DAYANANDA SAGAR COLLEGE OF ENGINEERING
DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

project presentation on

"COVID-19 SOCIAL DISTANCE MONITORING AND CONTACT TRACING"

BATCH – R05

Under the guidance of :-

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FINAL PHASE PRESENTATION

COVID-19 SOCIAL DISTANCE MONITORING AND CONTACT TRACING

Proposed Methodology

The system uses microcontroller. A spo2 sensor , and temperature sensor are connected to the microcontroller. the temperature sensor gives the temperature value in degree celsius. to measure the heart rate, the heart beat/pulse is detected and the number of pulses for one minute is counted to get the beats per minute. Light (using an LED) is passed from one side of the finger and the intensity of light received on the other side is measured (using an LDR).

The GPS and NODEMCU modules are interfaced with the microcontroller. the GPS module finds out the latitude and longitude of the patient. The temperature and spo2 values are measured and compared with a configurable threshold to be classified as “low”, “normal” or “high”. the NODEMCU module is used to send a message to the doctor’s mobile in case of emergencies. the message contains the temperature, spo2 values and the patient’s latitude and longitude. The doctor can thus take immediate action with the help of this alert system and if in case of changing the position of covid patient also detect by using GPS value and send alert to the concern persons.

And also ultrasonic sensor connected to the microcontroller, to detect the people within 20cm(can be varied) , and gives alert to the people.

CONTENTS

OBJECTIVES OF THE PROJECT WORK

- The patient with COVID-19 because self-monitoring allows the early detection of exacerbations
- A system to analyses the trigger factor of COVID-19 and a device that can use by COVID-19 patients, which can perform multiple functions that enable a physician to monitor the patient's condition and to provide continuous care.
- The different functionalities in a point of care device that are considered vital in caring for patients with COVID-19.
- The idea behind this work is to develop a point of care device and a memory which stores all the test results, patients' perception of their condition and the regularity with which the inhaler is used so that the physicians can later use these data to accurately assess the condition of the patient

CO AND PO MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	-	2	1	-	2	-	-	3	2	1	-	2
CO2	-	3	2	3	-	-	-	1	-	-	2	-	-	-
CO3	2	1	-	-	3	-	-	2	-	2	-	2	-	1
CO4	-	-	2	2	-	-	-	1	-	-	-	2	-	1
CO5	2	-	-	2	-	2	2	-	2	2	2	-	-	-
CO6	-	2	1	-	-	-	2	2	3	2	2	1	-	-

CO AND ITS JUSTIFICATIONS

COs	PROJECT WORK
CO 1	Demonstrate proficient knowledge on the concepts involved.
CO 2	Identify the problem and propose the possible solution through literature survey.
CO 3	Design and develop engineering solutions to complex problems through systematic approach.
CO 4	Build prototype/simulation for the proposed solution and articulate the work
CO 5	Provide sustainable solutions considering societal needs by exhibiting individual and cooperative learning.
CO 6	Complete the proclaimed work within stipulated time span with financial constraints.

CO1	**An overview on the concepts like Arduino ,programming and testing is demonstrated.**
CO2	With the help of research papers and websites the problem with the conventional existing components is solved
CO3	The project helps the students and developers to make use this kit at an affordable price and easy way.
CO4	Using the tools like telegram, embedded c and NODEMCU board is designed and tested.
CO5	The project avoids the purchase of multiple boards for multiple applications and hence is cost effective.
CO6	The project is completed within the estimated budget and stipulated time.

PO PSO-JUSTIFICATION

Project Title		COVID-19 SOCIAL DISTANCE MONITORING AND CONTACT TRACING"
PO	Levels 3/2/1	Justification
PO1	3	Applied the knowledge of Engineering fundamentals along with the Embedded C
PO2	3	Reviewed few research literatures for better understanding of concepts like SPO2,TEMPERATURE SENSING
PO3	3	Using this project we can measure SPO2,temperature and also track persons health details.
PO4	3	Ultrasonic sensor which measures the distance is preferred than Bluetooth and IR rays because of its accuracy property .
PO5	3	Used programming language such as C and embedded C.
PO6	2	Used to alert social distance.

PO7	**2**	**SPO2 and temperature readings helps is early identification of covid 19**
PO8	2	Practicing ethics by quoting citations of research papers which we used for our literature survey.
PO9	3	Functioned effectively as a team by distributing work among ourselves.
PO10	3	Held regular meeting to discuss about our projects, We improved communication skills.
PO11	2	Exploring the information gathered by each individual.
PO12	1	Exploring a new concept in telegram bot, which may be used in future.
PSO1	-	Using SENSORS TO detect any changes.
PSO2	3	Interfacing Arduino ide with embedded c code to enhance proper communication.

INTINTRODUCTION

Wearable devices suitable for monitoring the populations at risk and those in quarantine, both for evaluating the health status of caregivers, management personnel and for facilitating triage processes for admission to hospitals.

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Unobtrusive sensing systems for detecting the disease and for monitoring patients with relatively mildly mild symptoms whose clinical situation could suddenly worsen in improvised hospitals.

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AIM OF THE PROJECT

- The Wearable technology aims to influence the fields of health and medicine.
- The wearable devices are capable of monitoring COVID-19 patient and The gadgets can do this by evaluating changes in heart rate, oxygen level and temperature along with self-reported symptom data.
- And also gives alert to the patients to maintain social distance with people.

LITERATURE SURVEY

Title of the paper and year	Methodology	Advantages	Disadvantages
Comparative replication and immune activation profiles of SARS-CoV-2 and SARS-CoV in human lungs: an ex vivo study with implications for the pathogenesis of COVID-19 2020 Apr 9	We comprehensively investigated the replication, cell tropism, and immune activation profile of SARS-CoV-2 infection in human lung tissues with SARS-CoV included as a comparison.	The underlying mechanism that confers these viral characteristics on high transmissibility and asymptomatic infection remain incompletely understood.	Although SARS-CoV-2 and SARS-CoV share a number of common clinical manifestations, SARS-CoV-2 appears to be highly efficient in person-to-person transmission and frequently cause asymptomatic infections

Title of the paper and year	Methodology	Advantages	Disadvantages
Report of the WHO-China Joint Mission on Coronavirus Disease 2019 (COVID-19) Feb 2020	Joint Mission gave particular focus to addressing key questions related to the natural history and severity of COVID-19.	The findings in this report are based on the Joint Mission's review of national and local governmental reports, discussions on control and prevention measures with national and local experts and response teams, and observations made and insights gained during site visits.	Reassess risk and capacities based on different stages of the outbreak; approve different measures during the different phases of the response; assess different stages of the response; reach a balance between response and social development

Title of the paper and year	Methodology	Advantages	Disadvantages
Prospects for Designing a Portable System for Monitoring of the Patient's Condition with COVID-19 (2019)	The prospects and possibilities for creating an individual wearable system for monitoring the condition of a patient suffering from COVID-19 and preventing attacks of the disease are discussed.	As the basic method of determining the condition of the patient is considered the technique for determining the transmission coefficient of a certain frequency microwave signal through the chest.	The proposed method is non-invasive and harmless and can be used for patients of all age groups.

WORK DONE FOR PROJECT PHASE -1

Literature survey of possible wireless technologies that could be used.

Research on “Comparative replication and immune activation profiles of SARS-CoV-2 and SARS-CoV in human lungs “ paper for implementation.

