# MORADABAD INSTITUTE OF TECHNOLOGY

In Pursuit of Excellence

PROJECT REPORT

On

**"Robotic Arm to take sample of infected person for COVID-19 test"**

DEPARTMENT OF MECHANICAL ENGINEERING

Session: 2019-2020

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**"Robotic Arm to take sample of infected person for COVID-19 test"**

A THESIS SUBMITTED IN PARTIAL FULLFILMENT OF THE

REQUIREMENT FOR THE DEGREE OF

**BACHELOR OF TECHNOLOGY**

**IN**

**MECHANICAL ENGINEERING**

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## CERTIFICATE

This is to certify that the project report titled "Robotic Arm to take sample of infected person for COVID-19 test" Submitted by Nuzaif khan(RollNo:1608240060), Mumtazkhan (RollNo:1608240056), Mohdathar(RollNo:1608240046), MohdFaiz(RollNo:1608240048), SaddamHussain(RollNo:1608240054) in the partial fulfillment of the requirement for the award of Bachelor of Technology degree in mechanical engineering during session 2019-2020 at moradabad institute of technology and is an authentic work carried out by them under my supervision and guidance.

Date: 28/09/20

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# ABSTRACT

The project which we have prepared to utilize the use of robotic arm in different application such as taking sample for covid-19 patient for cramp hand. The main purpose of our project is taking sample of covid-19 patient without physical contact. An electric robotic arm is mainly consist of servo motor, dc gear, pcb, end effector, flex sensor, accelerometer, battery and arduino uno etc. These all are the parts used in assembling of robotic arm. In this robotic arm all parts are connected with each other. Firstly we send the signal from left hand with the help of flex sensor, the dc gear will move the hand vertical as well as horizontal direction, by the help of these steps we can do different task according to our requirement.

This system can be used by devices like tablets and smart phones to control the functioning of robotic arm because of the programming of arduino uno in it. It has many advantages such as it is easy to move, less maintenance, low cost, and eco friendly with the environment.

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# CHAPTER 1

## INTRODUCTION

What is a robot?

A robot can be defined as a programmable, self-controlled device consisting of electronic, electrical, or mechanical units. More generally, it is a machine that functions in the place of a living agent. Robots are especially desirable for certain work functions because, unlike humans, they never get tired; they can endure physical conditions that are uncomfortable or even dangerous; they can operate in airless conditions; they do not get bored by repetition, and they cannot be distracted from the task at hand. The concept of robots is a very old one yet the actual word robot was invented in the 20th century from the Czechoslovakian word *robota* or *robotnik* meaning slave, servant, or forced labour. Robots don't have to look or act like humans but they do need to be flexible so they can perform different tasks. Early industrial robots handled radioactive material in atomic labs and were called master/slave manipulators. They were connected together with mechanical linkages and steel cables. Remote arm manipulators can now be moved by push buttons, switches or joysticks. Current robots have advanced sensory systems that process information and appear to function as if they have brains. Their "brain" is actually a form of computerized artificial intelligence (AI). AI allows a robot to perceive conditions and decide upon a course of action based on those conditions.

Types of robot

There are 6 main type of industrial robots

1. ARTICULATED.
2. CARTESIAN.
3. CYLINDRICAL.
4. POLAR.
5. SCARA.
6. DELTA.

**1. Articulated** - This robot design features rotary joints and can range from simple two joint structures to 10 or more joints. The arm is connected to the base with a twisting joint. The links in the arm are connected by rotary joints. Each joint is called an axis and provides an additional degree of freedom, or range of motion. Industrial robots commonly have four or six axes.

**2. Cartesian** - These are also called rectilinear or gantry robots. Cartesian robots have three linear joints that use the Cartesian coordinate system (X, Y, and Z). They also may have an attached wrist to allow for rotational movement. The three prismatic joints deliver a linear motion along the axis.

**3. Cylindrical** - The robot has at least one rotary joint at the base and at least one prismatic joint to connect the links. The rotary joint uses a rotational motion along the joint axis, while the prismatic joint moves in a linear motion. Cylindrical robots operate within a cylindrical-shaped work envelope.

**4. Polar** - Also called spherical robots, in this configuration the arm is connected to the base with a twisting joint and a combination of two rotary joints and one linear joint. The axes form a polar coordinate system and create a spherical-shaped work envelope.

**5. Scara** - Commonly used in assembly applications, this selectively compliant arm for robotic assembly is primarily cylindrical in design. It features two parallel joints that provide compliance in one selected plane.

**6. Delta** - These spider-like robots are built from jointed parallelograms connected to a common base. The parallelograms move a single EOAT in a dome-shaped work area. Heavily used in the food, pharmaceutical, and electronic industries, this robot configuration is capable of delicate, precise movement.

Typical industrial robots are articulated and feature six axes of motion (6 degrees of freedom). This design allows maximum flexibility. Six-axis robots are ideal for:

- Arc Welding
- Spot Welding
- Material Handling
- Machine Tending
- Other Applications

## History of robotics

The history has its origin in the ancient world the modern concept began to be developed with the onset of the industrial revolution which allow the use of complex mechanics and the subsequent introduction of electricity. This made is possible power machines with the smaller compact motors.

The history of robotics dates back to Ancient Greeks. Greek mythology had at least one instance of robots: the mechanical servants of the Greek god of technology, fire, and the
Jacques De Vaucanson created some of the most famous automatons in 1737. His most famous work was "The Digesting Duck" which was capable of imitating a real duck by flapping its wings, eat grain, digest it, and defecate and was powered by weights.
In 1800s, the Japanese craftsman Hisashige Tanaka (1799-1881), known as "Japan's Edison" or "Karakuri Giemon", created an array of extremely complex mechanical toys, some of which served tea, fired arrows drawn from a quiver. Nikola Tesla demonstrated a radio-controlled-torpedo.
The first person who used the word "robot" was a play author Karel Capek in his 1921 play, creating the word from the Czech word "robota", meaning servitude.
In 1928, Japan's first robot, Gakutensoku, was designed and constructed by biologist Makoto Nishimura.
In 1940 Issac Asimov produced a series of short stories about robots starting with "A Strange Playfellow"; for Super Science Stories magazine whose story was about a robot and its affection for a child that it was bound to protect. Over the next 10 years he produced more Asimov was generally credited with the popularization of the term "Robotics" which was first mentioned in his story "Runaround" in 1942. But probably Issac Asimov's most important contribution to the history of the robot is the creation of his Three Laws of Robotics:

1) A robot may not injure a human being, or, through inaction, allow a human being to come to harm.
2) A robot stories about robots that were eventually recompiled into the volume "I, Robot"; in 1950.
must obey the orders given it by human beings except where such orders would conflict with the First Law.
3) A robot must protect its own existence as long as such protection does not conflict with the First or Second Law.
Asimov later added a "zeroth law" to the list. Zeroth law: A robot may not injure humanity, or, through inaction, allow humanity to come to harm.

