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## SSBES', Institute of Technology & Management, Nanded

# INCUBATION & INNOVATION CENTRE

## 2020 - 2021

# Project Title: "Corona Defender Robot" (CDR)

### Project by Students of BCA TY:


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## Project Run under this Incubation Centre:

# Project Title: “Corona Defender Robot”


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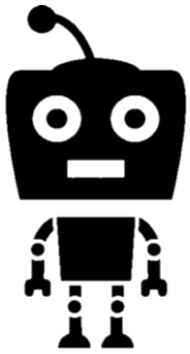
### Introduction

The aim of this report is to present an IoT-based robot designed to assist doctors in the medical field, particularly during the COVID-19 pandemic. The system utilizes an Arduino UNO board to control a robotic arm equipped with servo motors. Wireless communication is established through a Bluetooth module, enabling control commands from an Android app. This innovative solution aims to support healthcare professionals and enhance their efforts in providing effective and safe care to patients.



The system uses an Arduino UNO board that controls the movement robotic arm through Servo motors. The Arduino Uno board is connected with a Bluetooth module for wireless connection of android devices. An android app is used to provide commands to the robotic arm. We are engineers, we cannot do the doctor’s work, but can make a big difference by providing solutions which can support and reduce their novel efforts.

### System Overview

The IoT-based robot system consists of the following components:

**Arduino UNO board:** It serves as the central control unit, responsible for processing commands and controlling the movements of the robotic arm.

Robotic Arm: Equipped with servo motors, the arm mimics human movements and performs tasks as directed by the controlling system.

Bluetooth Module: Enables wireless communication between the Arduino UNO board and the Android app.

**Android App:** Allows doctors to send commands to the robotic arm, providing a user-friendly interface for seamless control and operation.

**Objectives and Features**

**The primary objectives of the IoT-based robot in the medical field are:**

- Assisting doctors by reducing their workload and minimizing exposure to potentially infectious environments.
- Enhancing precision and accuracy in performing medical tasks, such as administering medicines or collecting samples.
- Enabling remote operation and monitoring, allowing doctors to control the robot from a safe distance.

**Key features of the system include:**

- ✓ **Control Interface:** The Android app provides an intuitive interface for doctors to send commands to the robotic arm, ensuring ease of use and seamless operation.
- ✓ **Wireless Connectivity:** The integration of the Bluetooth module enables wireless communication, eliminating the need for physical connections and allowing flexibility in controlling the robot.
- ✓ **Servo Motor-Controlled Robotic Arm:** The robotic arm replicates human arm movements and can perform a wide range of tasks, making it versatile and adaptable to various medical procedures.

**Applications in the Medical Field**

The IoT-based robot has several applications in the medical field, especially in the context of COVID-19:

- **Patient Monitoring:** The robot can be equipped with sensors to collect and transmit patient vitals, providing real-time data to healthcare professionals for remote monitoring.
- **Medication Administration:** With precise control, the robot can assist in administering medicines or intravenous fluids, ensuring accurate dosage and reducing the risk of human errors.
- **Sample Collection:** The robot can be used to collect samples from patients, minimizing direct contact and reducing the risk of cross-contamination.

- **Disinfection and Sanitization:** By integrating additional modules, the robot can be equipped to perform autonomous disinfection and sanitization tasks, minimizing the spread of infectious diseases.
- **Benefits and Impact**

  The IoT-based robot offers numerous benefits and can have a significant impact in the medical field:
- **Enhanced Safety:** By reducing direct contact between doctors and patients, the risk of infection transmission is minimized, ensuring the safety of both healthcare professionals and patients.
- **Increased Efficiency:** The robot can perform tasks with precision and consistency, reducing human errors and improving overall efficiency in medical procedures.
- **Remote Operation:** Doctors can remotely control the robot, allowing them to attend to multiple patients simultaneously and efficiently manage their time.
- **Support in Critical Situations:** During emergencies or outbreaks, the robot can provide valuable support, augmenting the limited resources and manpower available.

