

# Robothon 2023- Team RoboTechX Middlesex University Dubai

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## Introduction

The solution provided by Team RoboTechX features simplicity and accuracy in handling the e-waste handling automation. We use EPSON VT6 6-axis robot, controlled by Python script over a TCP/IP network. Using a commonly found USB Webcam attached to the robot's arm, the Python script locates the world coordinate points on the task board and map it to local coordinate of the board. Subsequently the script will coordinate the motion of EPSON VT-6 robot and its custom 3D printed gripper to perform the tasks by sending the coordinate points and gripper opening control. The camera is also used to capture the display on the M5 device and determine the amount of distance the slider needs to travel.

## Equipment list

- EPSON VT6 6-axis robot
- Arduino Uno for controlling Servo motor
- Servo motor (20kg) for gripper
- Custom 3D printed gripper
- Webcam Full HD

## Software dependency list

- Python version 3
- OpenCV Python
- EPSON RC7+ SPEL
- Arduino IDE, C++ for controlling gripper
- Custom Python scripts and SPEL program
  - R23\_main.py - main python script
  - R23\_Arduino.ino – Arduino sketch for controlling the gripper servo
  - main.prg – ESPON SPEL program to control the robot
  - Settings.py – module for settings and variables setup
  - Map\_coord.py – module for coordinate translation
  - Slider\_task.py – module for detecting target slider position
  - SendToEpson.py – module for communicating with EPSON robot
  - arduino\_communication.py – module for communicating with Arduino

## Quick start guide

- Place the task board on the table, make sure the Velcro tapes hold it firmly
- Run EPSON RC7+ SPEL program
- Run the R23.py Python script
- Observe the captured image of the task board, make sure that the blue button and door knob are detected clearly. Press “g” to start the robot.
- Robot will go through the task sequence

Supplementary image : system connectivity