Implementation of wireless sensors i.e temperature , spo2, ultrasonic sensor programs.

Obtained results of the all sensors

WORK DONE FOR PROJECT PHASE -2

Forming the circuit and testing the intercombination results

Testing the code

analysing the outputs of SPO2, ULTRASONIC SENSOR AND TEMPERATURE SENSOR

•Preparation of for Phase- 1
research papers for presentation the ternational
conference.

PROGRESS REPORT

SEPTEMBER

- Commencement of Final Year project.
- Formation of Group.
- Finalization of the topic.

OCTOBER

- Preparation of Synopsis.
- Literature survey of possible algorithms to be used.
- Selection phase
- presentation.

NOVEMBER

- Sensors needed and implementation of its code.
- Prepration of research papers for
- The international
- Conference.

DECEMBER

- Presentation of final paper review at the conference international
- Conference.
- Prepration of report
- For phase 1
- Presentation.

•Preparation of for Phase- 1 research papers for presentation. the ternational conference.

PROGRESS REPORT

JANUARY

- Presentation of work
- conducted so far in the Phase-1 CIE presentation.
- Preparation and submission of project proposal for KSCST grant

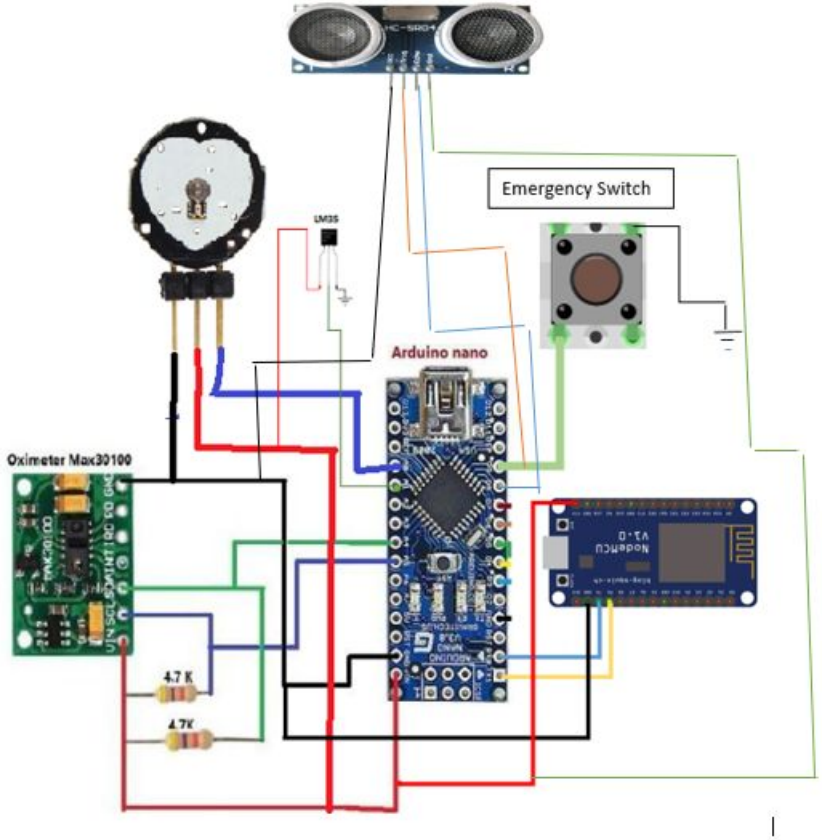
FEBRUARY

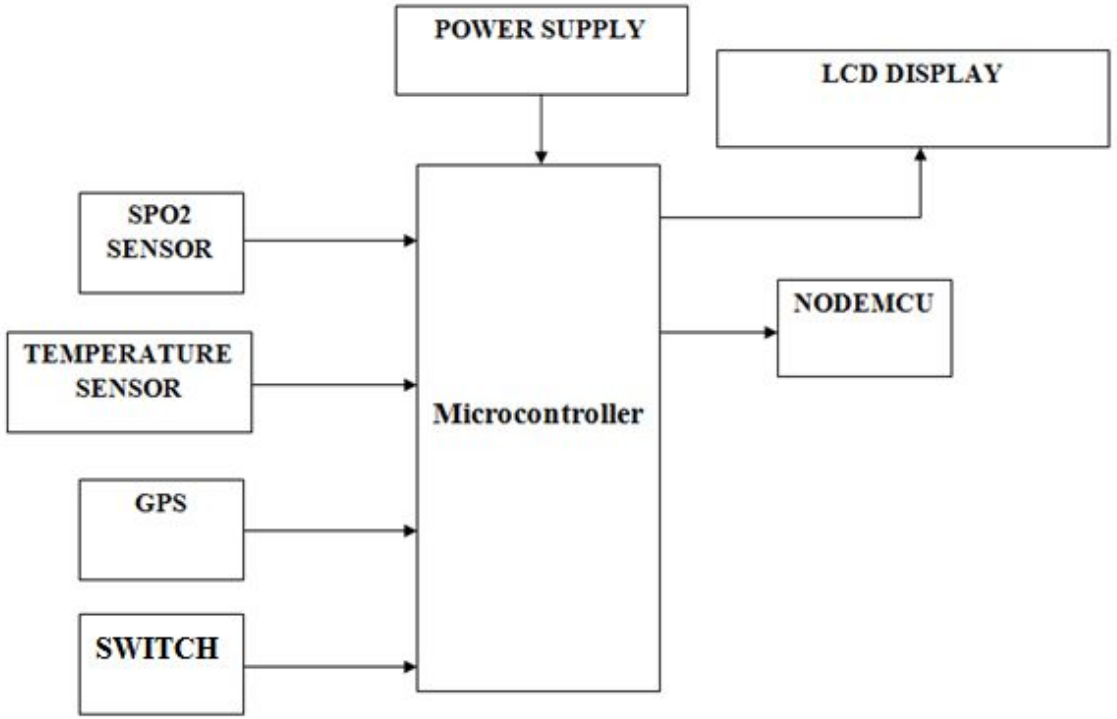
- Presentation of the Project
- Phase-1 (SEE) before the panel.
- Submission of Project Phase - 1

MARCH

- Acquired the components for the
- hardware implementation of the program.
- Performed the initial setup of
- Presentation of Project Phase - 2
- (Evaluation - 1)

HARDWARE DIAGRAM





COMPONENTS REQUIRED:

HARDWARE:

- Arduino Nano
- SPO2 Sensor.
- Temperature Sensor.
- Switch
- NODEMCU
- Ultrasonic sensor
- GPS
- vibrator