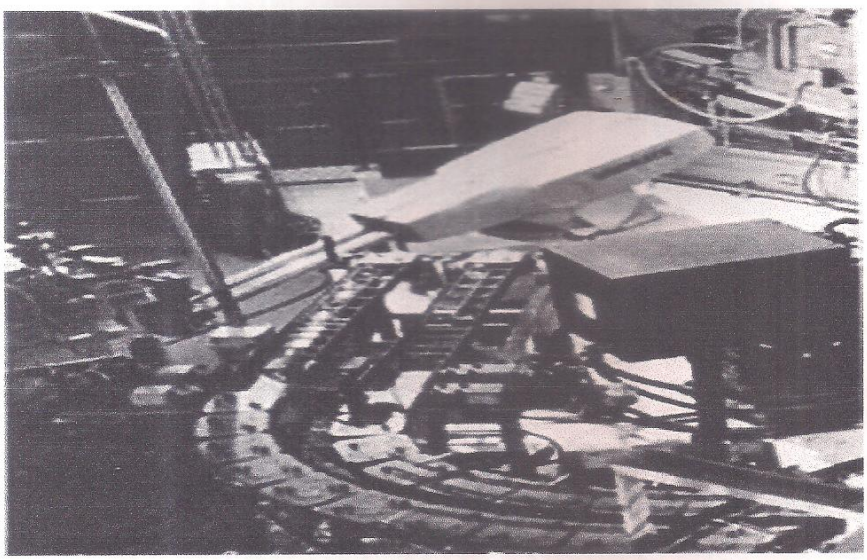

**Figure 1 ROBOTIC ARM**

Tuing published Computing Machinery and Intelligence in which he proposed a test to determine whether or not a machine has gained the power to think for itself.
George Devol invented the first truly modern robot called the Unimate which was digitally operated and programmable in 1954. Unimate was sold to General Motors in 1960 and it was installed in 1961 in a plant in Trenton, New Jersey to lift hot pieces of metal from a die casting machine and stack them.

In 1959 John McCarthy and Marvin Minsky started the Artificial Intelligence Laboratory at the Massachusetts Institute of Technology (MIT) an then he leaved MIT in 1963 to start the Artificial Intelligence Laboratory at Stanford University. After his starting this laboratory the Stanford Research Institute (later to be known as SRI Technology) created Shakey the first mobile robot to know and react to its own actions. Amongst other achievements SRI was also the research institute that helped bring us modern day laundry detergent in the development of Tide in 1966. In the same year, an artificial intelligence program named ELIZA is created at MIT by Joseph Weizenbaum. ELIZA functions as a computer psychologist that manipulates its users statements to form questions. Weizenbaum was disturbed at how quickly people put faith in his little program.
In 1969 Victor Scheinman, a Mechanical Engineering student working in the Stanford Artifi-

cial Intelligence Lab (SAIL) creates the Stanford Arm and today the design of this arm influences the design of robot arms.
In 1970 Stanford University produced the Stanford Cart which is designed to be a line follower but also was able to be controlled from a computer via radio link.
Victor Scheinman formed his own company and started marketing the Silver Arm, that was capable of assembling small parts together using touch sensors in 1974.

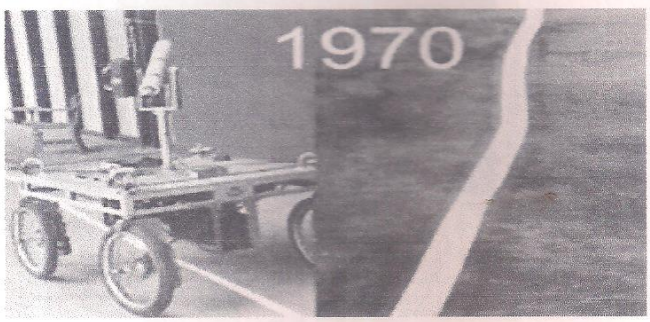


**Figure 2 ROBOTS IN 1970**

Soft Gripper was designed by Shigeo Hirose to to wrap around an object in snake like fashion in 1976.
In 1978 the 4 axis robot arm SCARA, Selective Compliance Assembly Robot Arm, was created. It was the best used for picking up parts and placing them in another location and it was introduced to assembly lines in 1981.
The Stanford Cart built in 1970 was rebuilt by Hans Moravec by adding a more robust vision system allowing greater autonomy in 1979 these were some of the first experiments with 3D environment mapping.
In 1981 Takeo Kanade built the direct drive arm, it was the first to have motors installed directly into the joints of the arm. This change caused this design to become faster and much more accurate than previous robotic arms.
In 1986 LEGO and the MIT Media Lab colaborated to bring the first LEGO based sensors, and 12 servo motors, was unveiled by the Mobile Robots Group MIT and Rodney Brooks and A. M. Flynn published the paper "Fast, Cheap and Out of Control: A Robot Invasion of educational products to market. LEGO tc Logo was used by in the classrooms of thousands of elementary school teachers. In the same year Honda began its humanoid research and development program to create robots capable of interacting successfully with humans.
In 1989 at MIT a hexapodal walking robot named Genghis, that used 4 microprocessors, 22 the Solar System" in the Journal of the British Interplanetary Society. The paper changed rover research from building the one, big, expensive robot to building lots of little cheap ones, and it also maked the idea of building a robot somewhat more accessible to the average person.
In 1993 an eight legged robot was developed at Carnegie Mellon University called Dante to collect data from a harsh environment similar to what we might find on another planet. However, Dante failed to collect gases from because of a broken fiber optic cable. In 1994 Dante II, a more robust version of its predicessor, descended into the crater of Alaskan volcano Mt. Spurr and completed the mission with a success.
Robotuna was a biomimetic robot that was designed to swim and resemble a blue fin tuna and

built by David Barrett for his doctoral thesis at MIT in 1996.

Honda's P2 humanoid robot was first shown in 1996. Standing for "Prototype Model 2", P2 was an integral part of Honda's humanoid development project; over 6 feet tall, P2 was smaller than its predecessors and appeared to be more human like in its motions.

Figure 3 SOLAR ROBOT

FIGURE 4- FIRST HUMAN ROBOT

The robotic dog AIBO of Sony was introduced in 1999. The AIBO was capable of interacting with humans. Then Sony also revealed its Sony Dream Robots, small humanoid robots in development for entertainment. The famous robot ASIMO of Honda was revealed as the most advanced result of Honda's humanoid project in 2000. ASIMO can run, walk, communicate with humans, interact with its environment, recognized voice and posture.

On January 3rd and 24th the Mars rovers Spirit and Opportunity land on the surface of Mars. Launched in 2003, the two robots will drive many times the distance originally expected, and are still operating.

In 2005 Honda introduced an updated version of ASIMO that has new behaviours and capabilities.

A 4-legged robot called "Starfish" that was capable of self modeling and learning to walk after having been damaged was created at Cornell University in 2006.

## APPLICATIONS OF ROBOTS IN INDUSTRIES: -

Work in an industry can be broadly divided into four major categories. Robots can be advantageously used in all these types of jobs. Robots can be classified according to the type of work they perform.

