

Nama : Muhammad Fakhri Zain Rifqi

NIM : 1103194017

## Technical Report : Micromouse

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### 1. Synopsis

Micromouse is a robot that can move freely in a labyrinth area (maze) without touching the objects around it. In the end, the robot knows which way to move, how many degrees to turn, and what if it encounters a dead end in the labyrinth area.

### 2. Installation

- Webots
  - Robot Simulation Software
  - Visual 3D environment = World
  - Robot Programming = Controller
- Micromouse
  - Maze Solving: Moving/searching around for the best path to reach the center. Use of searching algorithms to compute shortest path.
  - Performance: The shortest path is not always the fastest. Straight lines enable the mouse to accelerate.

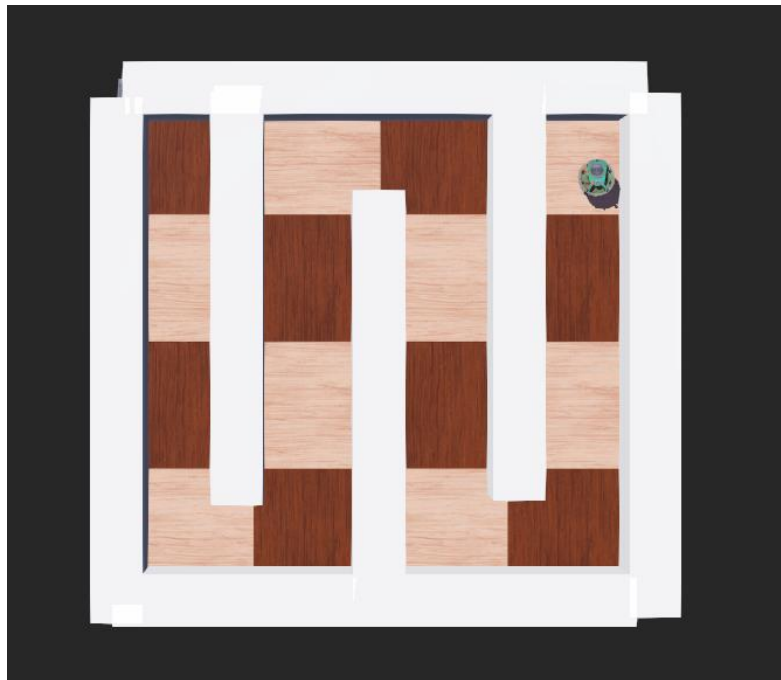
### 3. Construction

- E-puck



The e-puck is a small differential wheeled mobile robot. It was originally designed for micro-engineering education by Michael Bonani and Francesco Mondada at the ASL laboratory of Prof. Roland Siegwart at EPFL

- Maze



- Controller

Robot

The controller (in Java) is the “brains” of the Autonomous Agent and is responsible guide the robot to the centre of the maze

**Odometry → Localization & Mapping → Searching Algorithm**

- Odometry

The use of data from motion sensors to estimate change in position over time.

- Localization & Mapping

Since the robot now can detect if it has travelled to the next cell, It can calculate the relative orientation by monitoring its rotation from the input of the rotary encoders given its known direction at the starting cell.

- Flood Fill Algorithm

```

o---o---o---o---o---o---o---o---o---o---o---o---o---o---o---o
|014 013 012 011 010 009 008 007 007 008 009 010 011 012 013 014|
o  o  o  o  o  o  o  o  o  o  o  o  o  o  o  o
|013 012 011 010 009 008 007 006 006 007 008 009 010 011 012 013|
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|012 011 010 009 008 007 006 005 005 006 007 008 009 010 011 012|
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|008 007 006 005 004 003 002 001 001 002 003 004 005 006 007 008|
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|009 008 007 006 005 004 003 002 002 003 004 005 006 007 008 009|

```

## 4. Result



```

POSITION: [0,6] Orientation: 0
Exception in thread "main" java.lang.ArrayIndexOutOfBoundsException: Index -1 out of bounds for length 16
    at Rat0.run(Rat0.java:535)
    at Rat0.main(Rat0.java:788)
Counter: 7
WALL: FRONT
WARNING: 'Rat0' controller exited with status: 1.

```

Robot stuck on the front wall. requires further development of the maze used