Embedded motion control

Final design   **1-6-2016**

Group 7

E. van Halsema

F.J.M. Heck

R.J.C.M. Kerstens

J.W.A. van den Meijdenberg

N.W.A. Strijbosch

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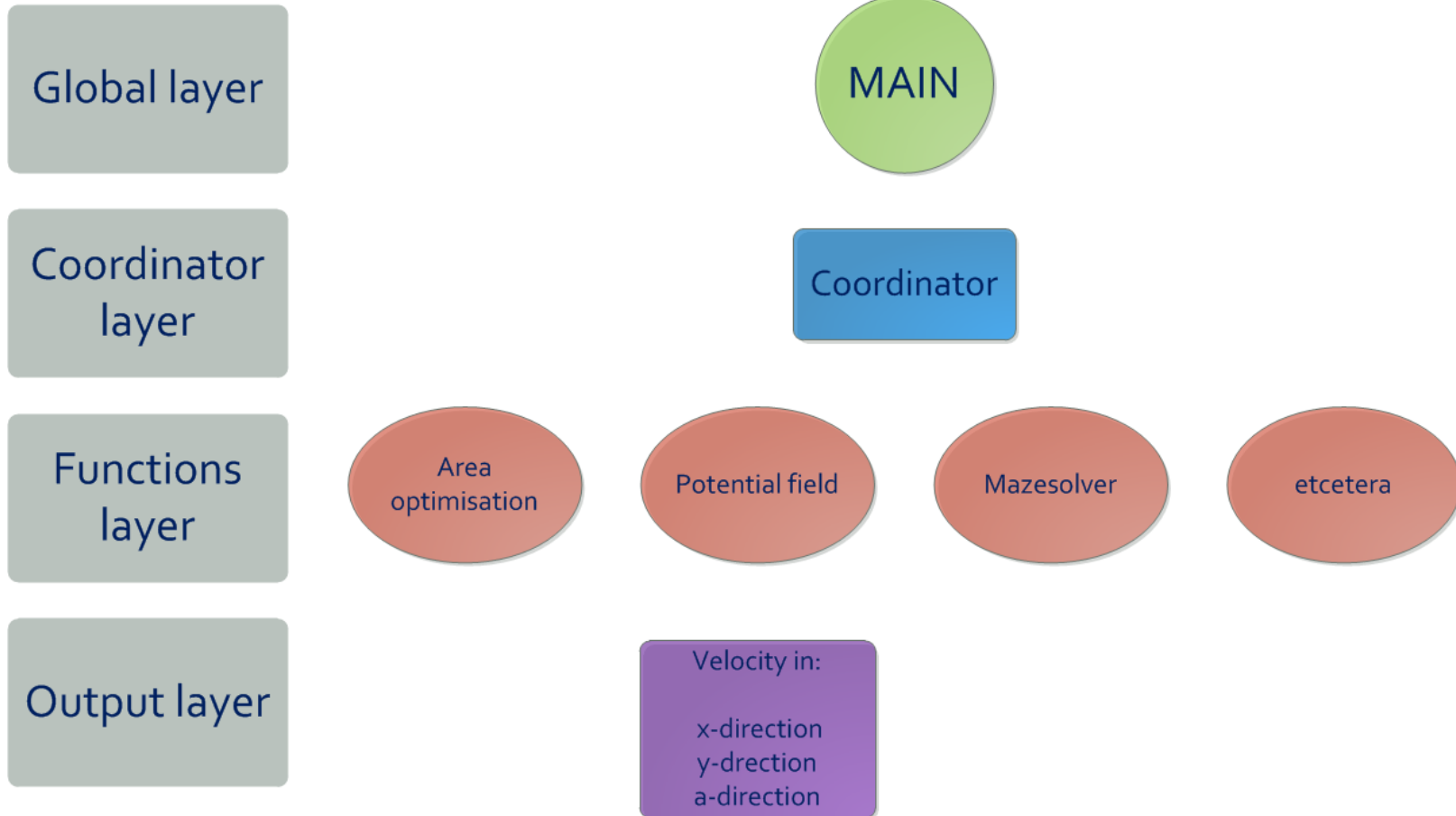**Eindhoven**
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Where innovation starts

