INF2004 Embedded Systems Programming

T15: Project Proposal

Name	Student ID	Work Package Distributions
Abdul Halim Bin Abdul Rahim	2201627	Task 1, Task 2 & Task 5
Rayson Yong Ching Rong	2201099	Task 2 & Task 4
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TASK 1 (HALIM): Robot Car Construction and PID Controller

Objective: Assemble and construct the two-wheel robot car, ensuring mechanical stability and precise wheel control. Design/implement a PID controller, and diagrams, for precise car movement.

Tasks:
1. Assemble the chassis, wheels, and motors according to the design specifications.
2. Design and implement the PID controller for speed and steering control.
3. Test and calibrate the mechanical components to ensure smooth movement and stability.
4. Integrate the assembled robot components.
5. Conduct comprehensive testing to ensure seamless collaboration between different modules.
6. Optimise and fine-tune algorithms for efficiency and speed.
7. Address any issues identified during testing.
8. Design Project work flow chart, data flow and block diagram.

TASK 2 (RAYSON): Distance measurements - Ultrasonic Sensor Implementation

Objective: Implement ultrasonic sensors into the robot car for obstacle detection.

Tasks:
1. Research and select appropriate ultrasonic sensors for obstacle detection.
2. Implement ultrasonic sensors into the car's design and connect them to the Raspberry Pi Pico.
3. Conduct initial testing of ultrasonic sensors for obstacle detection.
4. Integrate ultrasonic sensors with the overall robot system.
5. Conduct comprehensive testing of ultrasonic sensors in collaboration with other components.
6. Optimise and fine-tune ultrasonic sensor algorithms.
7. Address any issues identified during testing.

TASK 3 (JING YI): Navigations and Mappings - Algorithm Optimisation

Objective: Implement navigation algorithms that guide the robot car along the track, avoiding obstacles and optimising for efficiency.

Tasks:
1. Research and select navigation algorithms suitable for the project's requirements.
2. Develop and implement algorithms for path planning and obstacle avoidance.
3. Test the navigation algorithms using a simulated environment before deploying on the robot.
4. Conduct initial testing of navigation algorithms.
5. Integrate navigation algorithms with the overall robot system.
6. Conduct comprehensive testing of navigation algorithms in collaboration with other components.
7. Optimise and fine-tune navigation algorithms.

TASK 4 (KANG LE): Barcode Recognitions - Infra-red Sensor Implementation

Objective: Develop algorithms for barcode detection using infrared sensors.

Tasks:

1. Develop barcode recognition algorithms capable of reading "Code 39" barcodes.
2. Implement infrared sensors for line following and barcode recognition.
3. Implement a barcode recognition system with the robot's control software.
4. Conduct initial testing of infrared sensors and barcode recognition algorithms.
5. Integrate barcode recognition algorithms and infrared sensors with the overall robot system.
6. Conduct comprehensive testing of barcode recognition and infrared sensors in collaboration with other components.
7. Optimise and fine-tune barcode recognition algorithms.

TASK 5 (IBRAHIMARASHID): Overall Testings and Integrations, User Interface and Documentation

Objective: Create a user interface for controlling the robot, documenting the project's design, and conducting comprehensive testing.

Tasks:

1. Design and develop a simple user interface for users to interact with the robot.
2. Document the project's design, including hardware components, software architecture and algorithms.
3. Conduct thorough testing to validate the robot's functionality and performance.
4. Integrate the user interface with the overall robot system.
5. Conduct comprehensive testing of the user interface in collaboration with other components.
6. Optimize and fine-tune the user interface.
7. Address any issues identified during testing.