### 1) Pick and Place Operation-

There are certain types of industrial jobs in which an object is required to be picked up from a specified position and placed in a particular position. A robot, which does the pick-and-place operation, is called a pick-and-place robot. Pick-and-place robots are used for machine loading and unloading, palletizing, stacking and general materials handling.

**2) Point to Point Operation-** In the pick-and-place operation, the robot is expected to pick up an object from an initial position and place it at a final position. The initial and final positions can be different when the operation is repeated. There are operations in which work is required to be performed at several different locations. Consider, for example, the operation involved in drilling holes for a printed circuit board. A printed circuit board must have a very large number of tiny holes drilled very accurately in exactly the specified positions. Doing such a job manually will usually lead to an inaccurate product. A robot can be gainfully employed in doing the drilling operation, as it will perform the operation very accurately. A robot of this type is called a point-to-point robot. Application of point-to-point robots is in spot welding, gluing, drilling and other similar operations. In the first two categories of operations, namely pick-and-place operation and point-to-point operation, it is necessary for the robot to go from one point to the other, reaching the desired point accurately. The path traversed between two points, or the velocity with which the endeffector moves along the path, is unimportant since the robot is not expected to do any job while moving between two points. However, there are certain operations to be performed in an industry, wherein the path taken is important and the velocity with which the endeffector moves along the path is also important. In this event we have a continuous path operation.

### 3) Continuous Path Operation-

Consider, for example, spray-painting he walls of a room. The painting is not expected to be done continuously along the wall from one corner to the other since no paint is to be applied to the doors and windows. If we assume that the robot moves along a straight line along the wall to be painted, and if we assume that the paint is sprayed at a constant volume per unit time, in order to apply a uniform coat of paint on the wall, the robot has to move at a constant velocity. A robot, which does an operation of this type, is called a continuous path robot. The applications of continuous path robots are in paint spraying, seam welding, cutting, inspection and other similar operations.

During manual spray painting, the material of the paint gives out a toxic vapour because of which the human operator has to wear a protective mask to conveyor his face and the entire body. The human being has to operate in an environment where air is present. When paint is sprayed through air, air bubbles get entrapped.

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### 4 Assembly Operation-

Finally we have the assembly operation in an industry. In making a final part, a large number of component parts of different sizes and shapes must be put together properly. A robot, which performs the assembly operations, is called an assembly robot. The robot must be capable of identifying the required part, determine its position and orientation so that the right object can be picked up with the right orientation in order to join/attach it with the other required component. Suppose a toothed wheel is to be picked up by the robot. Using a TV camera, the robot gets the picture of each component and compares it with the picture of the toothed wheel already stored in the memory of the computer. If the present picture and the stored picture of the required component match, the robot decides that the required component has been identified. Otherwise it looks at the picture of a different component. This operation is repeated until the required component is found. Sometimes two hands are required to do a certain task. In this event two robot manipulators can be used. However, a good co-ordination between the two robots is essential.

## ADVANTAGE OF ROBOT IN INDUSTRY

- Use of robots result in increase productivity.
- Robot offer reduce cost of production.
- Robot offer improved production quality.
- Robot enable improved management control.

# CHAPTER 2

## LITERATURE REVIEWS

### 1. DESIGN AND DOVELOPMENT OF PICK AND PLACE ROBOTICS ARM USING PLC –SCADA

As per this project, the limitations of human work should be solved. The human works have many limitations likewise, laziness, less accuracy, time limits, less productivity, etc. In the industrial world automation is one of the essential elements for development. It helps to reduce the need for humans and increase efficiency and productivity. The field of automation occupies large areas, mostly in industrial manufacturing. A robotic arm is a type of mechanical arm, usually programmable, with similar functions to a human arm. The links of such a manipulator are connected by joints allowing either rotational motion or linear displacement. Used for assembly operations die casting, gas welding, arc welding and spray painting etc

### 2. AUTOMATION OF MOBILE PICK AND PLACE ROBOTIC SYSTEM FOR SMALL FOOD INDUSTRY

As per this project, aim is to design and implement a PLC based on reliable and high performance robotic system for food / biscuit manufacturing line. We are referring a robot, which is capable of picking unbaked biscuits tray and places them into furnace and then after baking it picks the biscuits tray from the furnace. A special gripper is designed to pick and place the biscuits tray with flexibility.

### 3. DESIGN AND IMPLEMENTATION OF PICK AND PLACE ROBOTIC ARM

In this project, mechanical construction is to build and assemble the robot body. The most suitable material to fabricate the structure of the arm has to be light and strong. Otherwise, the servo motor will not be able to pull up the arm and to perform the desired turning degree. Among the four materials considered (aluminum, Perspex, plastic polymer and carbon fiber), the aluminum is the most ideal material to be chosen as fabrication material.

### 4. ROBOTIC ARM IN MEDICAL FIELD WITH SPECIAL FOCUS ON CT IMAGE GUIDED BIOPSIES.

This project aims on the researches and advances done in medical field by engineers. Specially the use of robotics to improvise and simplify the treatment, diagnosis, surgery and other medical procedures. Use of robots in medical field has been increasing since there have been a lot of successful and less painful surgeries using robotic expertise and this project also gives depth information about the use and success of robotic technology in Medical field and also about advances in the field of robotics and compares them with our current research on robotic arm for medical diagnostic intervention.

### 5. DESIGN ANALYSIS OF ELECTRICAL CONTROLLED "PICK AND PLACE" ROBOTIC ARM

In this paper the design of a electrical controlled robotic arm has completed a prototype was build and confirmed function the use of robotic is highly recommended for industries especially for safety and productivity reason.

## 6. DESIGN OF A ROBOTIC ARM WITH GRIPPER AND END EFFECTOR

In this paper propose of this technology makes the robotic mechanics more flexible, a servo motor is used for the gripper and the gripper can perform basic function of picking, holding, grasping of object.

## 7. DESIGN AND OPERATION OF SYNCHRONIZED ROBOTIC ARM

In this paper purposed the robotic arm can be design to perform any desired task such as welding, gripping etc, depending upon the application. For example robotic arm in auto motive assembly line perform variety of task for picking and placing.

# OBJECTIVES

- Fabrication of electrical controlled robotic arm.
- Displacement analysis of robotic arm.
- Kinematic analysis of robotic arm.

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# CHAPTER 3

## METHODOLOGY

The mechanical design of the robotic arm is based on a robot manipulator with similar function to a human arm. Robotic arm system often consists of links joints, actuator, sensors and controllers. The link are connected by joints to form a open kinematic chain, one end of the chain is attached to robot base and another end is occupied with the tool (hand, gripper & endeffector).

## COMPONENT USE IN ROBOTIC ARM

1. **SERVO MOTOR**- A Servo motor is a rotary actuator or linear actuator that allows for precise control of angular or linear position, velocity and acceleration.


