Automatic Control of Color Sorting and Pick/Place of a 6- DOF Robot Arm

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INTRODUCTION

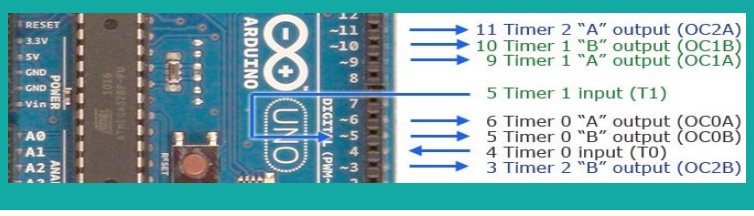
This work focuses on the implementation and design of a six degree of freedom, 6-DOF control of automatic color sorting and pick and place tasks for a robot arm using wireless controlling interface – Blynk apps. The robot arm able to differentiate the colors of the object (input) and categories or classified the object to the correct places. The main target of this project is to provide a stable, efficient, and precision results without any vibration or jittering from the servo motor during controlling the robot arm. In this work, six servo motors were used to realize the real robotic arm for industrial use. Five servos were operated to control the entire robot arm motion including the base, shoulder, and elbow as well as one servo is reserved for the positioning of the end effector. Two input variables namely TSC3200 Color Sensors & HC-SR04 Ultrasonic Sensors were employed as the input for the robot arm. The output variable mainly focused on the servo motor as the links for the robot arm to reposition and change the motion for the entire system.

BENEFITS & TECHNOLOGY DEVELOPMENT

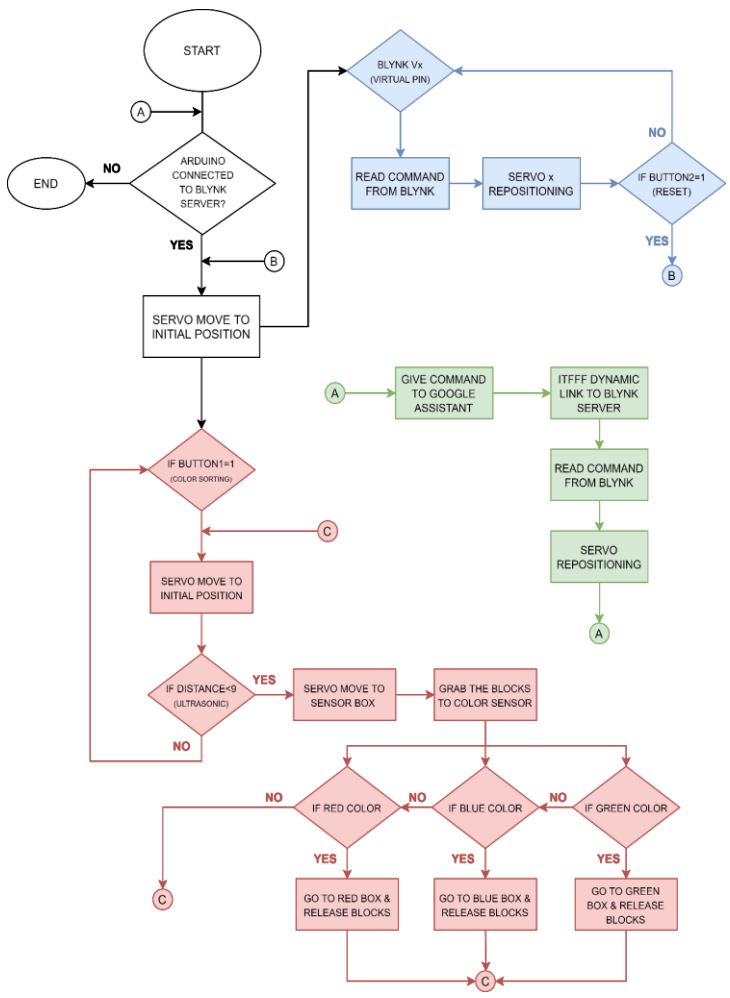
1. Industrial used robot arm model which powered by Internet of Things (IoT) concept.

ROBOT ARM → **CLOUD SERVER** → **END USER**

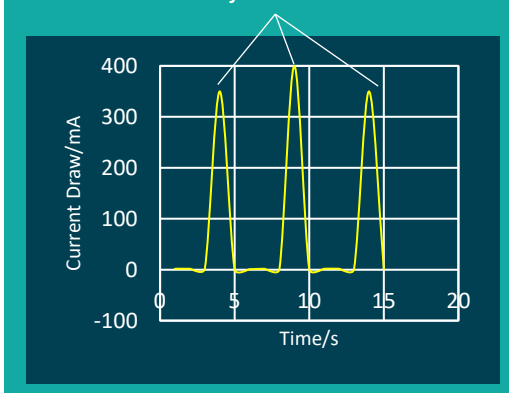
2. Using Arduino Timer Mode enabled method to eliminate jittering when large amount quantity of servo motors are using.