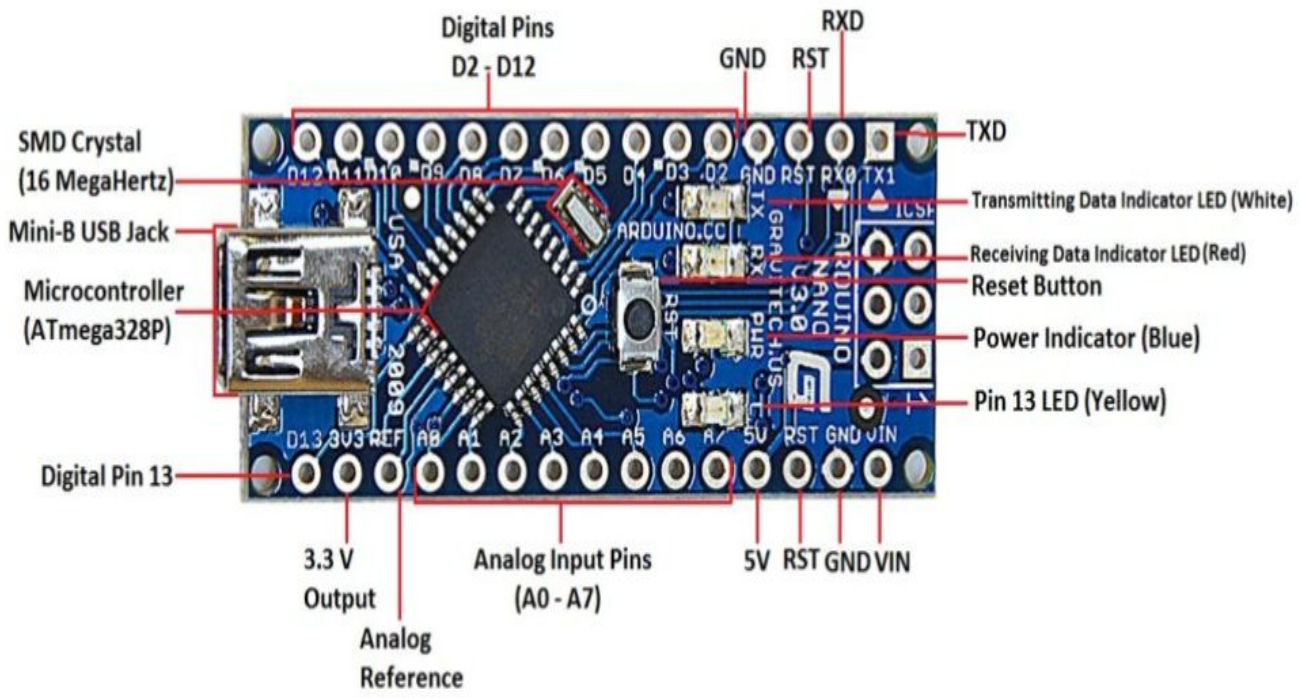
SOFTWARE

- Arduino application
- Blink
- Telegram
- Windows, Mac OS & linux

PARAMETERS OF DEVICES

DEVICE/COMPONENT	NORMAL RANGE	OUT OF RANGE
SPO2	94 to 100	Less than 93
HEARTRATE(beats/min)	55 to 140	More than 170 and less than45
TEMPERATURE(C)	35 to 37	More than 38

ARDUINO NANO (ATMEGA328P)

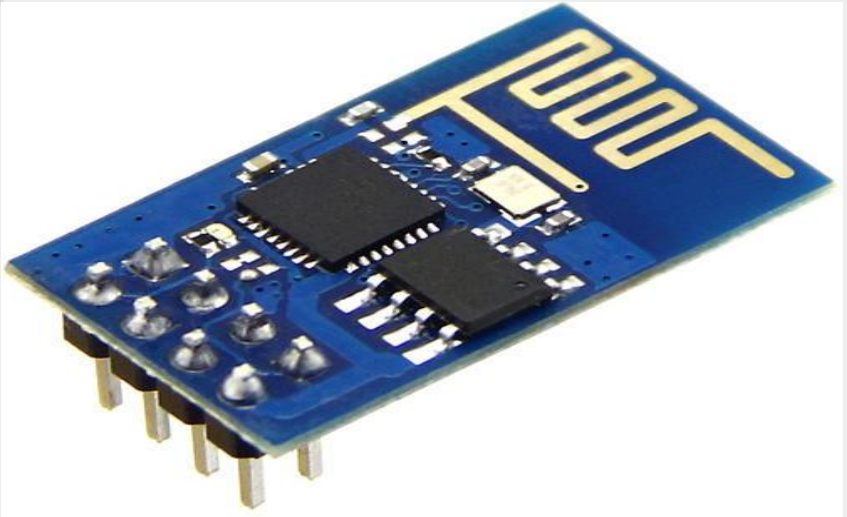


Arduino Nano Atmega328P

PIN DESCRIPTION:

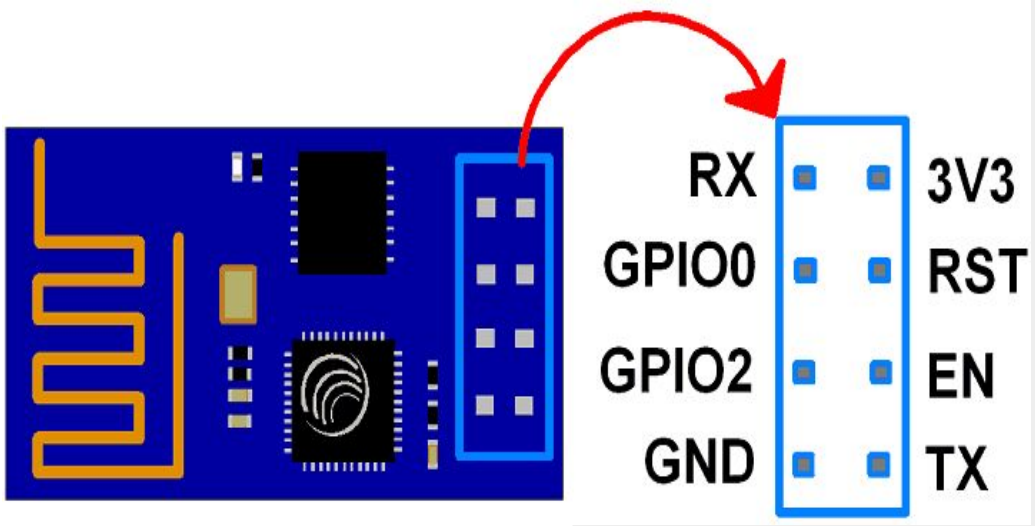
- Vin is the input voltage of the board, and it is used when an external power source is used from 7V to 12V.
- 5V is the regulated power supply voltage of the nano board and it is used to give the supply to the board as well as components.
- 3.3V is the minimum voltage which is generated from the voltage regulator on the board.
- GND is the ground pin of the board
- RST Pin(Reset): This pin is used to reset the microcontroller.
- I/O Pins (Digital Pins from D0 – D13): These pins are used as an i/p otherwise o/p pins. 0V & 5V
- Serial Pins (Tx, Rx): These pins are used to transmit & receive TTL serial data.
- External Interrupts (2, 3): These pins are used to activate an interrupt.
- PWM (3, 5, 6, 9, 11): These pins are used to provide 8-bit of PWM output.
- SPI (10, 11, 12, & 13): These pins are used for supporting SPI communication.
- Inbuilt LED (13): This pin is used to activate the LED.
- IIC (A4, A5): These pins are used for supporting TWI communication.
- AREF: This pin is used to give reference voltage to the input voltage