Figure 4 SERVO MOTOR

2. **FIEX SENSOR**- A Flex sensor is a sensor that measures the amount of deflection or bending

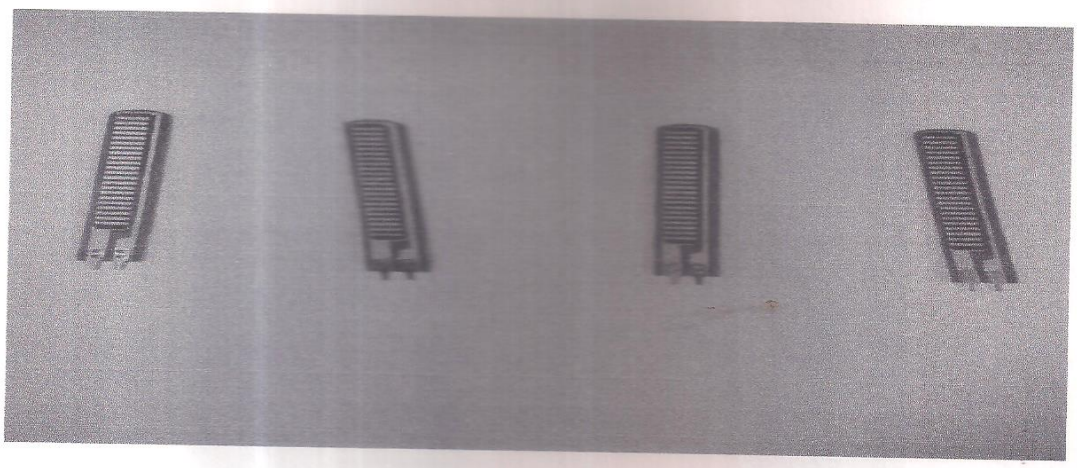

Figure 5 FLEX SENSOR

3. **ACCELEROMETER**- It is an electromechanical device used to measure acceleration forces. Such forces may be static, like the continuous forces of gravity.

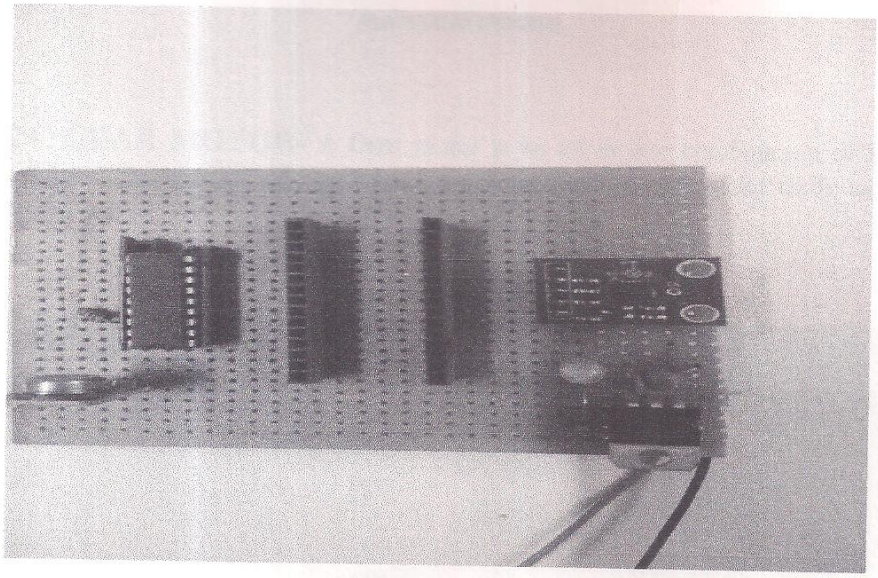

Figure-6 ACCELEROMETER

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4. **ENDEFFECTOR-** it is use to grip or hold something, it connect with the servo motor

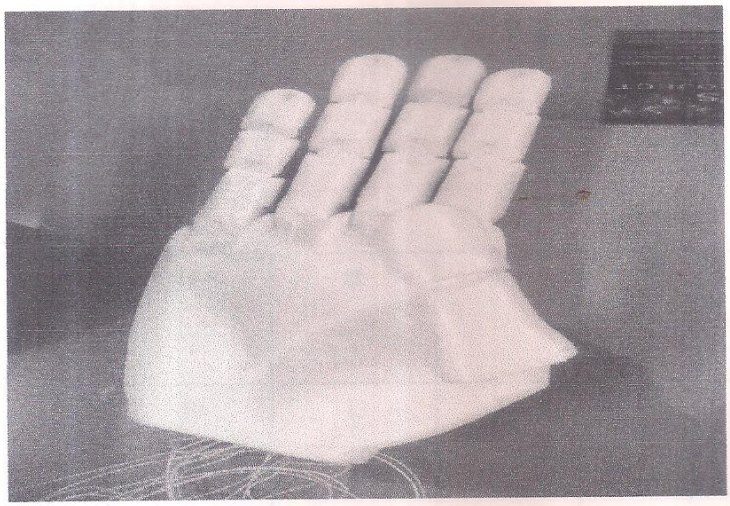

**Figure 9 END EFFECTOR**

5. **DC GEAR MOTOR-** A Gear motor is an all in one combination of a motor and gearbox. The addition of a gear head to a motor reduces the speed while increasing the torque output..

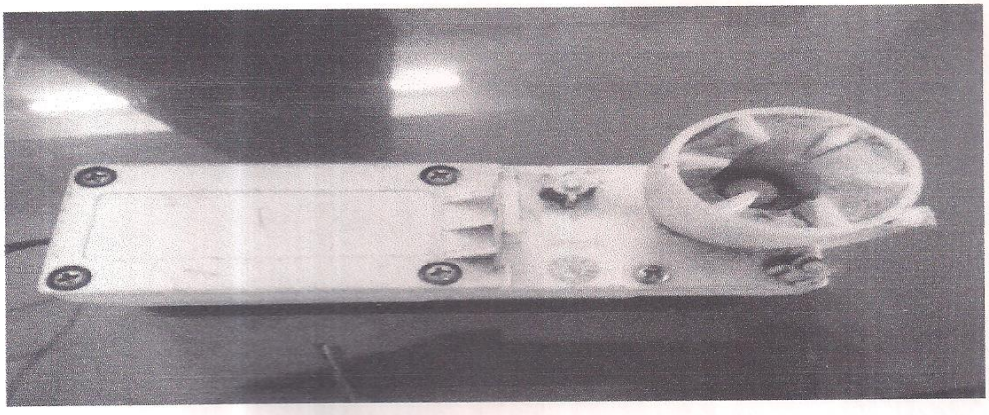

**Figure 7 DC GEAR**

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## NUMERICAL METHODOLOGY DISPLACEMENT ANALYSIS

**PRACTICAL DATA**

**SOFTWARE USED MINITAB**

| θ1 | θ2 | l1 | l2 | Xe | Ye | Φ |
|---|---|---|---|---|---|---|
| 45 | 45 | 40 | 45 | 30 | 75 | 85 |
| 45 | 0 | 40 | 45 | 65 | 64.5 | 90 |
| 35 | 30 | 40 | 45 | 53.5 | 65.5 | 65 |
| 50 | 20 | 40 | 45 | 69 | 48 | 70 |

TABLE-1 BASED ON PRACTICAL DATA

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## THEORETICAL DATA

| θ1 | θ2 | l1 | l2 | Xe | Ye | Φ |
|---|---|---|---|---|---|---|
| 45 | 45 | 40 | 45 | 28.28 | 73.28 | 85 |
| 45 | 0 | 40 | 45 | 60.10 | 60.10 | 90 |
| 35 | 30 | 40 | 45 | 51.78 | 63.72 | 65 |
| 50 | 20 | 40 | 45 | 68 | 46 | 70 |

TABLE-2 BASED ON THEORETICAL DATA

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## REGRESSION ANALYSIS

### FOR X-AXIS

These all values are calculated with the help of a software named Minitab we practically examine our prototype with different calculation and further we have develop two graph in x direction as well as y direction which shows the different between x direction as well as y direction.

