

CZ3004-Multi-Disciplinary project

Log report 1(Design)

Submitted by

Team 2

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|  | **Member** | **Section** |
| 1 | Aye Pwitnt Phyu | Robot movement and Rpi communication |
| 2 | Lin Yan | Image recognition |
| 3 | Jesline Ng | Android development |
| 4 | Phone Myint Thu Mya Min | Algorithm |

1) Robot movement and Rpi communication

2) Image recognition

3) Android development

**4)** **Algorithm**

## **Project plan and timeline**

Graphical user interface

Description automatically generated with low confidence

## **Algorithms proposed for Hamiltonian path**

Hamiltonian path is like the travel salesman problem. The difference is that in Hamiltonian path, there is no need to return to original vertex. There are a few methods to solve this problem.

1. The Brute-Force Approach
2. The Branch and Bound Method
3. The Nearest Neighbour Method

Among them, the nearest neighbour method is chosen since it is the simplest TSP heuristic and there are only 5 obstacles or vertexes. The coordinates of the obstacles can be received from android. First, transform them into travelling distances between vertexes or cost or edges. Second, create a graph to connect all vertexes with weighted edges. Then perform nearest neighbour algorithm to get Hamiltonian path.

Graphical user interface, text, application, email

Description automatically generated

Pseudo code for the nearest neighbour method

## **Algorithms proposed for path navigation**

There are 4 possible locations for the obstacle from the robot. They are top right, top left, bottom right, bottom left of the robot.

There are 4 possible camera locations for robot and 4 image locations for obstacles as well such as north, east, south and west. Therefore, there are total 64 scenarios for robot paths.

Diagram

Description automatically generatedThere will be only 16 movement functions for the robot since it can be repositioned back to desired direction.

Obstacle at top right of the robot

Diagram

Description automatically generated

Obstacle at top left of the robot

Diagram

Description automatically generated

Obstacle at bottom right of the robot

Diagram

Description automatically generated

Obstacle at bottom left of the robot

## **Design strategies**

Low coupling and single responsibility principle will be used to implement the algorithms for Hamiltonian path and path navigation for easier extension and modifications.