



**American International University – Bangladesh**

Faculty of Engineering

Department of EEE & CoE

---

# Intelligent Robotics and Automation

## Project Proposal

**SEMESTER: Fall 2022-2023**

**Project Title and Motivation of the Project: 2 MARKS**

**Impact on Society: Survey to develop a process for complex engineering problems considering cultural and societal factors (use pie chart): 5 MARKS**

**Goals and Benefits of the Project: 3 MARKS**

**Experimental Block Diagram and Component List: 3 MARKS**

**Project Timeline (GANTT CHART): 5 MARKS**

**References:** (only references from recent paper publications are allowed, don't use you-tube, Wikipedia, or any random website for references): 2 marks

**FOR FACULTY USE ONLY**

**COMMENTS BY COURSE TEACHER:**

---

COURSE TEACHER'S NAME

COURSE TEACHER'S SIGNATURE

DATE

# GROUP MEMBERS

|   |  |
|---|--|
| <b>NAME:</b> Chowdhury, Hafizur Rahman<br><b>ID No:</b> 19-39907-1<br><b>PROGRAM:</b> EEE<br><b>EMAIL:</b> <a href="mailto:hafizur.rahman2802@gmail.com">hafizur.rahman2802@gmail.com</a> | <b>NAME:</b> Abdullah-Al Mostofa<br><b>ID:</b> 19-40570-1<br><b>PROGRAM:</b> EEE<br><b>EMAIL:</b> almostofaa@gmail.com |
| <b>NAME:</b> Mohammad Mamunur Rashid<br><b>ID:</b> 19-40716-1<br><b>PROGRAM:</b> EEE<br><b>EMAIL:</b> mamunurmurad212@gmail.com   | <b>NAME:</b> Momtahir Ahammed<br><b>ID:</b> 19-40698-1<br><b>PROGRAM:</b> EEE<br><b>EMAIL:</b> momtahir66@gmail.com    |
| <b>REMARKS</b> (for OFFICE use only)  |  |

## Project Title and Motivation of the Project:

Our project's proposed title is "**Application of delta robot in diverse sectors**". The delta robot has prismatic or rotary joints on the arm are included. Motors are housed in the base structure, and the machines are suspended from the ceiling to move a series of linked arms. This strategy has the advantage of reducing arm weight, which allows for rapid acceleration and top speeds. However, its payload capacity is usually less than 8 kilograms.

Our project's ultimate objective is to develop a Delta Robot that can perform a wide variety of tasks, including pick-and-place, packing in assembly pattern, etc. In this research, we develop an entity modeling framework–friendly dynamic model of the Delta robot. we will try to obtain a dynamic model that is free of singularities and is suitable to dynamic analysis, control system design, and time-domain simulation. The object-oriented design makes it suitable for a wide range of applications, including coordinated control and robotic assembly.

## Impact on Society: Survey to develop a process for complex engineering Problems considering cultural and societal factors (use pie chart):

The ability to rotate an object is facilitated by the presence of at least a fourth axis in most delta robots. Delta robots' primary advantage is that their heavy motors are permanently mounted to the chassis, freeing up the robot's moving parts to be extremely lightweight. In contrast, an articulated arm robot's motors take turns bearing the load of the ones that came before it.

A Google form is made to collect peer reviews of our project.



## Application of Delta Robot In Diverse Sectors

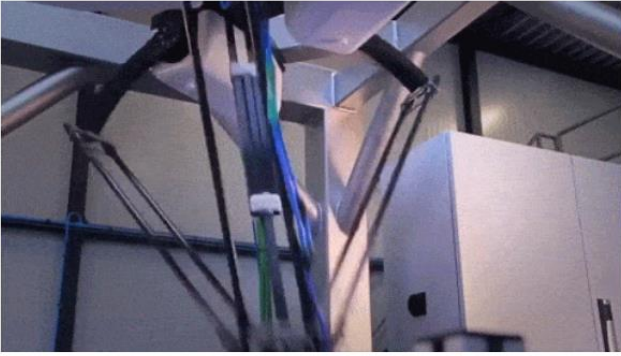
A delta robot is a type of parallel robot with three arms that are joined at the base by universal joints. The parallelograms in the arms are the most important part of the design because they keep the end effector in the right place. Stewart, on the other hand, can change the direction of its end effector.

When a vision system is added to a delta robot, it can be used as a very flexible pick-and-place tool. Vision adds the ability to keep track of where parts are on a conveyor and guess where they will be picked. Parts can now be picked up from any place or angle on the conveyor and put in a variety of places, like a package, a pallet, or another conveyor, among many others.

---

Figure: An overview of the Google survey form.

Could delta robot increase productivity in the industry?



- ☐ Yes
- ☐ No
- ☐ May be

How will you rate (in a scale of 5) Delta Robot over other industrial Robots?



- |                       |                       |                       |                       |                       |
|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| 1                     | 2                     | 3                     | 4                     | 5                     |
| <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

From your perspective, is it a reliable source for medical applications?



- ☐ Yes
- ☐ No
- ☐ Maybe

Note: The pie charts will be uploaded after collecting enough peer review.

## **Goals and Benefits of the Project:**

Besides few drawbacks, the delta robot has enormous benefits which are mentioned below. Also The goals of this project is to achieve the systematic movements and tasks done by the delta robot. As a secondary goal, image processing will be added for further research.