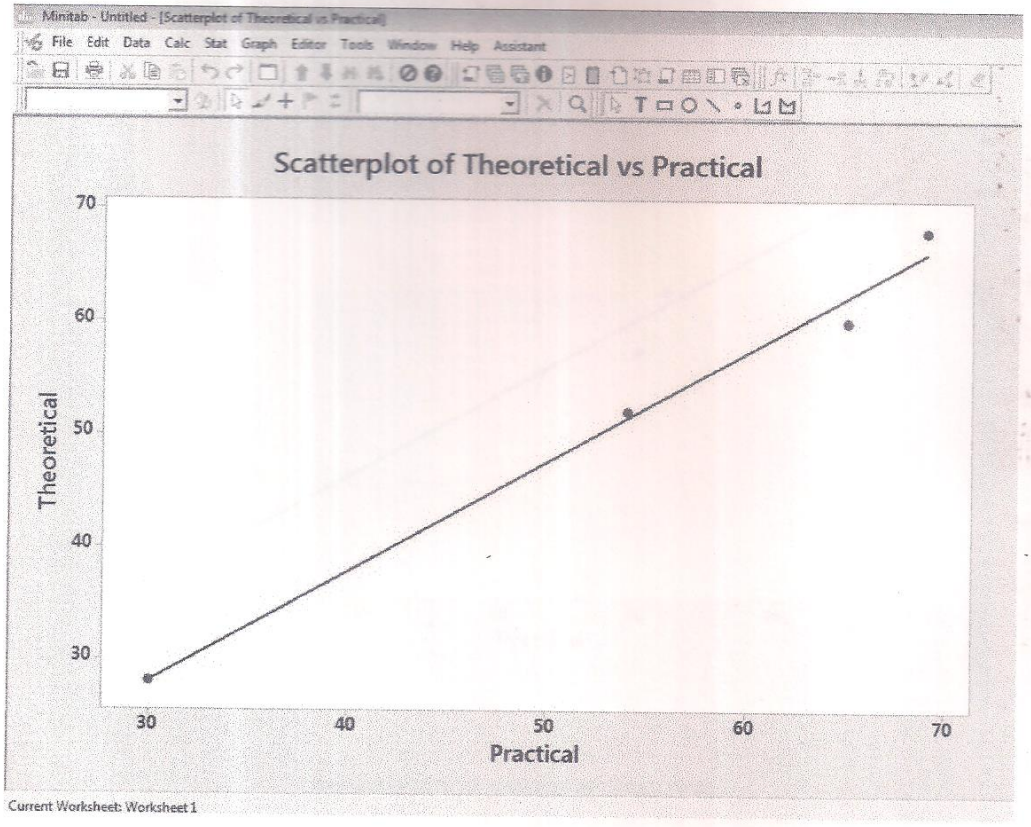


**Figure-8 PRACTICAL ANALYSIS IN X DIRECTION**

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## FOR Y-AXIS

In this graph we have changed certain things such as angle and we have taken different different direction in x axis and as well as in y direction.

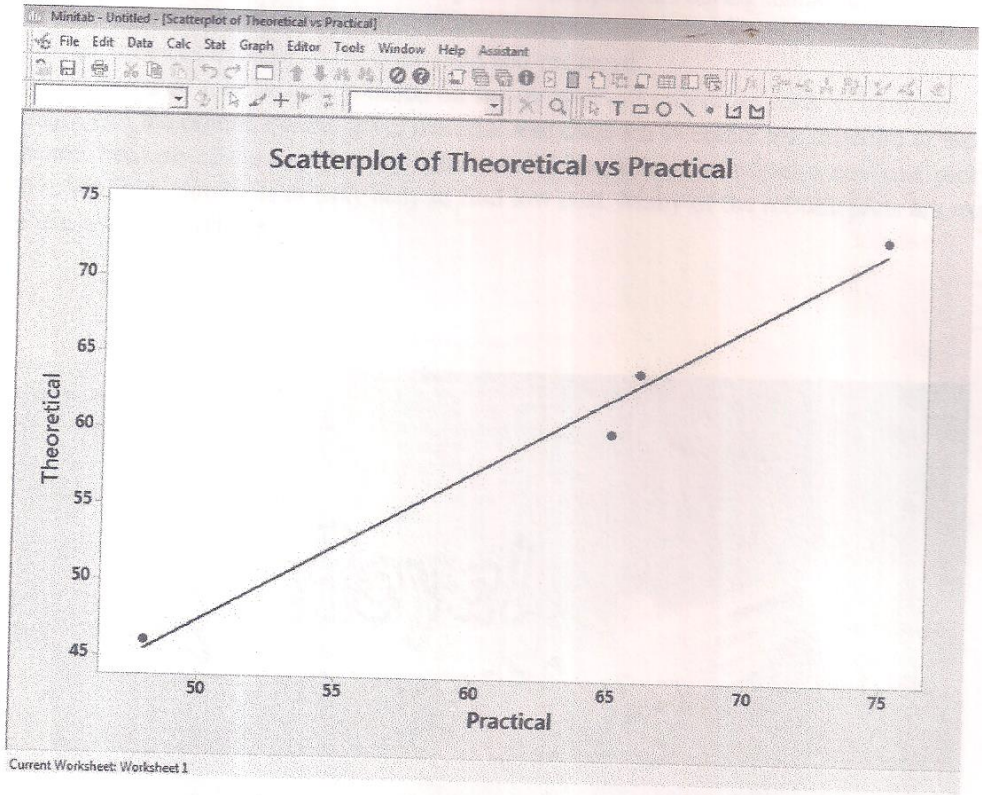


**Figure-9 PRACTICAL ANALYSIS IN Y DIRECTION**

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# CHAPTER 4

## RESULT

The structure of the robotic arm was built by four assembly parts base assembly, gripper assembly, arm assembly and finally its elbow assembly. The robotic arm is designed very important because its able to find replacement robotic parts or components during maintenance of the parts. Besides that a good designed help in providing comprehensible designed concept. As the result machines and devices are easy to be assembled and managed.

Selecting material of robotic arm is based on the mechanical properties such as hardness, density, strength and the others. Plastic (pvc) material was choosen to create the structure of the body robotic arm because of the low density feature and affordable cost. Metal screw was picked to join all robot links, due to its density easy to find low cost. Many of the robotic parts are exchangeable and easy to purchase.