Content

- **Code architecture**
- **Coordinator**
  - **States**
  - **Switch case based on events**
- **Essential functions**
  - **Area optimisation**
  - **Processing and filtering rectangle data**
  - **Mazesolver**
  - **Odometry correction**
 - **Potential field**
- **Future plans**

Global layer — MAIN

Coordinator layer — Coordinator

Functions layer — Area optimisation, Potential field, Mazesolver, etcetera

Output layer — Velocity in: x-direction, y-drection, a-direction

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Coordinator (1/2)

- **Event based coordinator**
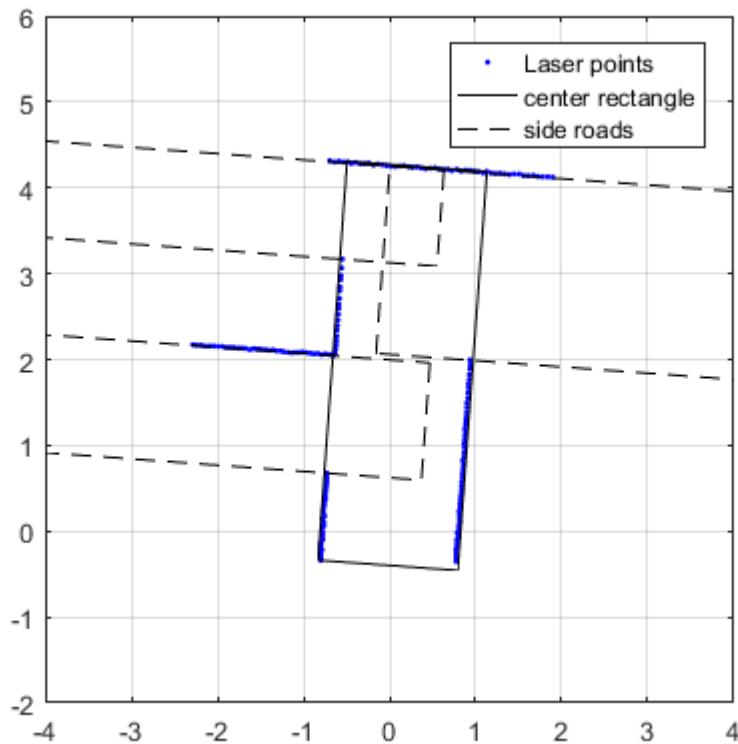- **Finite states of coordinator**
- **Fixed sequence of called functions**
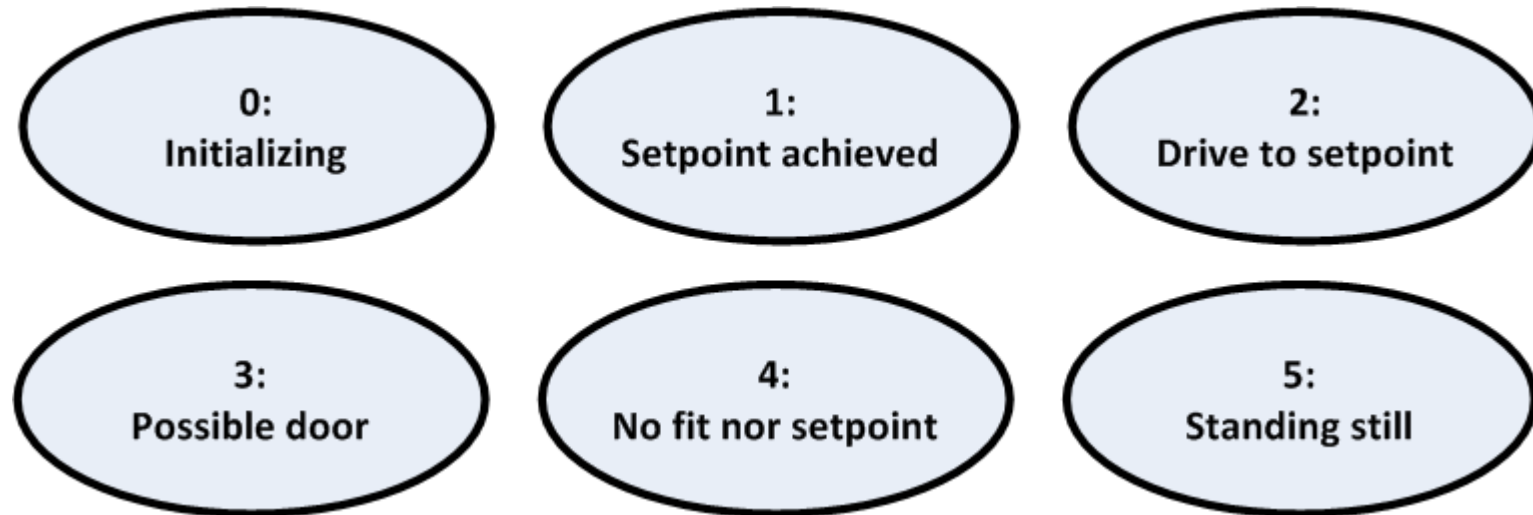
- **Switch case based on events**
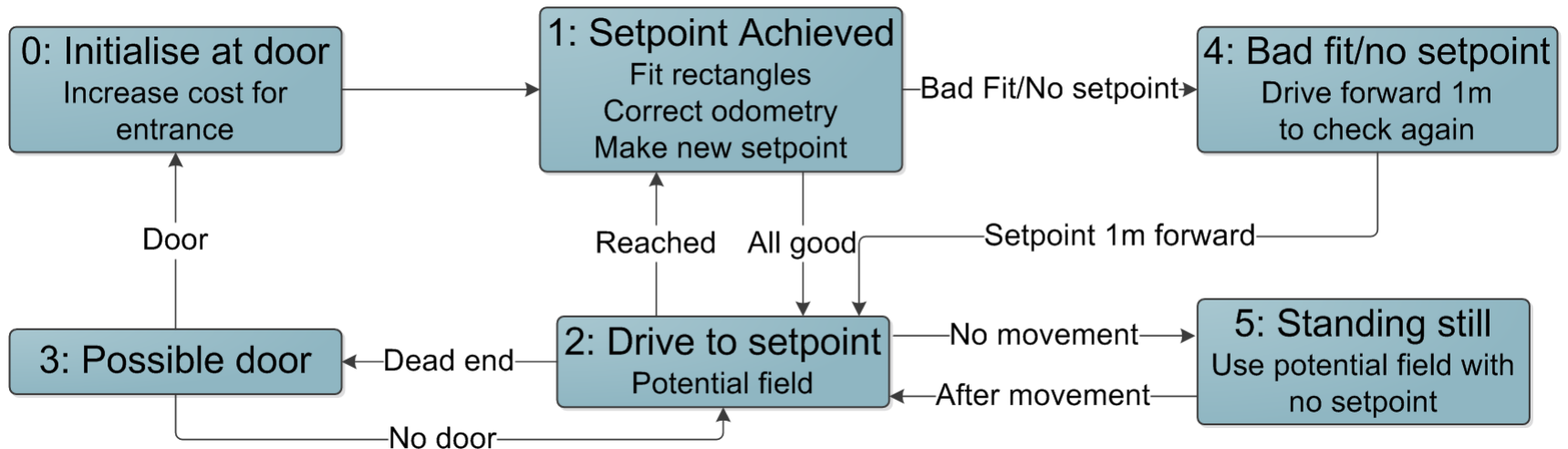
Area optimisation
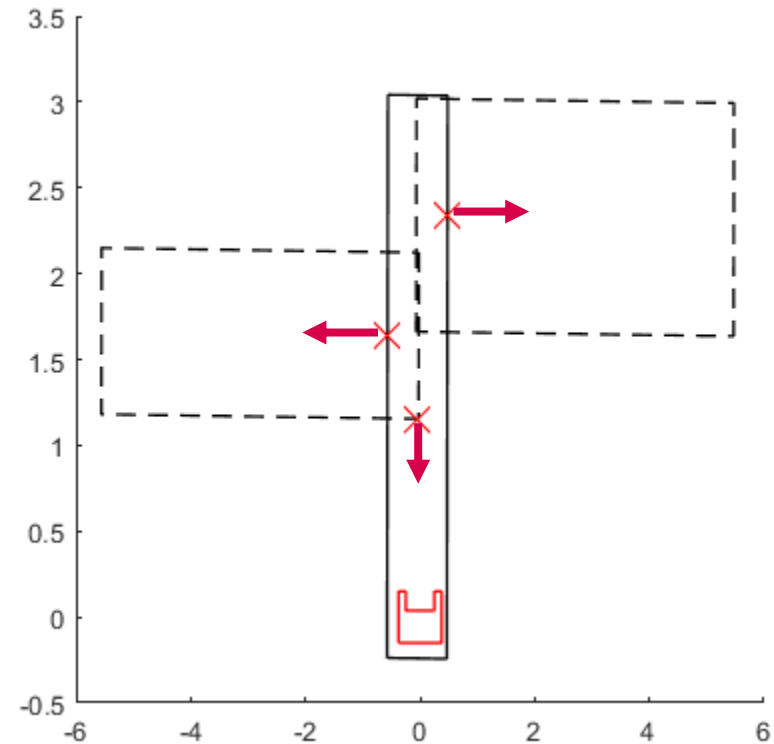
- **Robust local mapping algorithm**

