/2021	19:04:39
208	Pressure=_55	04/15/2021	19:04:52
209	heart_rate=_76Temperature=_36Pressure=_0	04/15/2021	19:05:04
211	heart_rate=_88Temperature=_35Pressure=_53	04/15/2021	19:05:28

Showing 161 to 170 of 175 entries

Previous 1 ... 14 15 16 17 18 Next

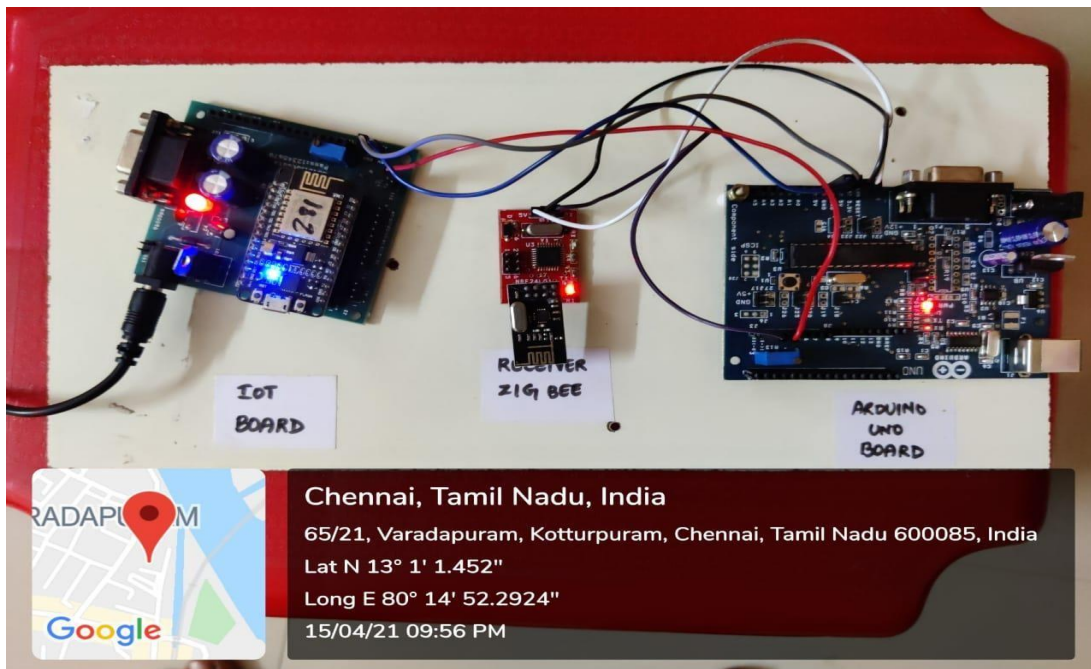
Chennai, Tamil Nadu, India

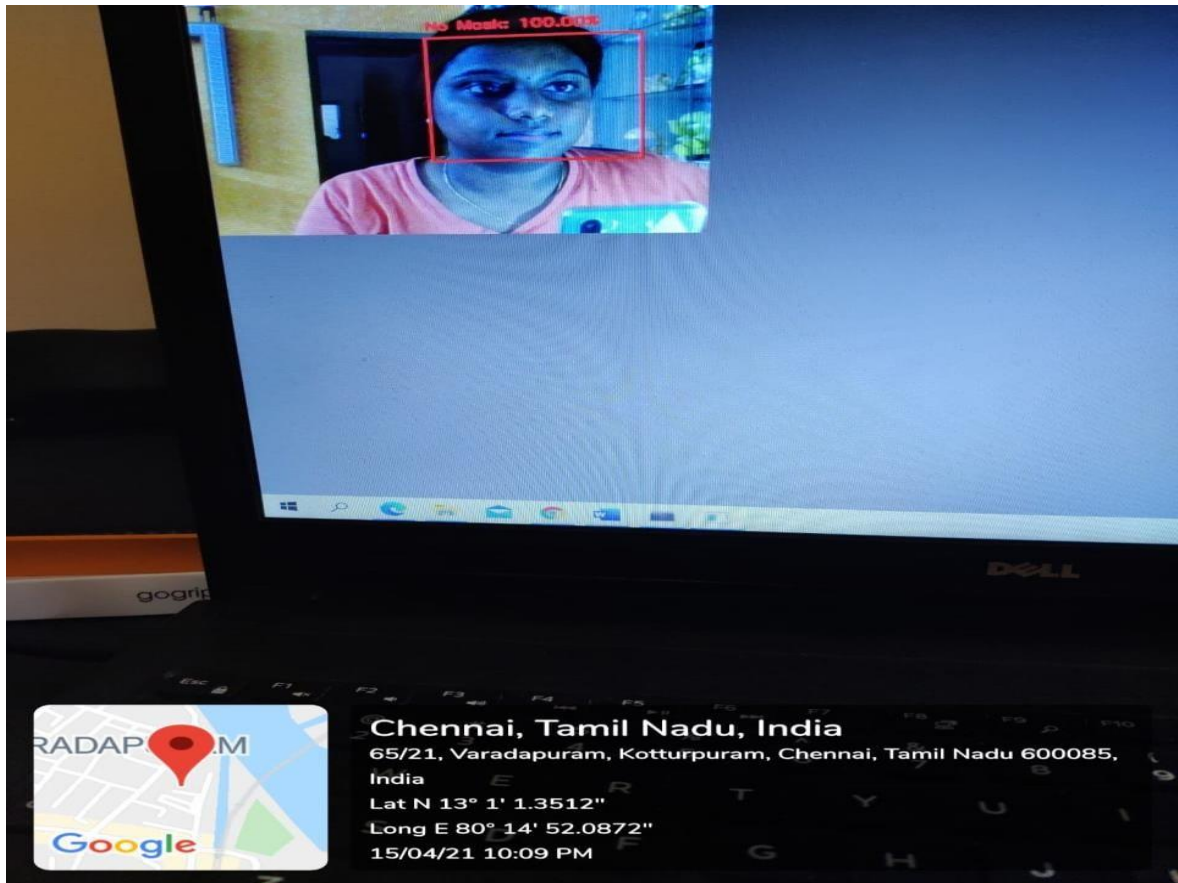
65/21, Varadapuram, Kotturpuram, Chennai, Tamil Nadu 600085, India