ESP8266 WIFI MODULE



ESP8266 comes with capabilities of

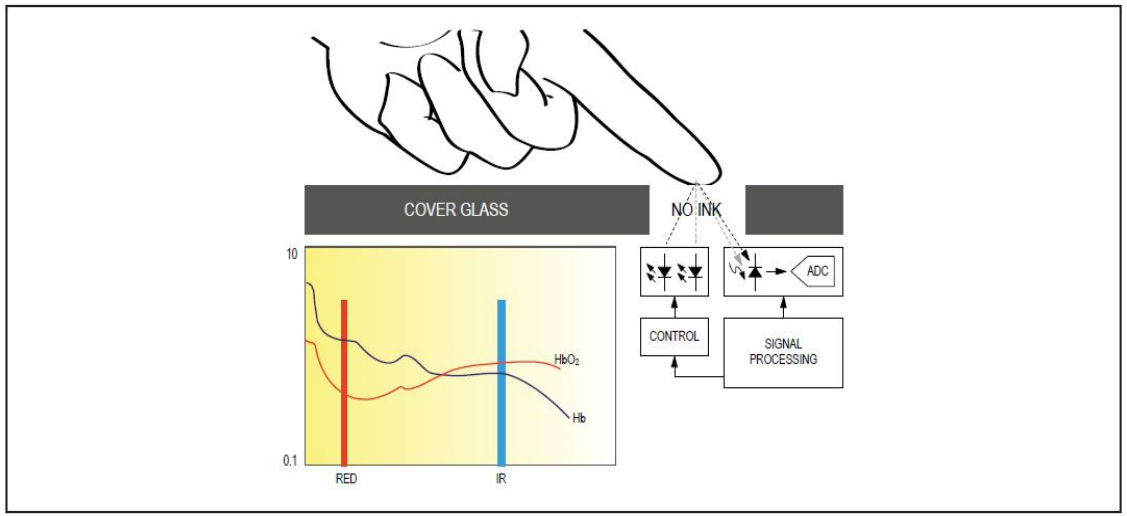
- 2.4 GHz Wi-Fi (802.11 b/g/n, supporting WPA/WPA2),general-purpose input/output (16 GPIO),
- Inter-Integrated Circuit (I²C) serial communication protocol,analog-to-digital conversion (10-bit ADC)
- Serial Peripheral Interface (SPI) serial communication protocol,I²S (Inter-IC Sound) interfaces with DMA(Direct Memory Access) (sharing pins with GPIO),
- UART (on dedicated pins, plus a transmit-only UART can be enabled on GPIO2), and
- pulse-width modulation (PWM).



ESP8266-01 Module Pins

- 3V3: - 3.3 V Power Pin.
- GND: - Ground Pin.
- RST: - Active Low Reset Pin.
- EN: - Active High Enable Pin.
- TX: - Serial Transmit Pin of UART.
- RX: - Serial Receive Pin of UART.

SPO2 SENSOR (MAX30100)

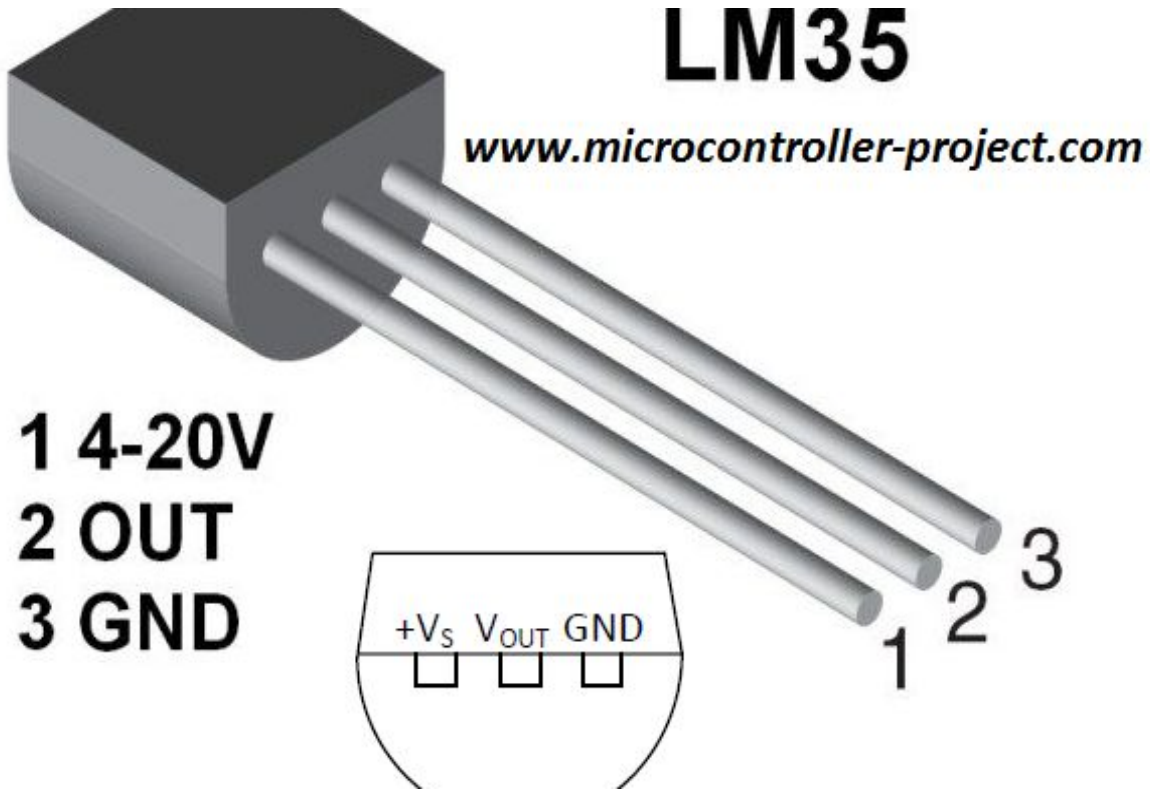


SPO2 SENSOR (MAX30100)

The MAX30100 is an integrated pulse oximetry and heart rate monitor sensor solution. It combines two LEDs, a photo detector, optimized optics, and low-noise analog signal processing to detect pulse oximetry and heart-rate signals.

This is the main function of the MAX30100: it reads the absorption levels for both light sources and stored them in a buffer that can be read via I2C. Working voltage: 1.8-5.5V

TEMPERATURE SENSOR



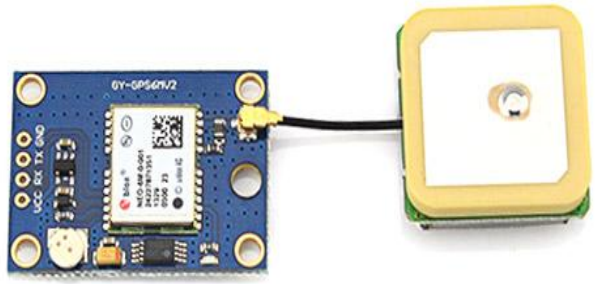
- A temperature sensor is an electronic device that measures the temperature of its environment and converts the input data into electronic data to record, monitor, or signal temperature changes. There are many different types of temperature sensors.
- The **LM35** series are precision integrated-circuit **temperature** devices with an output voltage linearly- proportional to the Centigrade **temperature**. ... The **LM35** device is rated to operate over a −55°C to 150° C **temperature** range, while the LM35C device is rated for a −40°C to 110°C range (−10° with improved accuracy).