Algorithm:
1. Preprocess laser data
2. Determine the dimensions of current corridor
3. Determine location and dimension of side roads
4. Determine reliability of the found dimensions

- **Relative to PICO**

- **Relative to PICO**

- **In worldmap**

- **In worldmap**

- **In worldmap**

- **In worldmap**

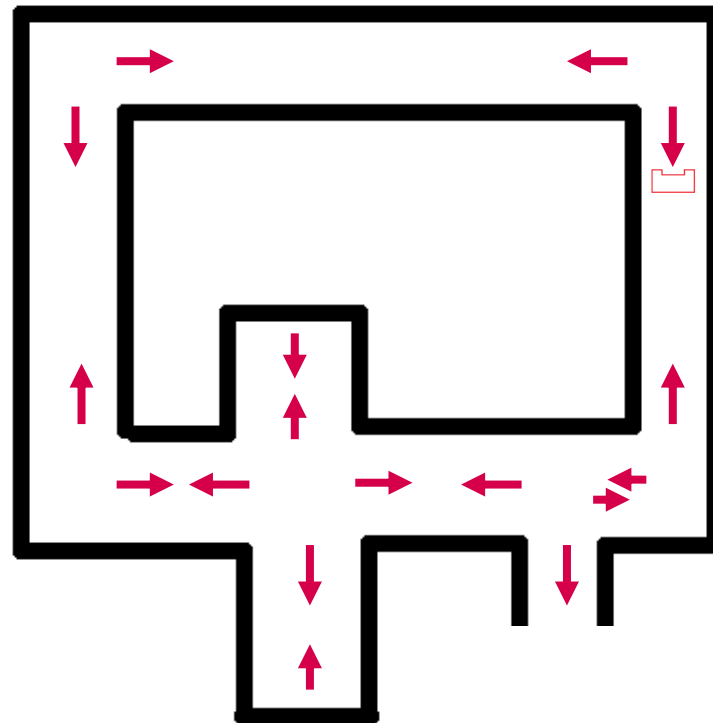- **In worldmap**

- **In worldmap**

Processing and filtering rectangle data

- **In worldmap**

    For each node:
- **Coordinates from origin**
- **Orientation**
- **Connected direction**
- **Crossing number**
- **Number of passes**