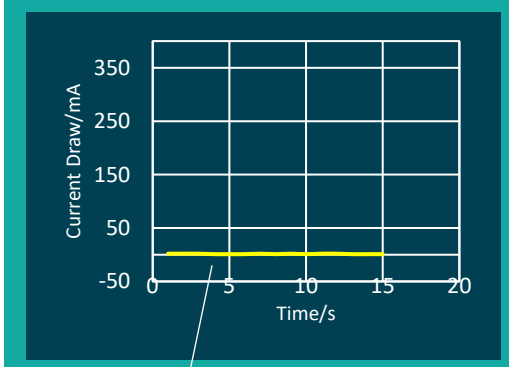
FLOWCHART



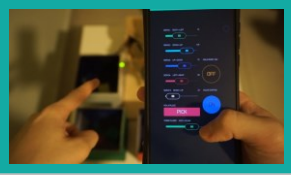
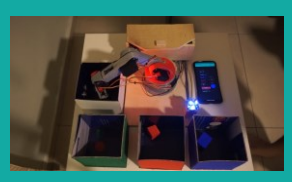
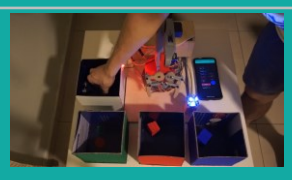
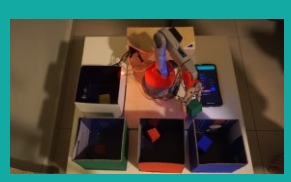
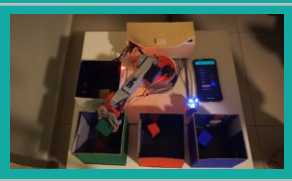
RESULTS



After using the timer register method from Arduino microcontroller

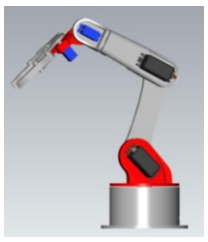


Robot Arm stable and running smooth

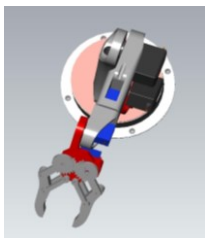
STEP	ACTIONS	SYSTEM / ROBOT ARM DEMONSTRATION
1	Color Sorting Mode switch on and the Sensor Box Green LED ON indicate the Color Sorting is ready.	
2	A green color block is place into the sensor box. The Sensor Box detect the present of block. Red LED ON, Green LED OFF.	
3	Pick process begin.	
4	The block is transferring by the robot arm from sensor box to color sensor. Block Color sensing process ongoing.	
5	The block sort to the correct color box and the robot arm release the block.	

Robot Arm Color Sorting Process

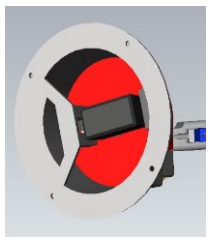
DESIGN OVERVIEW



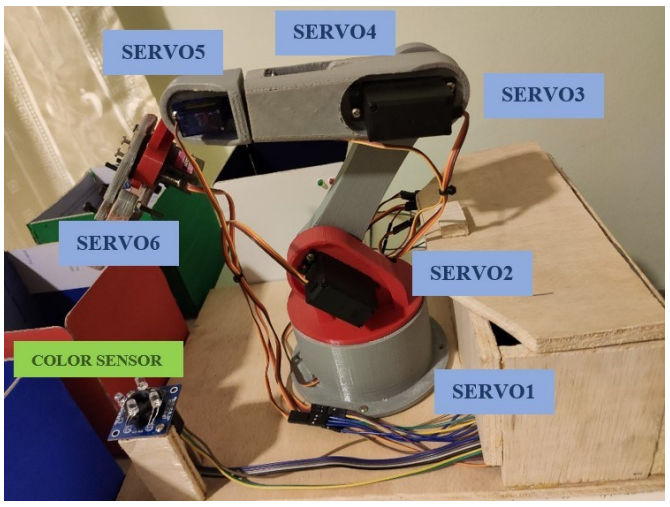
Side View of Color Sorting Robot Arm



Upper View of Color Sorting Robot Arm



Base View of Color Sorting Robot Arm



Hardware development of Color Sorting Robot Arm