**System Specifications**

**Project Category : IOT Based Project**

An IoT ecosystem consists of web-enabled smart devices that use embedded systems, such as processors, sensors and communication hardware, to collect, send and act on data they acquire from their environments. IoT devices share the sensor data they collect by connecting to an IoT gateway or other edge device where data is either sent to the cloud to be analyzed or analyzed locally. Sometimes, these devices communicate with other related devices and act on the information they get from one another. The devices do most of the work without human intervention, although people can interact with the devices -- for instance, to set them up, give them instructions or access the data.

The connectivity, networking and communication protocols used with these web-enabled devices largely depend on the specific IoT applications deployed.

IoT can also make use of artificial intelligence (AI) and machine learning to aid in making data collecting processes easier and more dynamic.The Internet of things (IoT) describes the network of physical objects—“things”—that are embedded with sensors, software,

and other technologies for the purpose of connecting and exchanging data with other devices and systems over the Internet.

Things have evolved due to the convergence of multiple technologies, real-time analytics, machine learning, commodity sensors, and embedded systems.Traditional fields of embedded systems, wireless sensor networks, control systems, automation (including home and building automation), and others all contribute to enabling the Internet of things. In the consumer market, IoT technology is most synonymous with products pertaining to the concept of the "smart home", including devices and appliances (such as lighting fixtures, thermostats, home security systems and cameras, and other home appliances) that support one or more common ecosystems, and can be controlled via devices associated with that ecosystem, such as smartphones and smart speakers. IoT can also be used in healthcare systems.

**Software Requirement Specification**

**The Arduino IDE**

The Arduino Integrated Development Environment - or Arduino Software (IDE) - contains a text editor for writing code, a message area, a text console, a toolbar with buttons for common functions and a series of menus. It connects to the Arduino and Genuino hardware to upload programs and communicate with them.

**Writing Sketches**

Programs written using Arduino Software (IDE) are called sketches. These sketches are written in the text editor and are saved with the file extension. ino. The editor has features for cutting/pasting and for searching/replacing text. The message area gives feedback while saving and exporting and also displays errors. The console displays text output by the Arduino Software (IDE), including complete error messages and other information. The bottom right-hand corner of the window displays the configured board and serial port. The toolbar buttons allow you to verify and upload programs, create, open, and save sketches, and open the serial monitor.

**Verify**

Checks your code for errors compiling it.

**Upload**

Compiles your code and uploads it to the configured board. See uploading below for details.

**Sketchbook**

The Arduino Software (IDE) uses the concept of a sketchbook: a standard place to store your programs (or sketches). The sketches in your sketchbook can be opened from the File > Sketchbook menu or from the Open button on the toolbar. The first time you run the Arduino software, it will automatically create a directory for your sketchbook. You can view or change the location of the sketchbook location from with the Preferences dialog.

**Uploading**

Before uploading your sketch, you need to select the correct items from the Tools > Board and Tools > Port menus. The boards are described below. On the Mac, the serial port is probably something like /dev/tty.usbmodem241 (for an Uno or Mega2560 or Leonardo) or /dev/tty.usbserial-1B1 (for a Duemilanove or earlier USB board), or /dev/tty.USA19QW1b1P1.1 (for a serial board connected with a Keyspan USB-to-Serial adapter). On Windows, it's probably COM1 or COM2 (for a serial board) or COM4, COM5, COM7, or higher (for a USB board) - to find out, you look for USB serial devices in the ports section of the Windows Device Manager. On Linux, it should be /dev/ttyACMx, /dev/ttyUSBx or similar. Once you've selected the correct serial port and board, press the upload button in the toolbar or select the Upload item from the Sketch menu. Current Arduino boards will reset automatically and begin the upload. With older boards (pre-Diecimila) that lack auto-reset, you'll need to press the reset button on the board just before starting the upload. On most boards, you'll see the RX and TX LEDs blink as the sketch is uploaded. The Arduino Software (IDE) will display a message when the upload is complete, or show an error.

