# Planar Manipulator

## Robotics Club

## Abstract/Introduction

The main focus of the project is to design a planar robotic arm that can resemble a human hand and can do all the work which can be done in a plane.It can write according to pattern drawn on screen, travel a set path, pick and place objects.it can be used to draw patterns and drawing on large papers which can't directly be printed through machines.
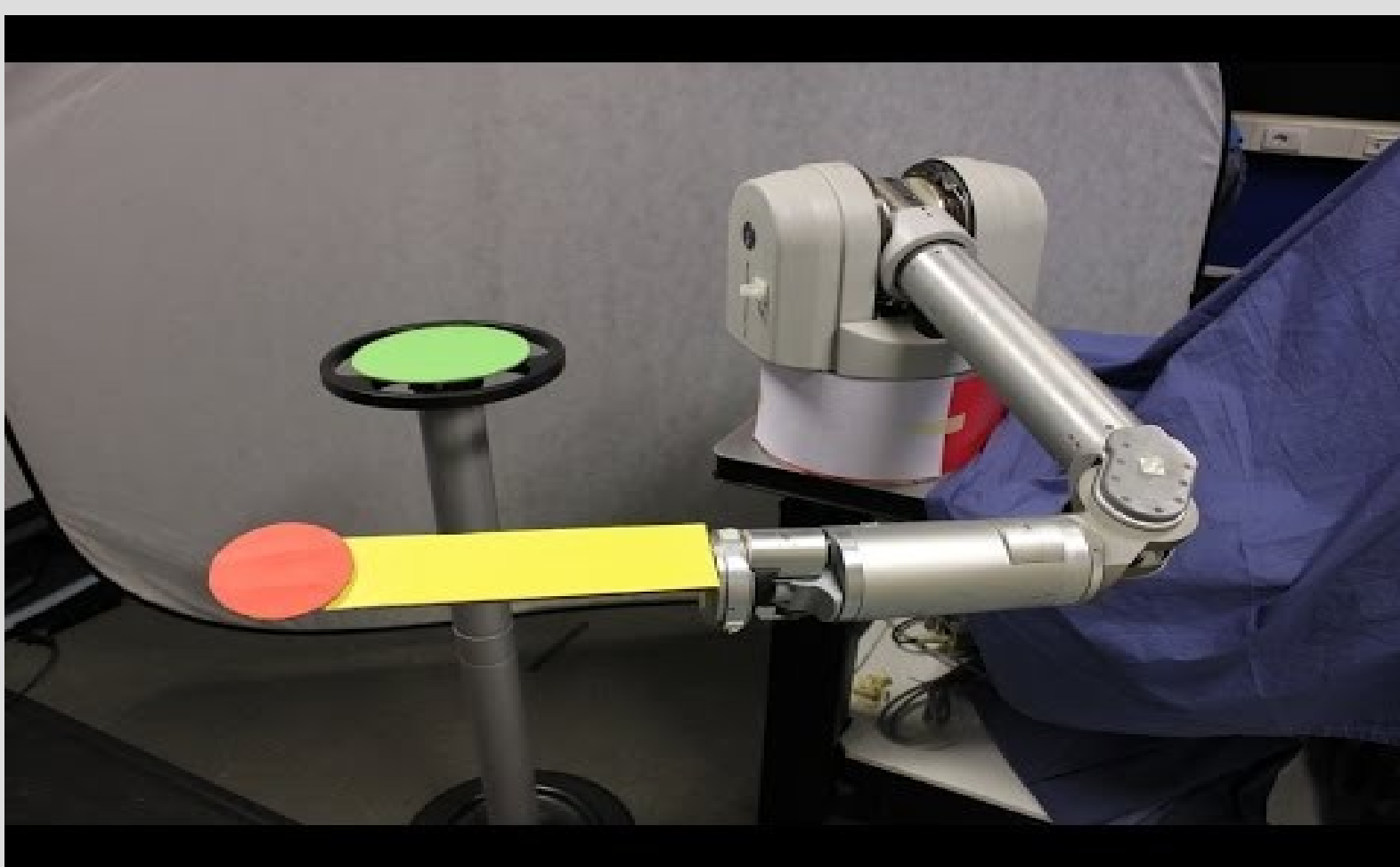
## Results

Uptill now we have been been successfull in acheiving writing part based on digital drawing on screen.

In the next level the arm is to be simulated and to be integrated with ROS to acheive its maximum capability.

Rotation can be made more controllable and precise by use of stepper motor instead of servo.

Size of paper is choosen with best suited aspect ratio.

Its small version can be used to copy notebook handwriting which can resemble human handwriting written through pen.

## Methodology

Mechanical part is designed in Tinkercad and is 3d printed.Each arm can rotate 180 degrees through servo motors. Rotation is made smooth through bearings. Foe the last part a pen up-down mechanism has been used.

Algorithm includes Inverse kinematics in order to reach a particular set-point. Its accuracy can be checked by use of forward kinematics.

Electronics part include Arduino for servo communication and voltage regulator to control voltage through Li-po batteries.

In software part OpenCv and py-serial has been used for drawing patterns and communicating through Arduino IDE.

## Conclusion

The design have been considered based on detailed  evaluation to provide smooth rotation with maximum area to be covered for a given length.

The manipulator can be further extended to acheive 3-dimensional rotation and to do all work of an industrialized robot.

## References

https://youtu.be/G-XXnPHYhxs