GPS

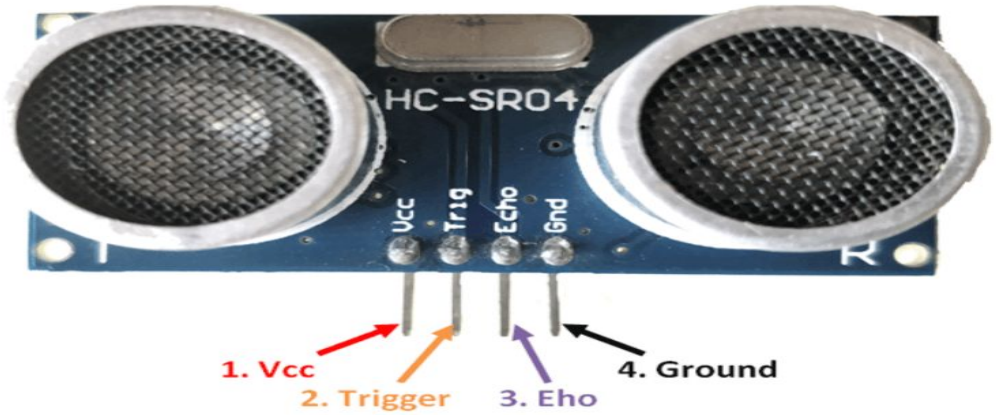
Features and Electrical Characteristics

- Standalone GPS receiver
- Anti-jamming technology
- UART Interface at the output pins (Can use SPI ,I2C .
- Under 1 second time-to-first-fix for hot and aided starts
- Receiver type: 50 Channels - GPS L1 frequency - SBAS (WAAS, EGNOS, MSAS, GAGAN)
- Time-To-First-fix: For Cold Start 32s, For Warm Start 23s, For Hot Start <1s
- Maximum navigation update rate: 5Hz
- Default baud rate: 9600bps
- EEPROM with battery backup
- Sensitivity: -160dBm
- Supply voltage: 3.6V
- Maximum DC current at any output: 10mA
- Operation limits: Gravity-4g, Altitude-50000m, Velocity-500m/s
- Operating temperature range: -40ºC TO 85°C

Pin Name	Description
VCC	Positive power pin
RX	UART receive pin
TX	UART transmit pin
GND	Ground



ULTRASONIC SENSOR

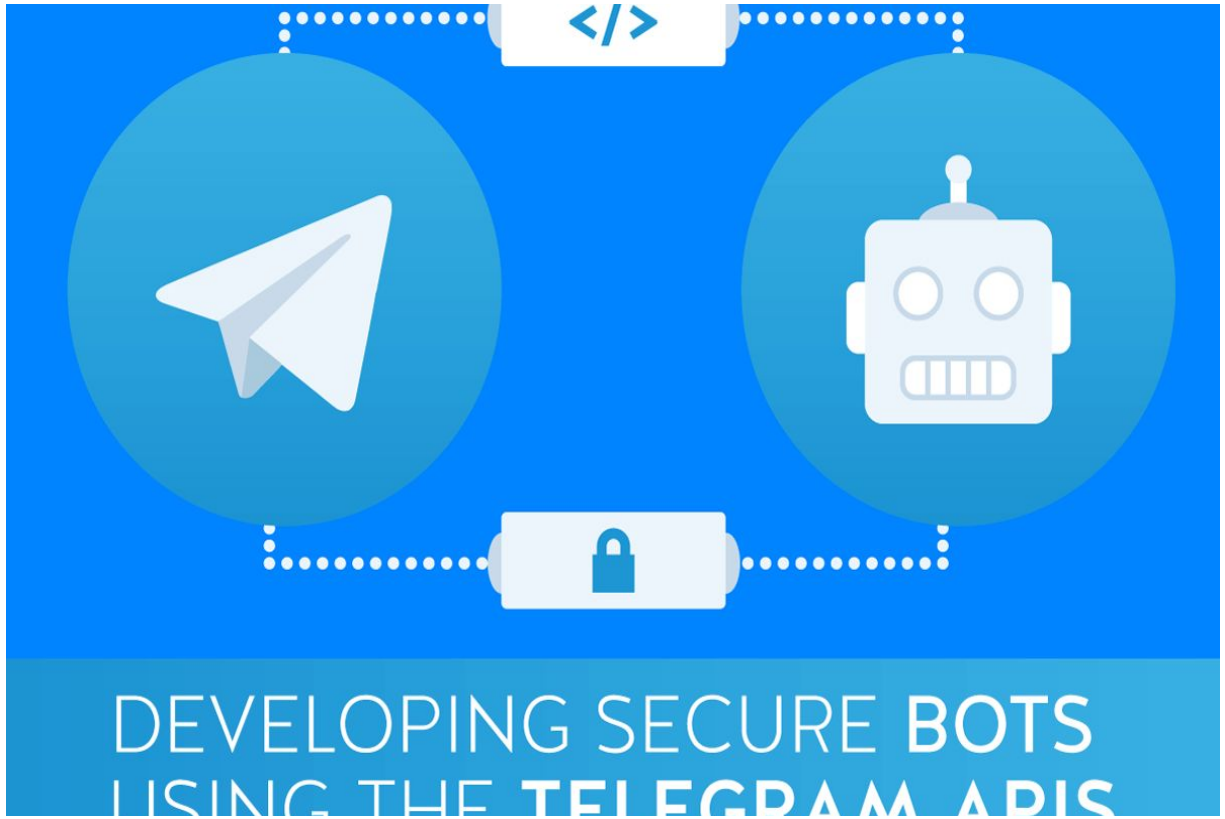


Pin Number	Pin Name	Description
1	Vcc	The Vcc pin powers the sensor, typically with +5V
2	Trigger	Trigger pin is an Input pin. This pin has to be kept high for 10us to initialize measurement by sending US wave.
3	Echo	Echo pin is an Output pin. This pin goes high for a period of time which will be equal to the time taken for the US wave to return back to the sensor.
4	Ground	This pin is connected to the Ground of the system.

HC-SR04 Sensor Features

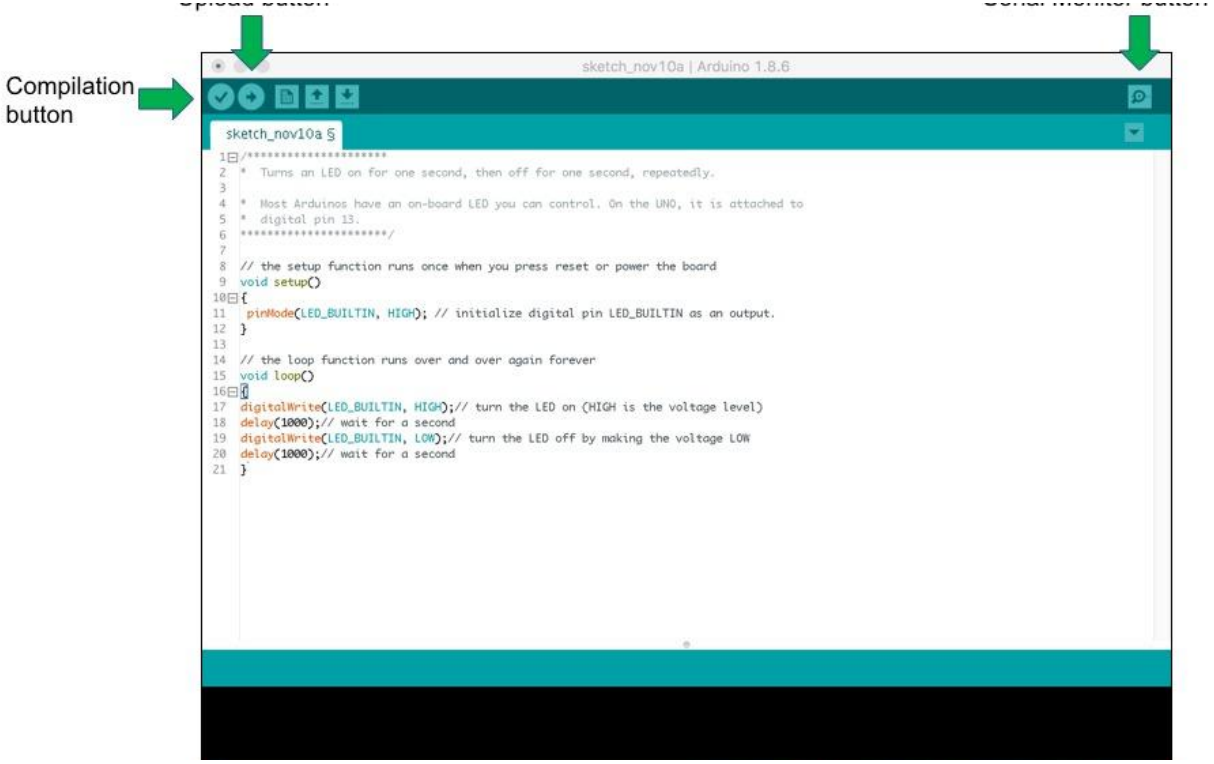
- Operating voltage: +5V
- Theoretical Measuring Distance: 2cm to 450cm
- Practical Measuring Distance: 2cm to 80cm
- Accuracy: 3mm
- Measuring angle covered: <15°
- Operating Current: <15mA
- Operating Frequency: 40Hz

