



ELEC 3848

Integrated Design Project

Second Semester, 2024-2025

Project - Autonomous Mobile Robot (AMR)

- An autonomous mobile robot (AMR) navigates its environment independently, using sensors to safely avoid obstacles while performing tasks.
 - Position/align the car, perform the motion and park the car to the specific location;
 - Self-proposed function(s) (using at least 4 modules other than those used in Lab; if your team has five member, you need to add one more module, either sensor or actuator).
- Higher scores for better performance and more innovative/complicated functions.
- Real-life Autonomous Mobile Robot (AMR) in operation:
 - https://youtu.be/u6vxWCKN_HI?si=C61bDy3OTnnYLioS
 - <https://youtu.be/DUrKvPSOL8U?si=fcKqQoMMuak8K2Kf>

Project overview

- In this project, you will be working in groups of 4 students to develop an autonomous mobile robot (AMR) using Arduino Mega, servo/DC motors, sensors, and **Raspberry Pi / Nvidia Nano** (please choose only one platform), etc.
- The project constitutes 54% of the total course weight, required function (10%) and self-proposed function (44%).
 - Your self-proposed function will demonstrate your system through three project components: project proposal (10%), weekly meetings (8%), as well as final demonstration, video and final report (26%).

Project Proposal (10%, due on 16th Mar., 2025)

- In the project proposal of **self-proposed function**, you have to identify one **innovative application** (ONLY ONE), but this application can consist of several simple Arduino functions. This innovation must be different from the required function.
- The proposal is at least 3 pages but not more than 5 pages (excluding cover and references if any), 1.5 line spacing, including a budget (max. HK\$500).
- A team photo should be included with full name of each team member
- We will provide Raspberry Pi / Nvidia Nano upon your request.

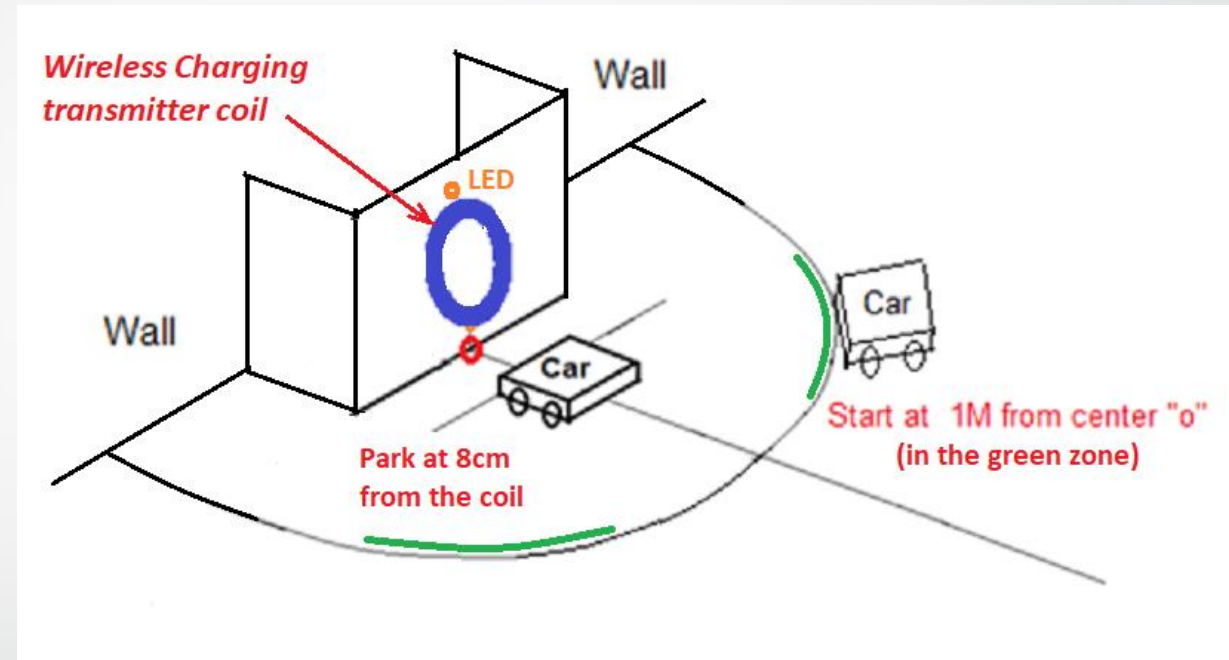
Required functions (10%)

- **Required Function** (10 points) :
 - Lab demonstration (as listed in course overview)
 - Robot Assembling
 - Robot alignment, rotation, send data to computer.
 - Demonstrate that your robot can park and aligned with the LED mark and wall, then receive power from the wireless charging coil.
 - Sending the voltage measured to Computer

Required Function: Align, parking, and charging

- This function simulates an **autonomous mobile robot** (AMR) track LED mark and move towards the wall
- The robot is parked at a location of 8cm away from the lamp center.
- You can start the car by a switch.
 - You need to walk away from the car after start.
 - No wiring connection is allowed.
- Your task is as followed :
 - Start the robot at the green zone ~ 1m from the coil.
 - Move to the best location to the charging coil, wait for 10 sec to show the charging parameter in the computer. **During the alignment, the robot cannot touch the wall/charging station.**
 - Park the robot 8cm perpendicular to the charging station.
- The data from ultrasonic sensor, Gyroscope, and power meter etc. would be transmitted to the computer for record.
- The location, charging parameter, and alignment will determine your marks.
- **To be demonstrated in the lab as scheduled.**

(no additional assist check label allowed)



Final Demonstration and reporting of self-proposed function (total 26%)

- The functions of your self-proposed application will be demonstrated in the last week of instructions (10%).
- The performance score of the proposed application depends on the complexity and novelty of the final implementation.
- Besides demonstration (10%), you will also need to submit a product video (6%), and a final report (10%) on your function. Marks allocation as follow:
 - a. 10%: demo in the lab;
 - b. 6% : product video;
 - c. 10%: final report.

Final Report (10% + 6% Product video: deadline 4th May., 2025)

- Your document must consist of the following sections:
 1. Cover Page and Project Abstract (1 point)
 2. System Description (5 points)
 3. Changes to Proposal (2 points)
 4. Reflection of Project (2 points)
 5. A link to the “downloadable” Product Video, 3-5mins (6 points)

Course Personnel

- Teachers
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