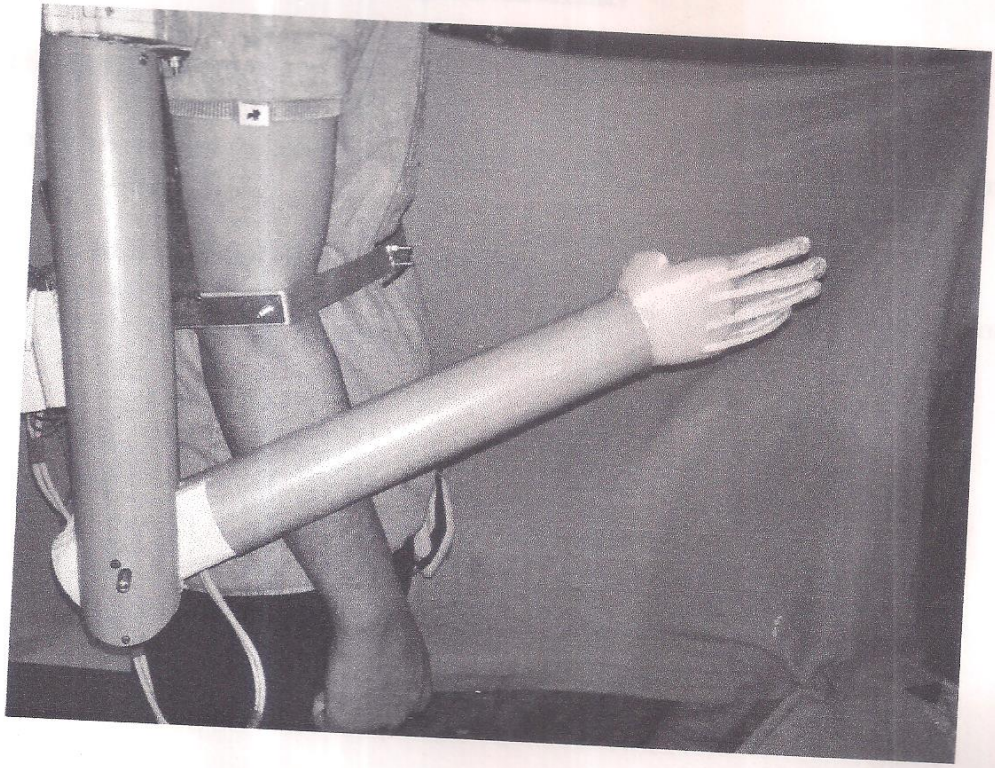

Figure 10 ROBOTIC ARM

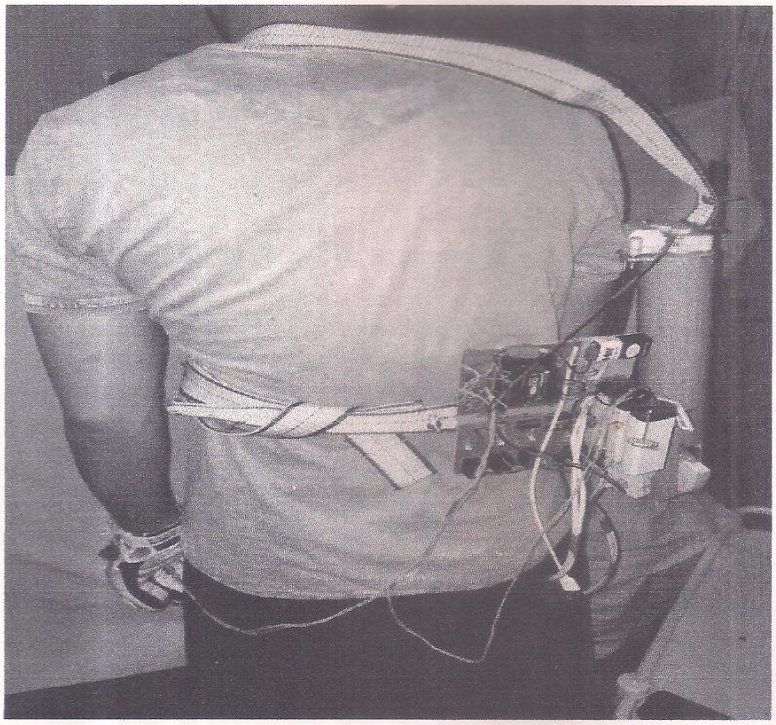

Figure 11 FULL ASSEMBLY

## THE MAIN ASSEMBLY

The main assembly of the robotic arm was involved with 2 sub assembly which is the arm and the base assembly.

## ROBOT DOF (DEGREE OF FREEDOM)

There are 3 degree of freedom in the robotic arm which is link 1, link2, link 3, these links of the robotic arm able to make the movement more flexible.

# DISCUSSION

Finally working on the assembly had done. The assembly of the robotic arm was successful with the minimal rework needed.

The component use to make the assembly can be easily found and replace from local hardware store and no exotic manufacturing were use to fabricate all the customize parts. The enables convient replacement of the parts and component when the contempory once are defected. For eg(parts drawing and assembly).

During the process of assembly the spinner part with the motor. Problem was founded when assembly the spinner screw and nuts was losen when the motor is rotating. The moment assembly has being fixed when different types of motors has been assembled with the servo motor and step motor.

Due to this we can reached to the flexible and rechargable design. Beside that assembling between first link and second link also occur some problem because of the servo motor. To overcome the problem a DC gear was added to avoid and reduce the problem.

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# CONCLUSION

The first objective of the project was to design a working electrical controlled robotic arm with abilities to perform sense pick and place functions.

The design of a working electrical controlled robotic arm with the ability to perform different function. The types of the robotic arm were stared from the prototyping stage. Drawing and assembly schismatic were generated as designed data to be kept for the future references if improvement were to be done to enhance the development device in any possible way.

Therefore entire objective were achieved. The prototype of the robotic arm was successfully developed and it was able to there all function.

It was tested to give a clear image on its overall reliability.

The overall successful rate of the robotic arm to perform its task correctly was 90%.

The other objective of the project is to do analysis of mechanical properties of the design of robotic arm calculation were done practically as well as theoretically among different links.

