**1. Car Robot**

*Assembly Instructions and Components:*

• **Motor Block Assembly:** Begin by preparing the motors with foam tape to reduce vibrations. Use 3D-printed motor holders to secure the motors, ensuring they are tightly fastened with screws. Attach wheels directly to the motor shafts for propulsion.

• **Electronics Setup:** Integrate an Arduino microcontroller with a motor driver (e.g., L298N) to control the motors. Power the system using a suitable battery, and include voltage regulators as needed. Ensure proper wiring between the components, and consider using a proto-board for organized connections.

*Sensors:*

• **Encoders:** Utilize motor encoders to monitor wheel rotations, providing feedback for precise movement control.

• **Optional Sensors:** Depending on your project’s requirements, you can add sensors like ultrasonic distance sensors, infrared sensors, or cameras for enhanced functionality.

*Useful Links and Tutorials:*

• **Build Your Own TurtleBot Robot:** This guide offers a step-by-step approach to assembling a robot similar to the Car Robot, covering mechanical assembly and electronics integration.

**2. TurtleBot3**

*Assembly Instructions and Components:*

• **Official Assembly Guide:** The TurtleBot3 comes with detailed assembly instructions provided by ROBOTIS. Follow these guidelines to assemble the robot correctly.

*Sensors:*

• **LIDAR:** Equipped with a 360-degree Laser Distance Sensor (LDS) for mapping and navigation.

• **IMU:** Includes an Inertial Measurement Unit for orientation and acceleration data.

*Useful Links and Tutorials:*

• **Quick Start Guide:** Provides instructions on setting up the TurtleBot3, including software installation and basic operations.

• **Video Tutorials:** A collection of videos demonstrating various aspects of the TurtleBot3, from assembly to advanced applications.

**3. Robotic Manipulator**

*Assembly Instructions and Components:*

• **DIY Robotic Arm Tutorial:** This tutorial guides you through building a robotic arm using Arduino, covering mechanical assembly and control systems.

*Sensors:*

• **Flex Sensors:** Used to detect the bending of joints, providing feedback for movement control.

• **Limit Switches:** Implement limit switches to prevent the arm from moving beyond its intended range.

*Useful Links and Tutorials:*

• **Robot Arm Tutorial:** Offers insights into designing and building a robotic arm, including considerations for sensors and control mechanisms.

**DIY Video Tutorials:**

• **TurtleBot3 Assembly:** A visual guide to assembling the TurtleBot3 Burger model.

• **Building a 5 DOF Robot Arm:** Step-by-step video on assembling a 5 Degrees of Freedom robotic arm.

**Beginner Tutorials:**

• **Getting Started with TurtleBot3 in ROS:** An introductory video for beginners to learn about TurtleBot3 and the Robot Operating System (ROS).

• **Popsicle Stick Robotic Arm with Arduino:** A simple project to build a basic robotic arm using everyday materials and Arduino, suitable for beginners.