**Hardware Requirement Specification**

**Hardware requirement for body of Robot:**

- Metal sheet 10 kg
- Wooden sheet

- Glue gun
- Nails and drilling machine
- PVC pipes
- PPE kit
- High performance whe

**Hardware components required for lower body of Robot:**

- Relays
- Arduino Uno
- 300 RPM left side torque DC motors
- Jumper wires
- Switch
- 12 volt battery DC
- Bluetooth HC 5 Module

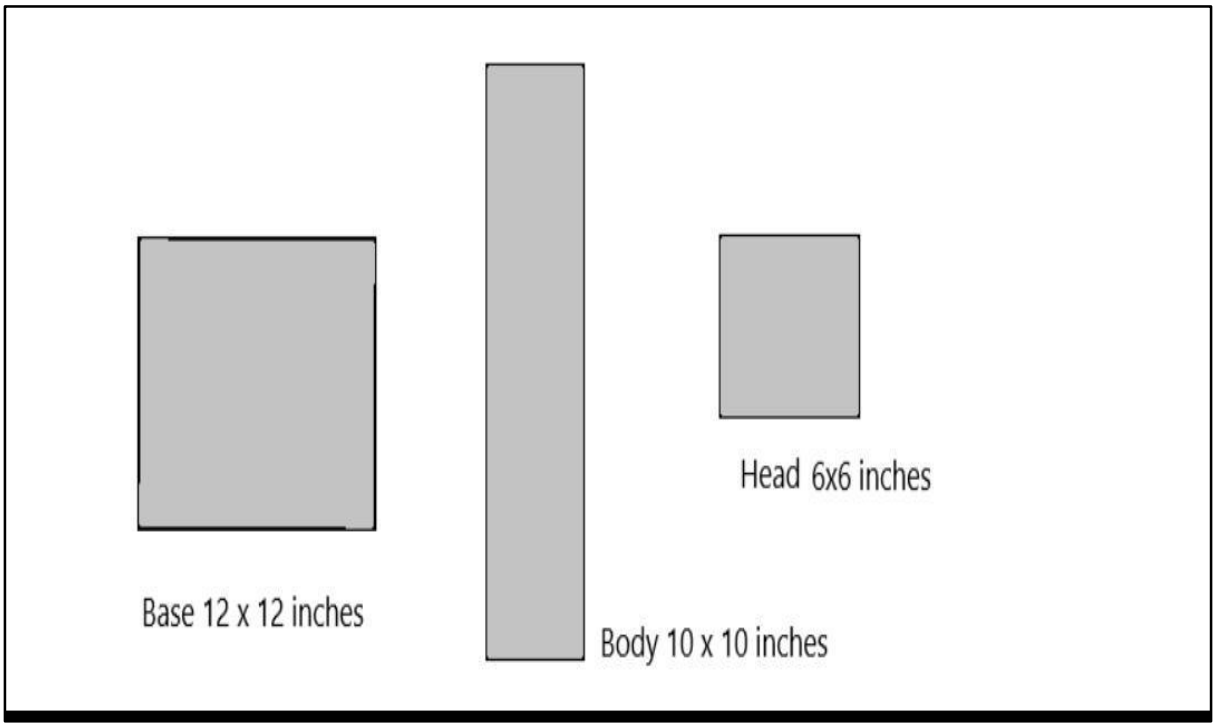
**A Prototype Model of the CRD Robot**

# Results and Analysis

## Overview of the work done

The body is a main part of a robot which will be strongest as well as lowest price to purchase for that by the i research in the market so the conclusion is metal sheet. The metal sheet is the

strongest material and affordable to the body of a robot we used box structure of metals in such a way that it it look like a robot of three types or boxes we made the the details of the boxes given below.




## Conclusion and Future Scope

### Conclusion of the project

Robots are created by human to help them in several aspects of our life. The quick developing of robotics during the last century made robots be everywhere. Because medicine is an important issue still now, it was obvious to link robotics and medicine.

And this is how the first medical robots appeared. We have come a long way since that moment. Medical robotics is improving very quickly, this is why the last ten years hosted the most impressive inventions ever made in this domain.

But we can notice that before that, a lot of improvements need to be made and that these robots are far from being perfect.

And the main disadvantage which is about money is not going to disappear. On the contrary, the more robots will be developed in the future, the more they will be expensive. Money is the biggest issue about medical robotics.

The cost and the maintenance of these robots are so expensive that just a few hospitals have it. And even like that all patients can't do it because these operations are not totally repaid by the social welfare and are expensive. Ethic problems exist too, not everyone is ready to be operated by a robot.