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## REFERENCES


1. MIR SAJJAD HUSSAIN TALPUR, MURTAZA HUSSAIN SHAIKH
"AUTOMATION OF MOBILE PICK AND PLACE ROBOTIC SYSTEM FOR SMALL FOOD INDUSTRY" PATENT APPLICATION PUBLICATION DATE: 28TH JUNE 2007 PAGE NO. 1 – 7.
2. SHYAM.R.NAIR
"DESIGN OF ROBOTIC ARM FOR PICK AND PLACE & OBJECT CONTROL" 2012
3. PURAN SINGH AND ANIL KUMAR "DESIGN OF ROBOTIC ARM WITH GRIPPER AND EFFECTOR" 2013.
4. RAVIKUMAR MOURYA, AMIT SHELKE, SOURABHSATPUTE, SUSHANT KAKADE, MANOJBOTRE.
"DESIGNAND IMPLEMENTATION OF PICK AND PLACE ROBOTIC ARM" INTERNATIONAL JOURNAL OF RECENT RESEARCH INCIVIL AND MECHANICAL ENGINEERING DATE: SEPT 2015 PAGE NO.: 2 – 3.
5. SHAH SHUBHAM KAMLESH, ABHIJEET KUMAR, RUBY MISHRA, GOURISHANKAR MOHAPATRO.
"ROBOTIC ARM IN MEDICAL FIELD WITH SPECIAL FOCUS ON CT IMAGE GUIDED BIOPSIES" NOV 2016.
6. MODI AKSHAY KUMAR, MAHENDRA KUMAR, PRAVIN KUMAR D.PATEL, DODIA BHAGIRATH KUMAR VAR JANGBHAI, MORADIYA CHIRAG KUMAR KHODABHAI,BHAVESH PRAJAPATI "DESIGN AND DEVELOPMENT OFPICK AND PLACE ROBOTICS ARM USING PLC-SCADA" 1ST INTERNATIONAL CONFERENCE ON CURRENT RESEARCH IN ENGINEERING. DATE: 13TH APRIL 2017 PAGE NO.: 1- 3.
7. B.O .OMIJEH AND UHUNWANGHU "DESIGN AND ANALYSIS OF ELECTRICAL CONTROLLED PICK AND PLACE ROBOTIC ARM 2017.


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## CERTIFICATES AND AWARDS

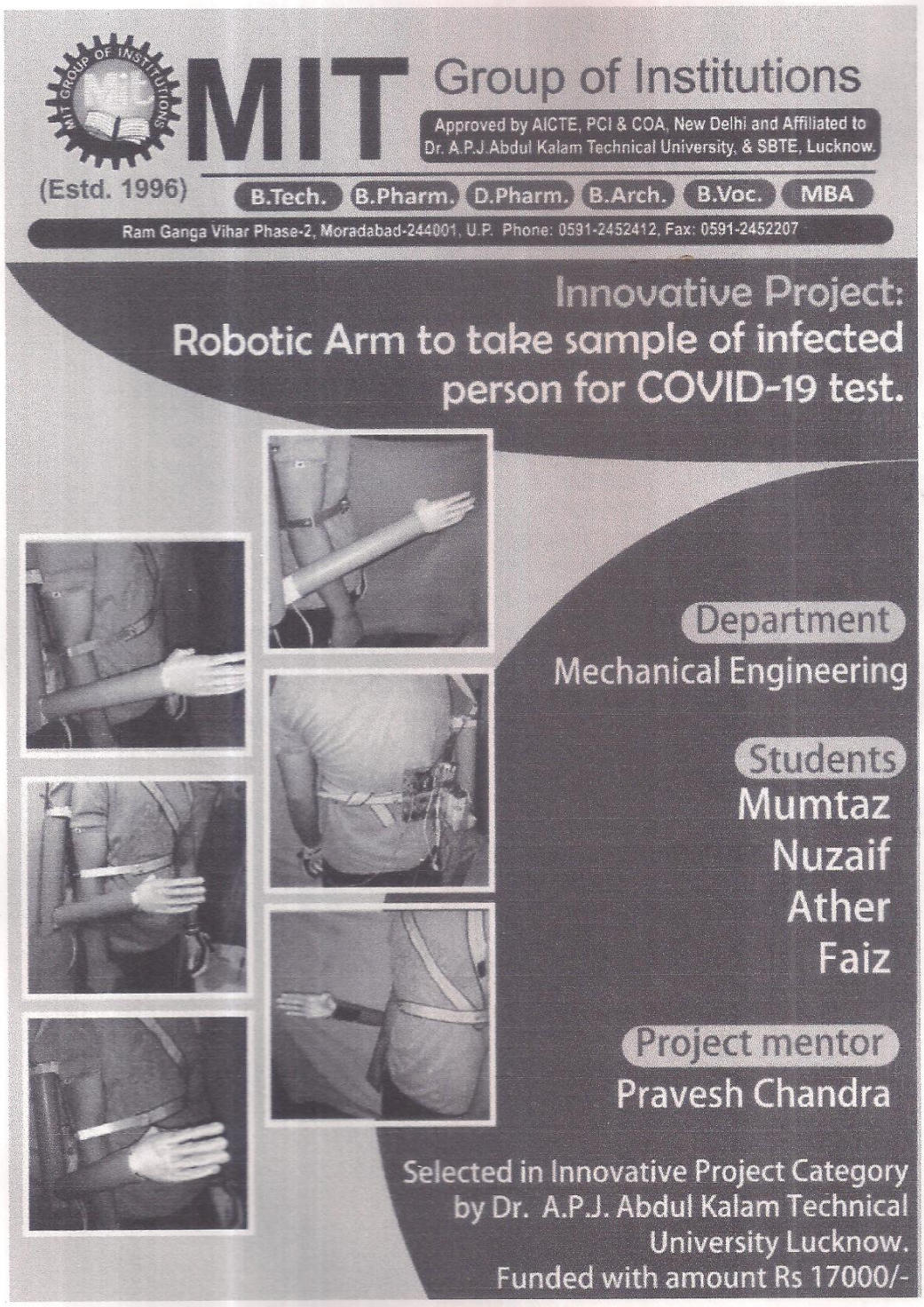


Figure 12 ROBOTIC ARM FOR SAMPLE OF INFECTED PERSON FROM COVID -19

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# हाजिर है कोरोना सैंपलिंग के लिए रोबोटिक आर्म

अनुज मिश्र • मुरादाबाद

अपने बनाए प्रोजेक्ट रोबोटिक आर्म के साथ बाएं से नुजैफ, अथर और फैज • जागरण

कोरोना काल को नवोन्मेषी प्रयोग करने वालों ने अवसर में बदलने का काम किया है। निजी कॉलेज के छात्रों ने रोबोटिक आर्म तैयार किया है। यह कोरोना मरीजों के सैंपल लेने के दौरान संक्रमण सुरक्षा व दूरी बनाने में कारगर साबित होगा। मेडिकल स्टाफ एक हाथ में रोबोटिक आर्म को पहनेगा और दूसरे हाथ में उसका कंट्रोलर रखेगा। इसे एक जगह फिक्स कर भी कंट्रोल कर सैंपलिंग कर सकते हैं। कोविड-19 की आसानी से जांच के लिए मुरादाबाद इंस्टीट्यूट ऑफ टेक्नोलॉजी (एमआइटी) के मैकेनिकल इंजीनियरिंग अंतिम वर्ष के चार छात्रों मुमताज, नुजैफ, अथर और फैज ने इसका पूरा नाम रोबोटिक आर्म फार टेकिंग सैंपल फॉर कोविड-19 टेस्ट रखा है। छात्रों ने शिक्षक प्रवेश चंद्रा के निर्देशन में यह प्रोजेक्ट तैयार किया है। चंद्रा बताते हैं कि कोविड-19 जैसी बीमारी को देखते हुए अब्दुल कलाम टेक्निकल विश्वविद्यालय (एकेटीयू) की ओर से छात्रों को कोविड-19 में योगदान के लिए यह कुछ नया करने का चैलेंज दिया गया था, जिसे छात्रों ने स्वीकार करते हुए बीस दिनों में यह प्रोजेक्ट तैयार कर दिया। इतना ही नहीं एकेटीयू की ओर से छात्रों के इस प्रोजेक्ट को बेस्ट प्रोजेक्ट अवार्ड भी दिया गया। साथ ही बतौर उत्साहवर्धन 17 हजार रुपये की धनराशि भी दी है।

