

PROJECT PROPOSAL

RC Car

Using Arduino with Bluetooth

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1. Approach

In this project, the main purpose is implementing a remote controller (RC) car using Bluetooth that is wireless communication technology and Arduino. The Bluetooth connection will have two ends:

1. Android app to be used in controlling the car,
2. Arduino main board.

The equipments required are:

1. Android Device
 - a. Will contain an Android App with a simple GUI and Bluetooth 4+ connection to control the RC Car.
 - b. Should be Android version 5.0+.
2. Arduino UNO R3 [1]
 - a. Is a microcontroller board based on a removable, dual-inline-package ATmega328 AVR microcontroller. It has 20 digital input/output pins (of which 6 can be used as PWM outputs and 6 can be used as analog inputs), a 16 MHz resonator, a USB connection, a power jack, an in-circuit system programming(ICSP) header, and a reset button.The R3 is the third, and the latest, revision of the Arduino UNO.
3. Bluetooth Module for Arduino (HC-05) [2], [3]
 - a. Used for enabling Bluetooth connection between Arduino and Android Device
 - b. HC-05 Bluetooth Module is an easy-to-use module designed for transparent wireless serial connection setup.
 - c. It has a range of 10 meters.
 - d. It uses the 2.45GHz frequency band.
 - e. It can be operated within 4-6V of power supply.
4. Motor Driver Module for Arduino (L298N) [4]
 - a. Used for supplying the required current to the motors.
 - b. L298N is the most commonly used motor driver with L293D, however, since L293D has some limitations (max. no. of motors connectable, max. current available), L298N is selected.
 - c. The module can drive DC motors that have voltages between 5 and 35V, with a peak current up to 2A.
5. Motors (4x)
 - a. Each tire will have its own motors working independently, however, in cooperation.
6. Wires
 - a. For the general connection of the components in the main board
7. Power Supply

2. Goals/Needs

This RC Car prototype can further be adapted to short-range military applications, daily-life assistant applications, and entertainment fields [5]. If the remote car controlling is performed successfully, it is planned to support with a camera for real-time video surveillance.

Video surveillance is the process of monitoring a situation, an area or a person. This generally occurs in a military scenario where surveillance of borderlines and enemy territory is essential to a country's safety. Human surveillance is achieved by deploying personnel near sensitive areas in order to constantly monitor for changes. But humans do have their limitations, and deployment in inaccessible places is not always possible.

There are also added risks of losing personnel in the event of getting caught by the enemy. With advances in technology over the years, it is possible to remotely monitor areas of importance by using robots in place of humans.

3. Timetable

There will be at least 6 phases (meetings) for monitoring the overall process of the final product and the current deliverables. It is planned to be done every two weeks.

4. Key Personnel

List the key personnel who will be responsible for completion of the project, as well as other personnel involved in the project.

Evaluator	Prof. Dr. Suat ÖZDEMİR
Project Manager	Mert Çökelek
Researcher	Muhammed Said Kaya

5. Evaluation

The evaluation will be based on the performance of the product in terms of speed and financial cost. The final product is expected to be responsive, reliable, secure and easily usable.

In more detailed,

- **Responsiveness:** The max. response time of the car (its reflection to the commands) should not exceed 0.5 seconds.
- **Reliability:** The RC Car should be available to its user anytime s/he wants to access.
- **Security:** The system must not allow any unwanted 3rd party to have control, -and if supplied, the camera data-.
 - This will be supplied using security features of Bluetooth, and SSL/TLS in Session Layer for data communication.
- **Useability:** The Android App should have a simple and effective GUI for controlling the car.

6. Future Work

If the proposed project is completed before the final deadline, the goal is to add real-time video surveillance functionality by using a camera with wireless connection.

7. References

[1] Arduino UNO R3 <https://store.arduino.cc/usa/arduino-uno-rev3>

[2] HC-05 Bluetooth Module

<https://www.geeksforgeeks.org/all-about-hc-05-bluetooth-module-connection-with-android>

[3] https://wiki.eprolabs.com/index.php?title=Bluetooth_Module_HC-05

[4] L298N Driver

<https://howtomechatronics.com/tutorials/arduino/arduino-dc-motor-control-tutorial-l298n-pwm-h-bridge/>

[5] <https://www.electronicshub.org/bluetooth-controlled-robot-using-arduino/>