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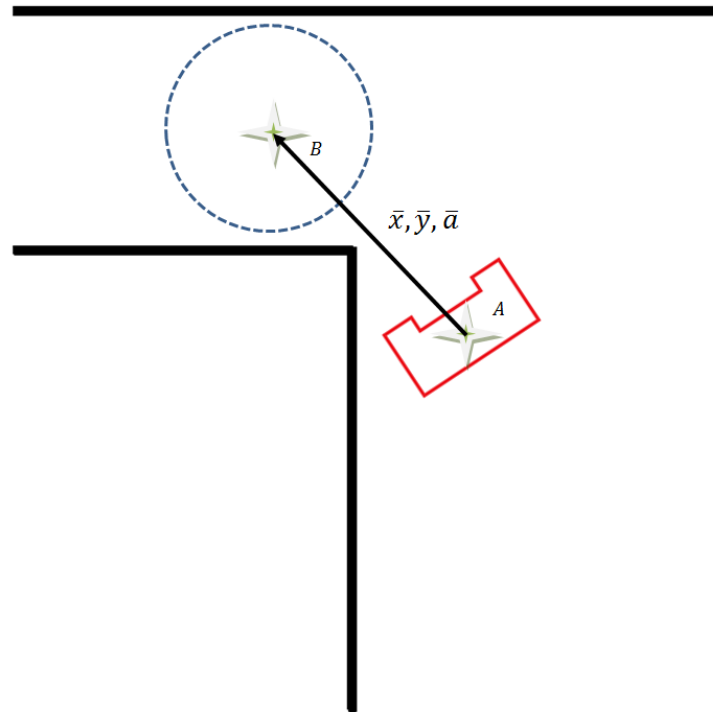**Eindhoven**
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Mazesolver

- **Maze solving algorithm: Trémaux's algorithm**
  - **Efficient method**
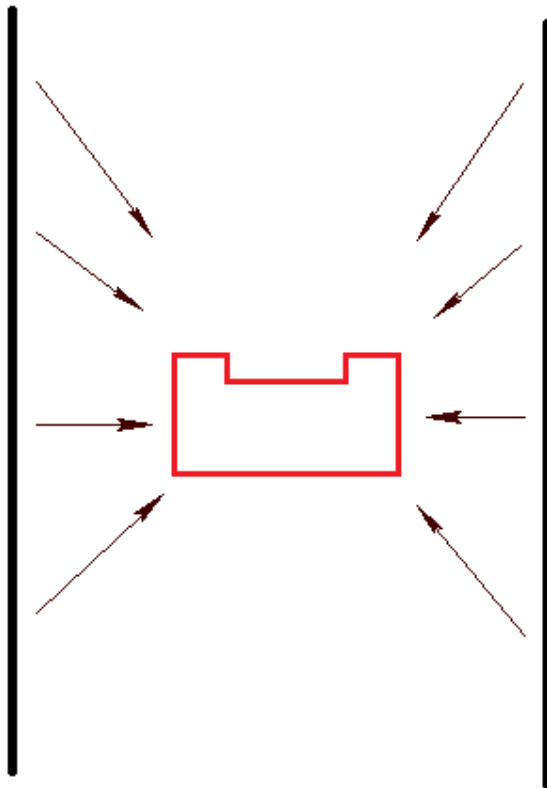 - **Mapping used to mark paths as unvisited, marked once or marked twice**
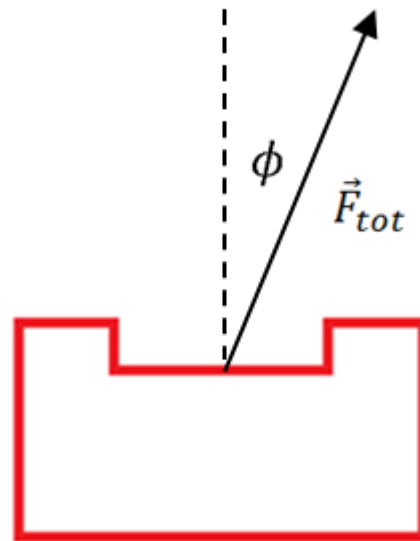
Odometry correction