### **2.1 Speed**

When compared to other types of robot manipulators, delta robots shine with their lightning-fast speed. The speed of these robots is so great that they outpace SCARA robots by a factor of 30%. Their groundbreaking architecture is what allows for such lightning-fast performance. Different from the serial-link structure of most industrial robots, delta robots instead use parallel links. This indicates that their axes are coupled mechanically in parallel rather than in series. The high speeds, quick acceleration, and increased cycle demands are all made possible by the parallel-link layout.

### **2.3 Gripper**

Due to its limited payload capabilities, delta robots frequently employ vacuum end-effectors. These aid users in maximizing the velocity of their delta robots.

### **2.4 Productivity**

Greater rates of productivity are possible with the help of delta robots because of their higher rates of speed and throughput. The throughput of a factory using delta handling robots can be increased by as much as 180 parts per minute or 3 parts per second. More goods can be produced at once if throughput is increased. The use of robotic manipulators increases productivity since they allow for a 12-hour workday to be extended to 24 hours. Due to the reliability of delta manufacturing robot arms, they can operate nonstop, increasing daily output.

### **2.5 Safety**

For tasks that require a lot of speed and repetition but are nonetheless hazardous to human labor, delta robots are the way to go. Worker stress, exhaustion, and dissatisfaction are common outcomes of high-volume, high-velocity tasks. Musculoskeletal ailments, such as muscular strains, carpal tunnel syndrome, and rotator cuff tears, account for more than 30% of all injuries sustained on the job. Because of the risk of injury, manufacturers may face higher compensation expenses and a shortage of qualified workers. By reducing the risk of accidents on the assembly line, the FANUC M-1ia may help keep your factory's workforce healthy and happy. Jobs that need less physical exertion, such as working with robots, will become more attractive to workers. Unlike human workers, delta robots can reliably and swiftly complete routine jobs.

### **2.6 Footprint**

Unlike other types of robots, delta assembly robots don't need a lot of room to function. With their compact design and ability to be installed in a vertical orientation, they are a good choice for factories with limited floor space. They are very simple to incorporate into a robotic work cell due to their compact size.

## Experimental Block Diagram and Component List:

A block diagram of the delta robot was made to have an overview of the project

### Block Diagram for Delta Robot:

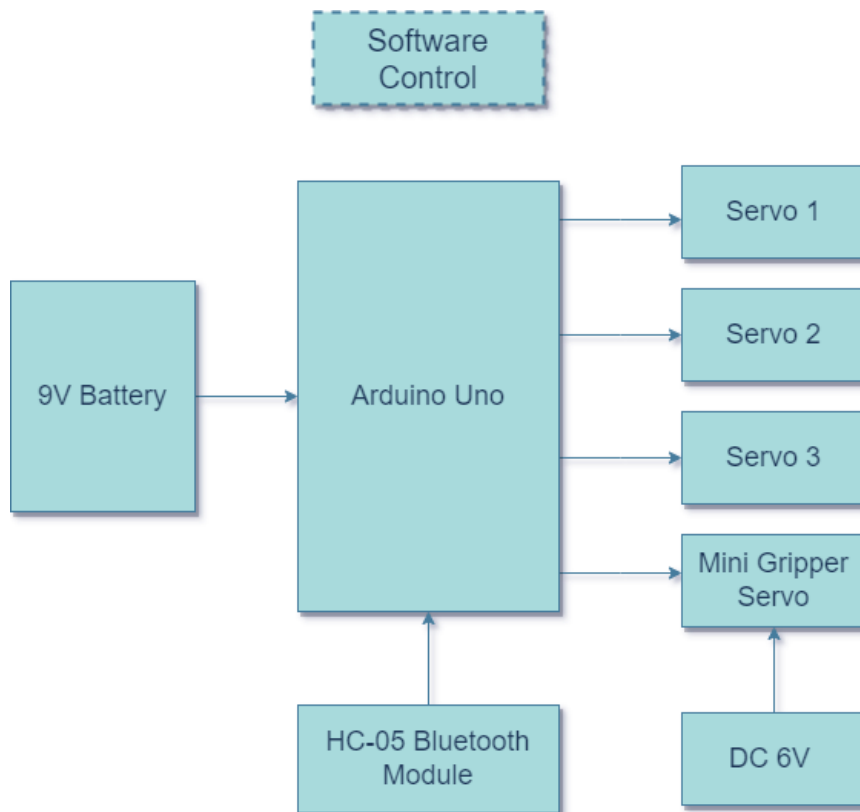


Figure: Block Diagram of Delta Robot

### Component List:

| Serial No. | Name of the component | Quantity |
|------------|-----------------------|----------|
| 1.         | 3D Printed parts      | 12       |
| 2.         | Servo                 | 3        |
| 3.         | Mini Servo            | 1        |
| 4.         | HC-Bluetooth Module   | 1        |
| 5.         | Arduino Uno           | 1        |
| 6.         | 604z bearing          | 3        |
| 7.         | Threshold rod         | 3        |

**Note:** A cost Analysis will be made with all kind of additional components and miscellaneous expense.

Project Timeline (GANTT CHART):