The IoT-based robot designed for assisting doctors in the medical field during the COVID-19 pandemic showcases the potential of technology in healthcare. By combining Arduino-based control, wireless communication, and a versatile robotic arm, the system offers enhanced safety, efficiency, and remote operation capabilities. This innovative solution can significantly aid healthcare professionals in delivering effective care, reducing their workload, and mitigating the risks associated with infectious diseases.

**Future Scope**

**We can install FPV camera :**

Generally robot is a mix of electronic, electrical and mechanical engineering and can do the tasks automatically on its own or under the supervision of humans. The camera is the eye for robot, call as robovision helps in monitoring security system and also can reach into the places where the human eye cannot reach.

**Microphone:**

It is believed that providing robots with auditory capabilities such as microphones will help in improving the life of the hearing impaired and also be able to recognize speech and converse with humans. Microphones are transducers that detect sound signals and convert them into electric signals.

**For video conference:**

The help of the video conference by the robot we can connect the doctors all over the world under a single roof for saving the time and money between the less time the doctor can give the service to the more people in very less time .

**Radio Frequency :**

Radio Frequency As compared to the other thing like bluetooth ,the radio frequency has more powerful communication device and it also has more range then the bluetooth it is also very easy to use and compact in size and easy to travel or move from one place to another place.

**Ultrasonic sensor**

An ultrasonic sensor is an electronic device that measures the distance of a target object by emitting ultrasonic sound waves, and converts the reflected sound into an electrical signal. Ultrasonic waves travel faster than the speed of audible sound (i.e. the sound that humans can hear). Ultrasonic sensors have two main components: the transmitter (which

emits the sound using piezoelectric crystals) and the receiver (which encounters the sound after it has travelled to and from the target).

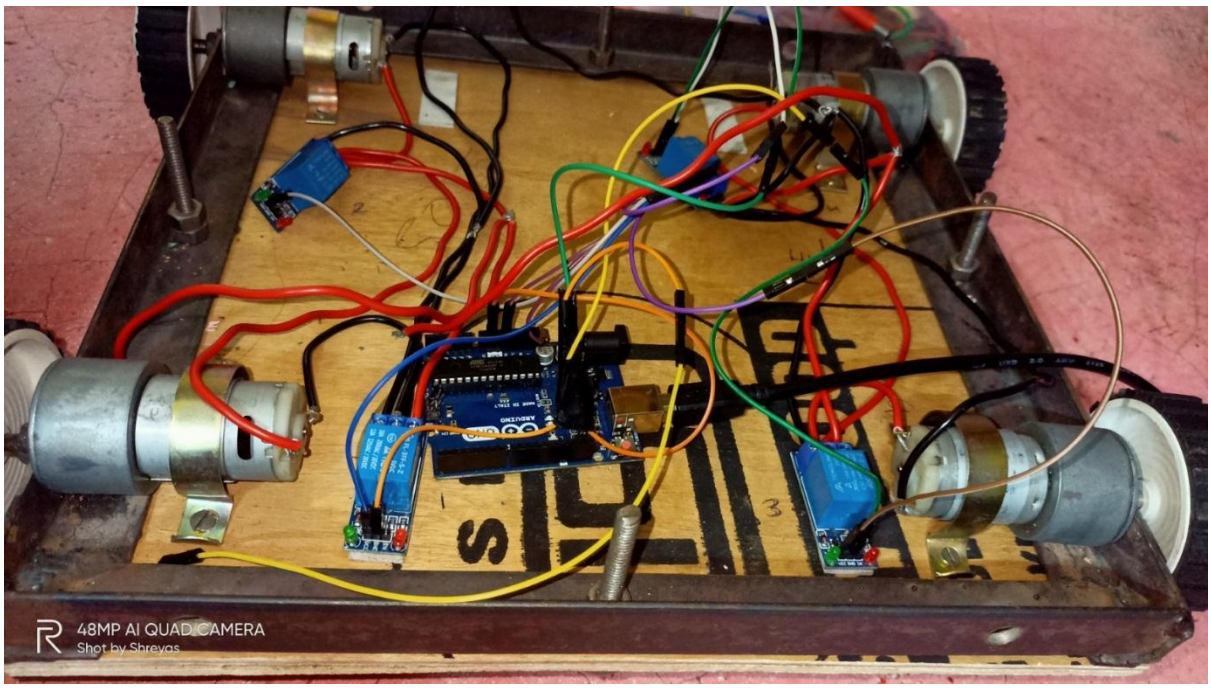
In order to calculate the distance between the sensor and the object, the sensor measures the time it takes between the emission of the sound by the transmitter to its contact with the receiver. The formula for this calculation is D = ½ T x C (where D is the distance, T is the time, and C is the speed of sound ~ 343 meters/second). For example, if a scientist set up an ultrasonic sensor aimed at a box and it took 0.025 seconds for the sound to bounce back, the distance between the ultrasonic sensor and the box would be.