TELEGRAM BOT



- Telegram is about freedom and openness – our code is open for everyone, as is our API. Today we're making another step towards openness by launching a Bot API and platform for third-party developers to create bots.
- **Bots** are simply Telegram accounts operated by software – not people – and they'll often have AI features. They can do anything – teach, play, search, broadcast, remind, connect, integrate with other services, or even pass commands to the Internet of Things.

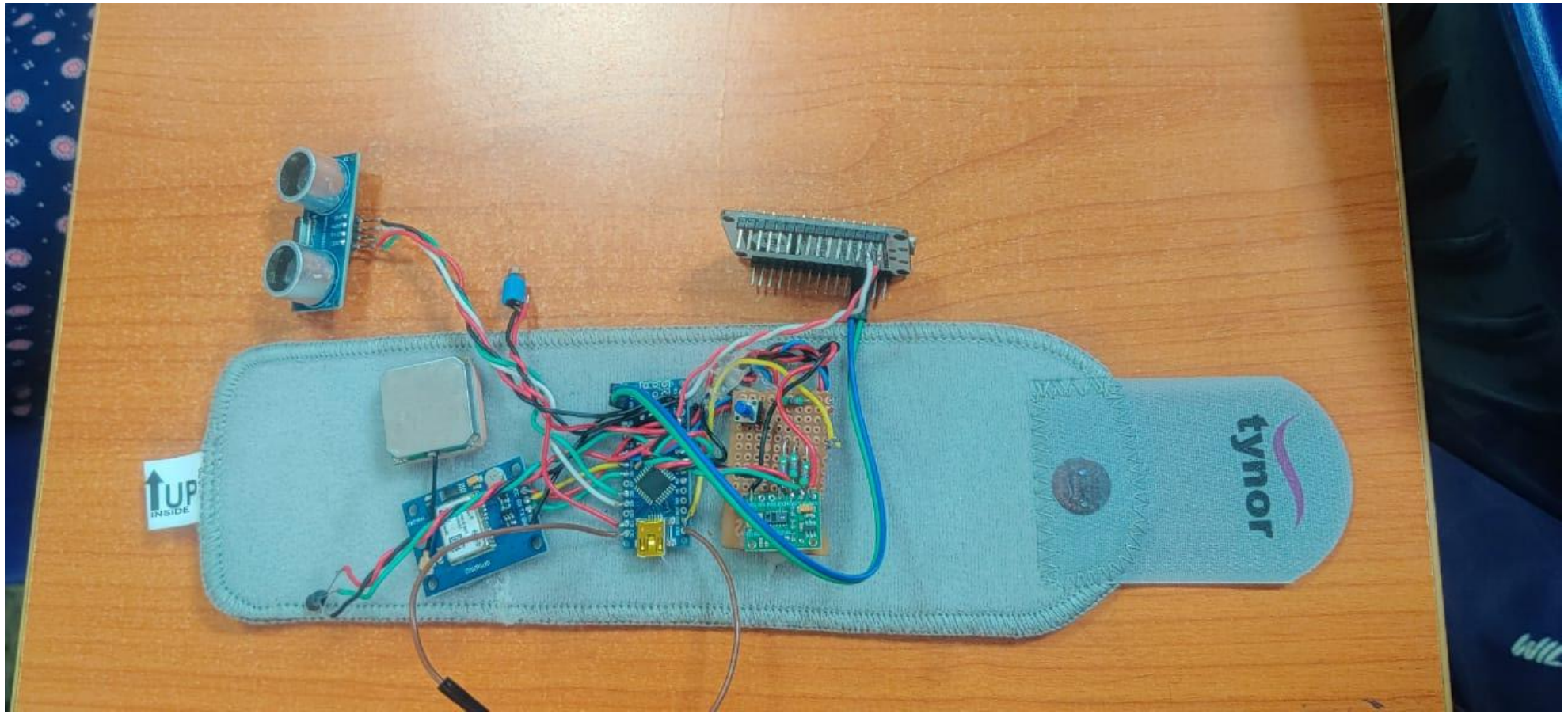
ARDUINO SOFTWARE



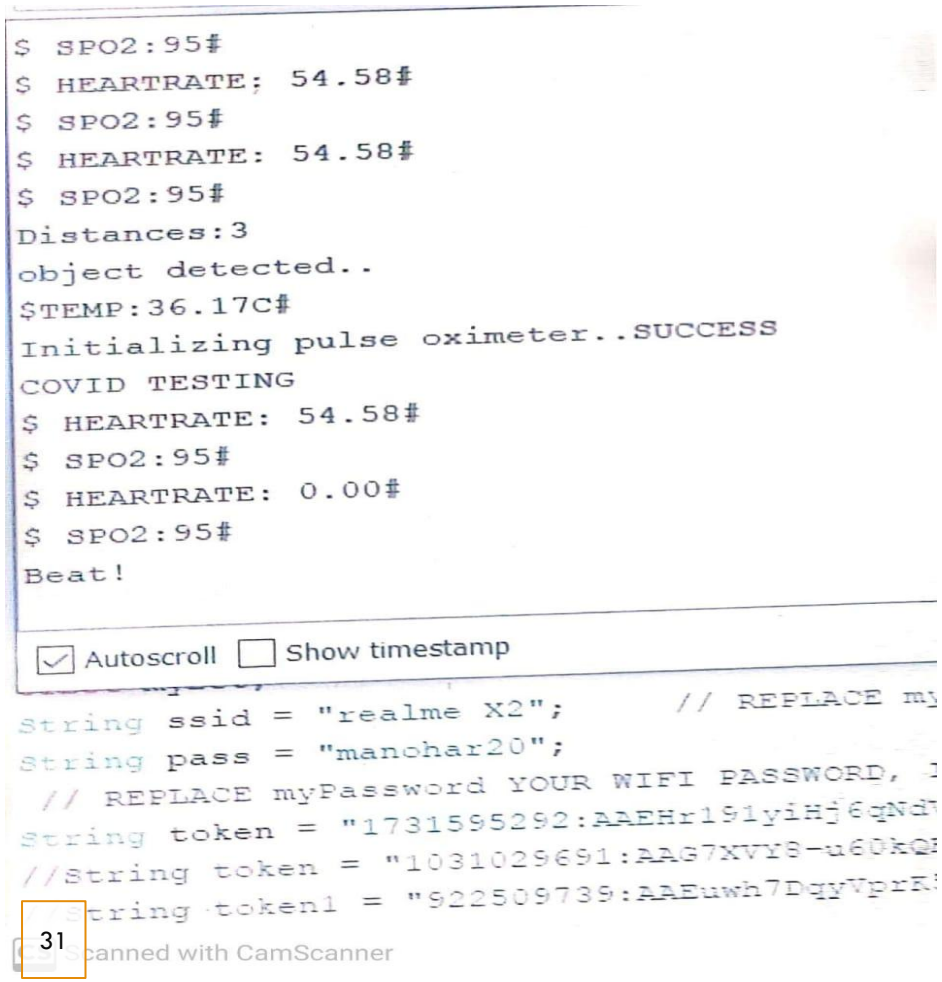
- The Arduino Integrated Development Environment is a cross-platform application that is written in functions from C and C++. It is used to write and upload programs to Arduino compatible boards, but also, with the help of third-party cores, other vendor development boards.
- The Arduino IDE supplies a software library from the Wiring project, which provides many common input and output procedures.