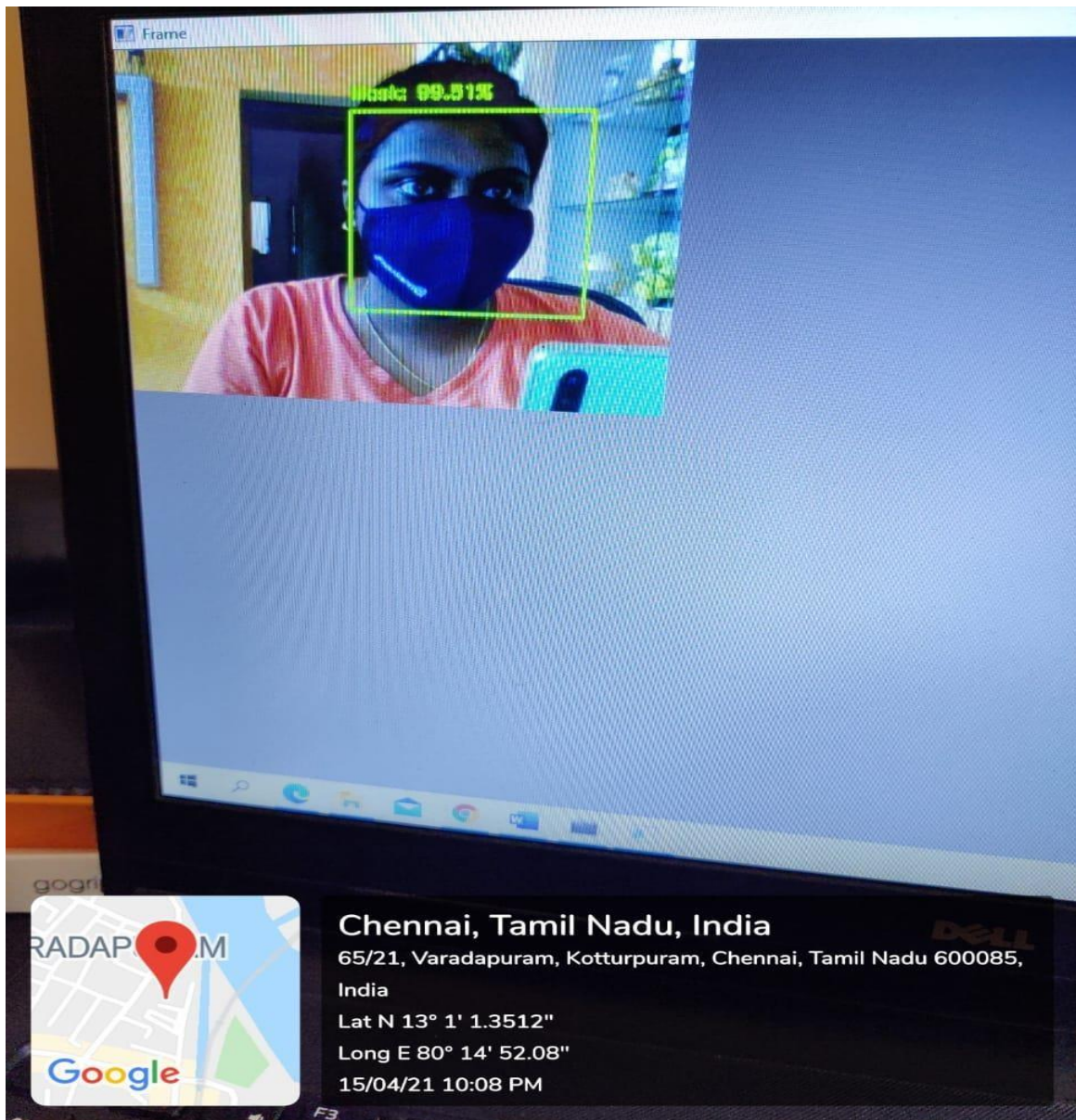
Lat N 13° 1' 1.3476"

Long E 80° 14' 52.0872"

15/04/21 09:53 PM







CHAPTER 6 CONCLUSION AND FUTURE SCOPE

6.1 CONCLUSION

As technology advances and new patterns emerge, we now have a novel face mask detector that could be useful in public healthcare. To combat COVID 19, real-time monitoring systems based on IoT are becoming increasingly important. It has the ability to transform health and geriatric treatment. Since the proposed project uses everyday materials, it does not require a large investment and can be easily incorporated into our lives. It's also worth noting that the proposed strategy comes with its own set of benefits. When introduced throughout the world, it will also be more cost-effective. The invention of face mask detection, which can detect whether an individual with a mask and allows them entry into a real-time health monitor system, will be extremely beneficial to society.

6.2 FUTURE SCOPES

This technology has a lot of potential in India, and it can help the country develop in a variety of ways. The technology and its applications can be used in a variety of industries across the world. The customer would be identified primarily via the camera in grocery store. Each customer is recognized by face recognition and the amount is paid online or offline. As a result, grocery with face recognition would be convenient for customers safety, as each would be able to shop simply by displaying their faces, with no need to carry debit cards or other forms of payment. Face-based retailing has a wide range of uses, including retail stores, restaurants, movie theatres, car rental agencies, and hotels, to name a few. The Swiss Face recognition and a vehicle make, model, colour, and licence plate reader are used in European surveillance.

- In India, preventing ATM fraud is a priority. It is possible to build a database of all ATM cardholders in India, and facial recognition systems can be built. As a result, if a user enters an ATM, his photograph will be taken in order to grant access after it is matched with a database photo.
- In India, this technology can be used to report duplicate voters, and it can also be used to verify passports and visas.
- The same method may also be used to verify a driver's licence.
- Technology can be used to improve surveillance and security in the defence ministry, airports, and other important locations
- It can also be used to recognise applicants during exams such as the Civil Services Test, SSC, IIT, MBBS, and others.
- This device can be used for verification and attendance monitoring in a variety of government and business settings.
- It can also be used in bank lockers and vaults for access control verification and authentication of authentic users.

- The device can also be used by police forces for suspect identification.

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