**Bibliography and references**

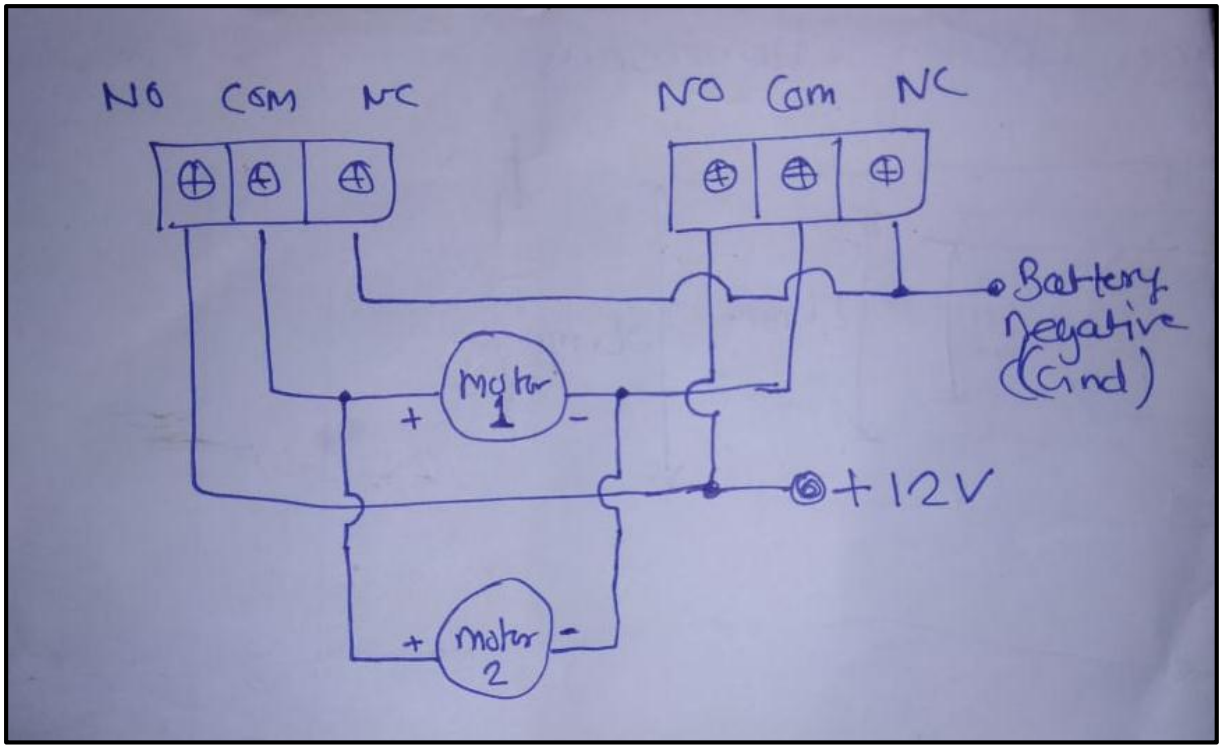

1. Programming Arduino: Getting Started With Sketches (second edition)
2. Arduino Workshop: A Hands-On Introduction with 65 Projects 1st Edition
3. Website : Wikipedia, Arduino,


CDR Side and Front View

CDR base in the preparatory pahse.




CDR Base with Circuit connections




Circuit diagram

Sample Tray of CDR


The Team with Hon'ble Director and Completed CDR with Project students