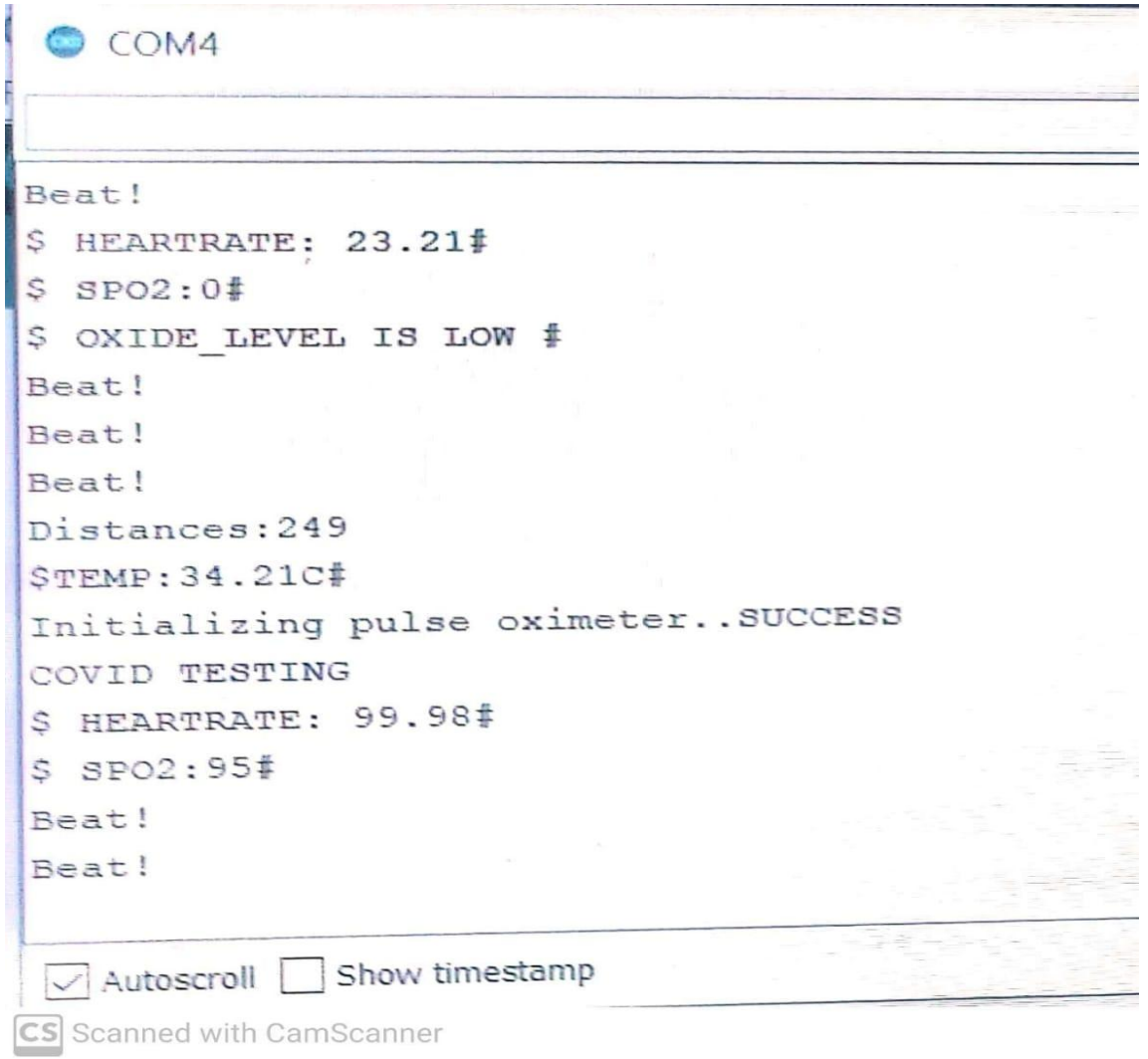
FINAL PHASE

LINKING WITH TELEGRAM BOT TO GET ALERTS AND FORM EMER

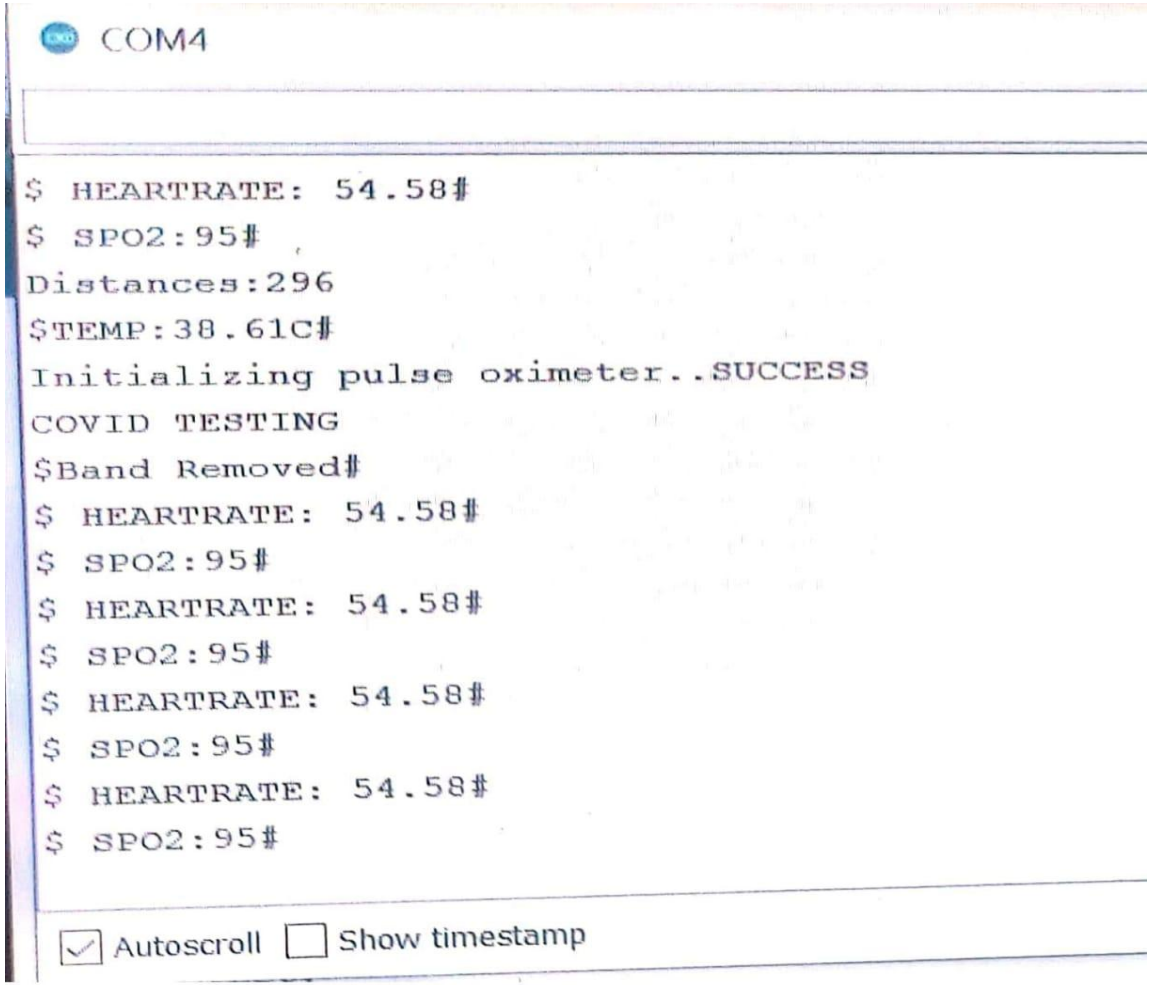


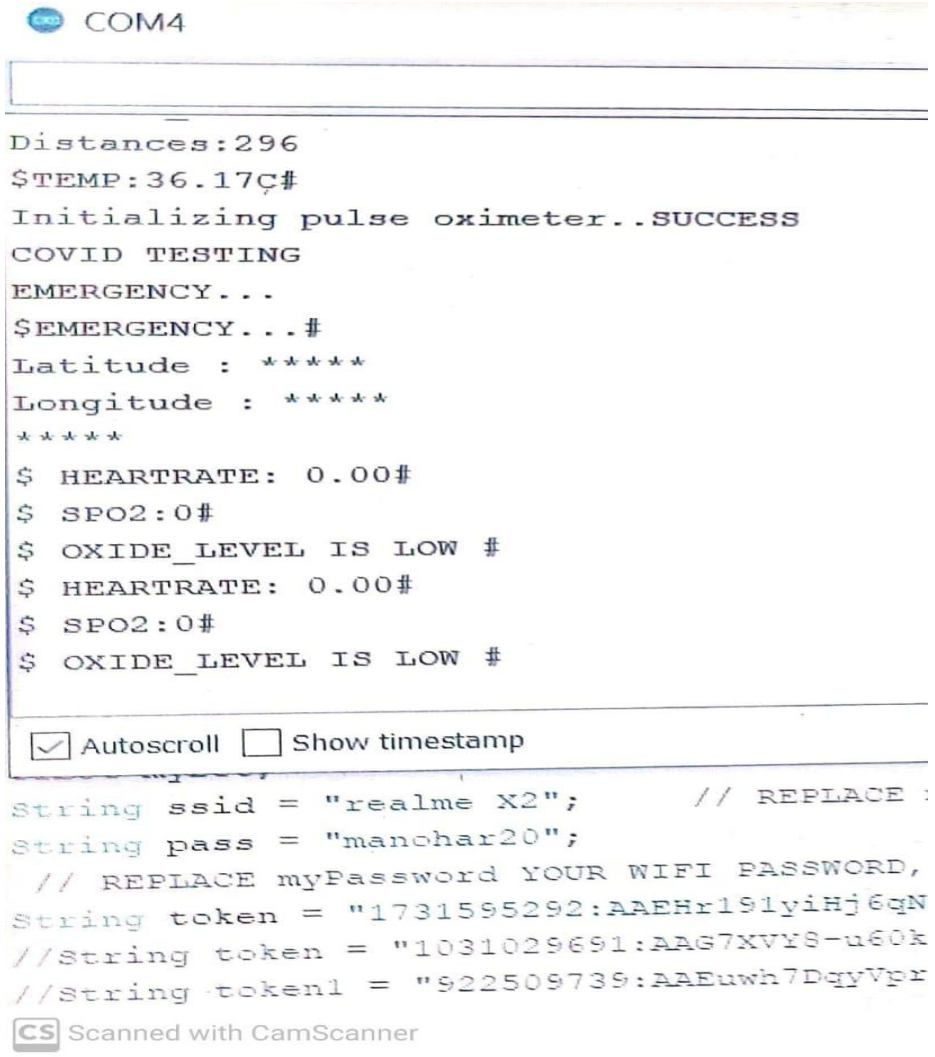
DISTANCE MEASURING AND HEARTRATE OUTPUT





BAND REMOVED AND EMERGENCY OUTPUT





ADVANTAGES

- Easy Implementation
- Best Method for Detection of Covid Symptioms.
- Early Detection of Disease
- Cost Effective Method
- Easy to track the person.
- Maintain everyone Health record.

BUDGET

Sl. No.	Particulars	Estimated Cost in Rs.
1	Arduino Nano	350
2	Temperature Sensor	200
3	Heartbeat Sensor	550
4	Spo2 Sensor	1100
5	Ultrasonic Sensor	250
6	Buzzer	15
7	Nodemcu	525
8	GPS	1000
9	Wires	300
10	Others	500
11		
12		
	Total	4790

RESULTS

- Can measure the output of all the sensors and take action based on results.
- Alert process successfully implemented when a person(any object) comes under 20cm(can be varied).
- All the emergency alerts and parameters values are successfully sent via telegram.
- Can track the latitude and longitude of the location using GPS.

UNEXPECTED RESULTS

- Due to this pandemic we couldn't make the device like"wrist band".
- Due to this second lockdown in April we had left out device in our room in bangalore ,due to emergency of phase 3 presentation we had managed to courier the device to our place.But unfortunately due to some transportation problem wired which were soldered came out ,so we may get errors while showing Spo2 and other sensors value.
- Due to the requirement of huge data servers we coulnt design a website or app which would have helped us to know the person in our surroundings who has covid .

CONCLUSION

- The clinical outcome can be improved through timely intervention by identifying any deterioration and exacerbation at an early time.
- The diagnosis and treatment can be rapid with screening of suspected and asymptomatic/ presymptomatic cases
- The contacts between medical staff and patients can be minimized by remote monitoring and care.
- They are therefore very promising for combating pandemics such as COVID-19.

FUTURE SCOPE

- *If pandemic goes on increasing we can design and develop many such devices and give it to patients.
- Can reduce the size of the devices.
- Use data servers and analyse the nearest covid affected person near us .
- Can integrate other devices like BP checking,oxygen emergency alert,etc.

REFERENCES

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