**इन उपकरणों का किया गया है इस्तेमाल:** रोबोटिक आर्म तैयार करने में पोजीशन, पिक एंड प्लेस समेत सात सेंसर लगे हैं। थ्रीडी प्रिंटिंग के द्वारा बनाया गया हाथ, पीवीसी पाइप (इससे हाथ की आर्म बनाई गई है), सर्वो मोटर, प्रोग्रामिंग के लिए एडुरिनो मीटर एवं कंट्रोलिंग के लिए कंट्रोलर लगाया गया है। यह सभी चीजें आसानी से बाजार में उपलब्ध हैं।

**ऐसे करेगा काम:** एक हाथ में रोबोटिक आर्म और दूसरे हाथ में कंट्रोलर होगा। रोबोटिक आर्म पहनने के लिए उसके साथ एक बैंड जुड़ा रहेगा। उस बैंड को अपने शोल्डर से बांध रोबोटिक आर्म को पहना जा सकता है। अब कंट्रोलर वाले हाथ से हम जो गतिविधि करेंगे या जो कंट्रोल कमांड देंगे, रोबोटिक आर्म वहीं कार्य करेगी। इसकी लंबाई हाथ से तीन फिट अधिक रखी गई है।

Figure 13 NEWS PAPER ARTICLE FOR ROBOTIC ARM

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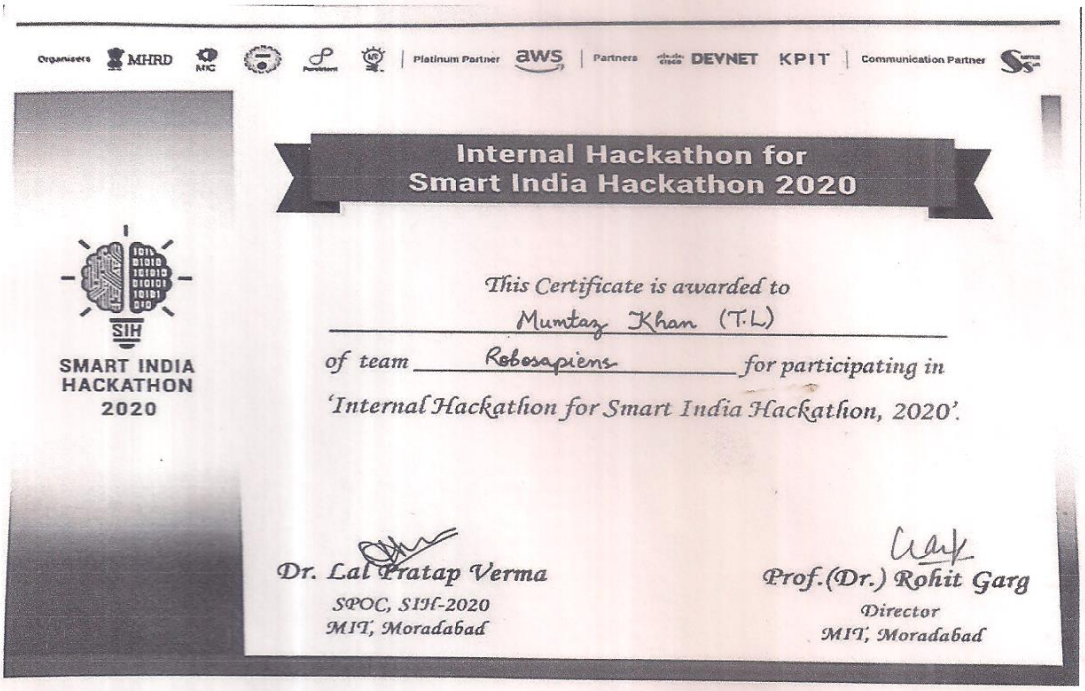


Figure 14 CERTIFICATE FOR TAKING PART IN SMART INDIA HACKATHON

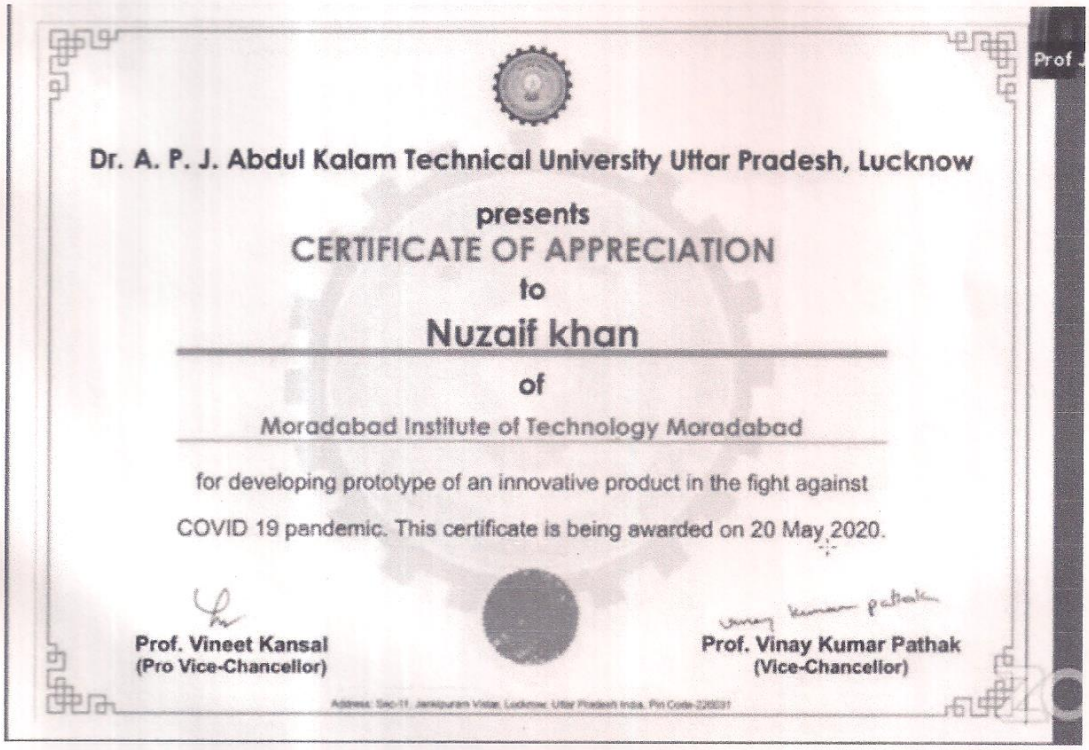


Figure 15 CERTIFICATE FOR DEVELOPING A PROTOTYPE FROM DR.A.P.J.ABDUL KALAM TECHNICAL UNIVERSITY

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