- **Odometry corrected between two consecutive setpoints**
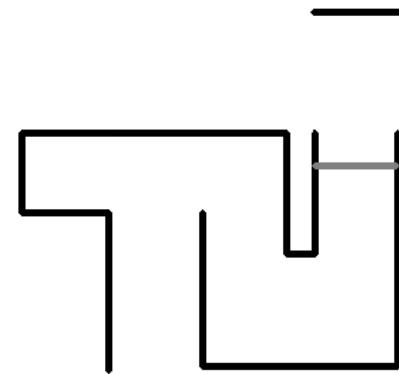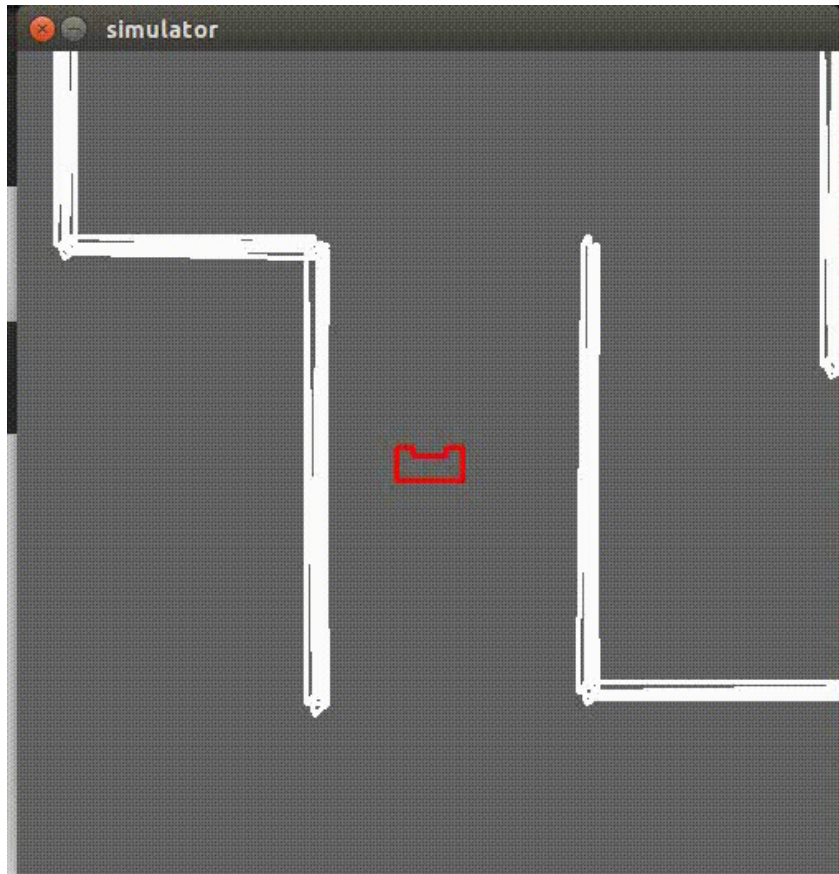- **Deviation based on rectangles of area optimisation**

- When PICO is located close to a wall,
$$F_{rep} \gg F_{attr}$$
- When PICO is not located close to a wall,
$$F_{rep} \ll F_{attr}$$

Simulation of the code

Future plans

- **Experiments on PICO (planned 2-June):**
  - **Test complex open-space situations**
  - **Test door handling**
- **Visualisation of:**
  - **Area optimisation (rectangles)**
  - **Potential field with setpoint (vectors)**
- **Maximum PICO speed dependent on situation**

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Questions/Discussion

Thank you for your attention!

› Questions?

› Remarks?

› Discussions?