Robotic Arm Hardware Assembly and Motor Control Report

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1. Introduction

This report explains the complete hardware assembly of a robotic arm and the software required to control multiple motors. This integration enables the robotic arm to perform useful and coordinated tasks across various applications.

2. Event Details

Date -8/11/25

Time :2pm -5pm

Venue -CR4 JUIT

Robotic arm workshop

No of participants -21

3. Hardware Components Required

- Mechanical frame with joints (Base, Shoulder, Elbow, Wrist, Gripper)
- Servo motors or stepper motors
- Motor driver or servo controller
- Microcontroller (Arduino, ESP32, Raspberry Pi)
- Power supply
- Connecting rods, joints, screws, and brackets
- Breadboard and jumper wires

4. Hardware Assembly Process

• Assemble the base and mount the rotating base motor.

• Attach the shoulder joint and install its motor.

• Fix the elbow joint and connect its motor.

• Attach wrist joint and gripper mechanism along with motors.

• Connect all motors to the motor driver or servo controller.

• Connect controller outputs to the microcontroller.

• Test each motor movement individually for calibration.

5. Software Code for Motor Control

Below is a sample Arduino code to operate multiple servo motors:

```
#include <Servo.h>

Servo baseMotor;
Servo shoulderMotor;
Servo elbowMotor;
Servo wristMotor;

void setup() {
  baseMotor.attach(3);
  shoulderMotor.attach(5);
  elbowMotor.attach(6);
  wristMotor.attach(9);
}

void loop() {
  baseMotor.write(90);
  shoulderMotor.write(45);
  elbowMotor.write(120);
  wristMotor.write(60);
  delay(1000);

  baseMotor.write(0);
  shoulderMotor.write(0);
  elbowMotor.write(0);
  wristMotor.write(0);
  delay(1000);
```

}

6. Applications of Robotic Arm

- Pick and place automation
- Industrial manufacturing
- Medical and laboratory assistance
- Education and robotics research

7. Workshop Photos

Below are some photographs captured during the robotics workshop:

8. Conclusion

A robotic arm becomes highly functional when its hardware and software are perfectly integrated. With proper calibration and multi-motor programming, the arm can perform a wide range of precise and repetitive tasks essential in modern automation.