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User Manual for Arduino Bluetooth Controlled Car with Obstacle Avoidance

1. Introduction:
Welcome to the user manual for the Arduino Bluetooth Controlled Car with Obstacle Avoidance. This manual provides step-by-step instructions on how to assemble, operate, and troubleshoot your Arduino-based car.

2. Components Required:
To assemble the Arduino Bluetooth Controlled Car, you will need the following components:

- Arduino Uno board
- Motor Shield (Adafruit Motor Shield V2)
- Servo motor
- Ultrasonic sensor (HC-SR04)
- Bluetooth module (HC-05 or HC-06)
- DC motors (two)
- Wheels (two or four)
- Chassis for the car
- Jumper wires
- Power source (battery pack or power supply)

3. Assembly Instructions:
Follow these steps to assemble your Arduino Bluetooth Controlled Car:

1. Mount the DC motors on the chassis and connect them to the motor shield.
2. Attach wheels to the DC motors.
3. Connect the ultrasonic sensor to the Arduino board.
4. Install the servo motor on the chassis.
5. Connect the Bluetooth module to the Arduino board.
6. Ensure all connections are secure and wires are properly connected.
7. Power up the Arduino board using a suitable power source.

4. Installation of Libraries:
Before uploading the code to your Arduino board, make sure to install the following libraries:

- AFMotor.h
- SoftwareSerial.h
- Servo.h

5. Uploading the Code:
Upload the provided Arduino sketch to your Arduino board using the Arduino IDE. Make sure the correct board and port are selected in the IDE before uploading.

6. Operating Instructions:
Once the code is uploaded and the hardware is assembled, follow these steps to operate the car:

1. Turn on the Arduino Bluetooth Controlled Car.
2. Pair your Bluetooth-enabled device (smartphone, tablet, etc.) with the Bluetooth module on the car.
3. Open a serial terminal app on your device and connect to the Bluetooth module using the appropriate baud rate (9600 baud).
4. Use the following commands to control the car:
    - 'O': Activate the car.
    - 'F': Move the car forward.
    - 'S': Stop the car.
5. The car will automatically perform obstacle detection and avoidance while moving forward.

7. Troubleshooting:
If you encounter any issues with the Arduino Bluetooth Controlled Car, consider the following troubleshooting steps:

- Check all connections to ensure they are secure.
- Verify that the Bluetooth module is paired with your device.
- Ensure the power source is providing sufficient power to the Arduino board and motors.
- Double-check the code for any errors or inconsistencies.

8. Safety Precautions:
When operating the Arduino Bluetooth Controlled Car, please keep the following safety precautions in mind:

- Avoid operating the car near steep drops or obstacles that could cause damage.
- Keep hands and fingers away from moving parts to prevent injury.
- Supervise children and pets when using the car, especially indoors or near stairs.
- Turn off the car when not in use to conserve battery power and prevent accidental activation.

Happy driving!