Technische Universiteit
Eindhoven
University of Technology

Final design
Group 6

R. Beenders
M.P. Bos
M. Cornelis
S.J.M. Koopmans

Where innovation starts

Table of contents

- Corridor challenge
- Overall structure
  - Differences with the old model
- Multithreading
  - Choice of threads
  - Interaction between threads
- In-depth explanation
  - World model
  - Detection
  - Strategy
  - Movement

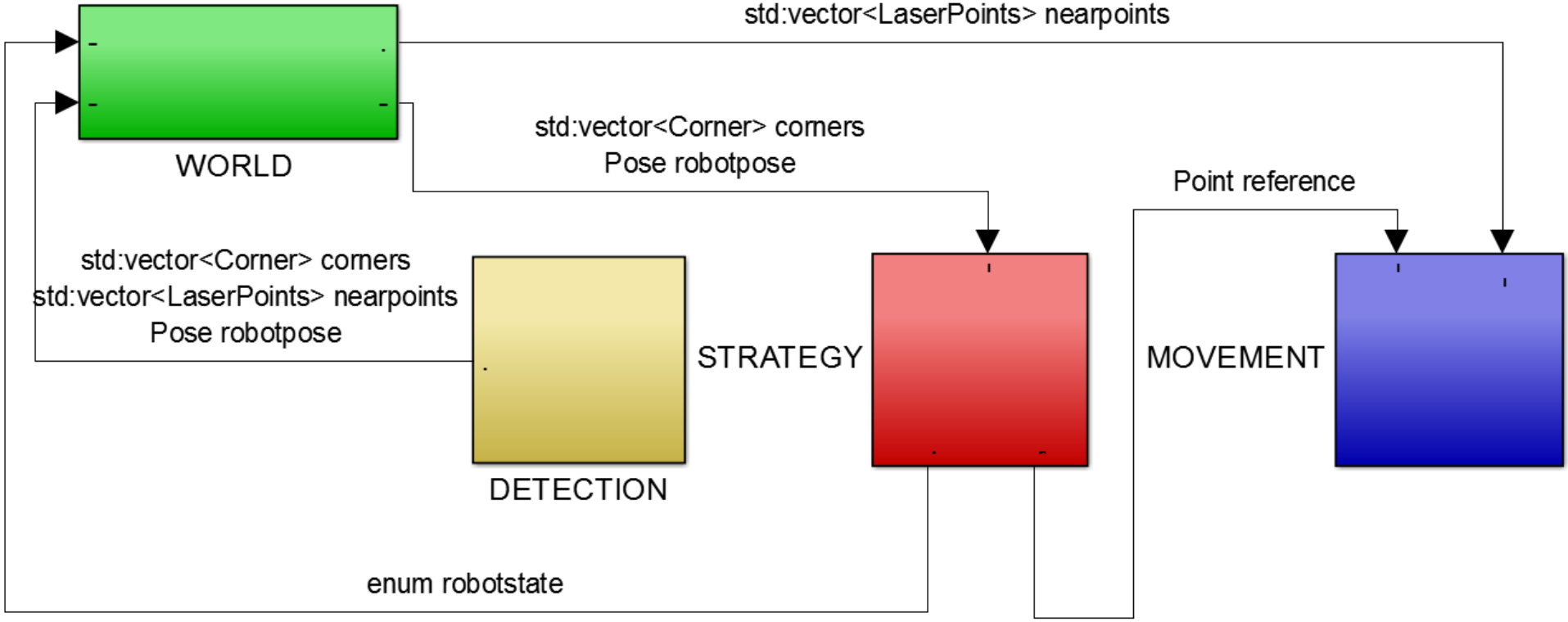
Corridor challenge

- What went wrong?
- How did we fix it?
- Result

Corridor challenge

- What went wrong?
- How did we fix it?
- Result

Overall Structure



C Structures

- Point: x,y (double)
- Pose: x,y,angle (double)
- Corner: x,y (double), type (enum), id (int), [CC (array of ints)]
- Node: x,y (double), NWSE (array of enum), situation (enum)

Differences with old model:

- Multithreading
- Main only used for initialization

Multithreading

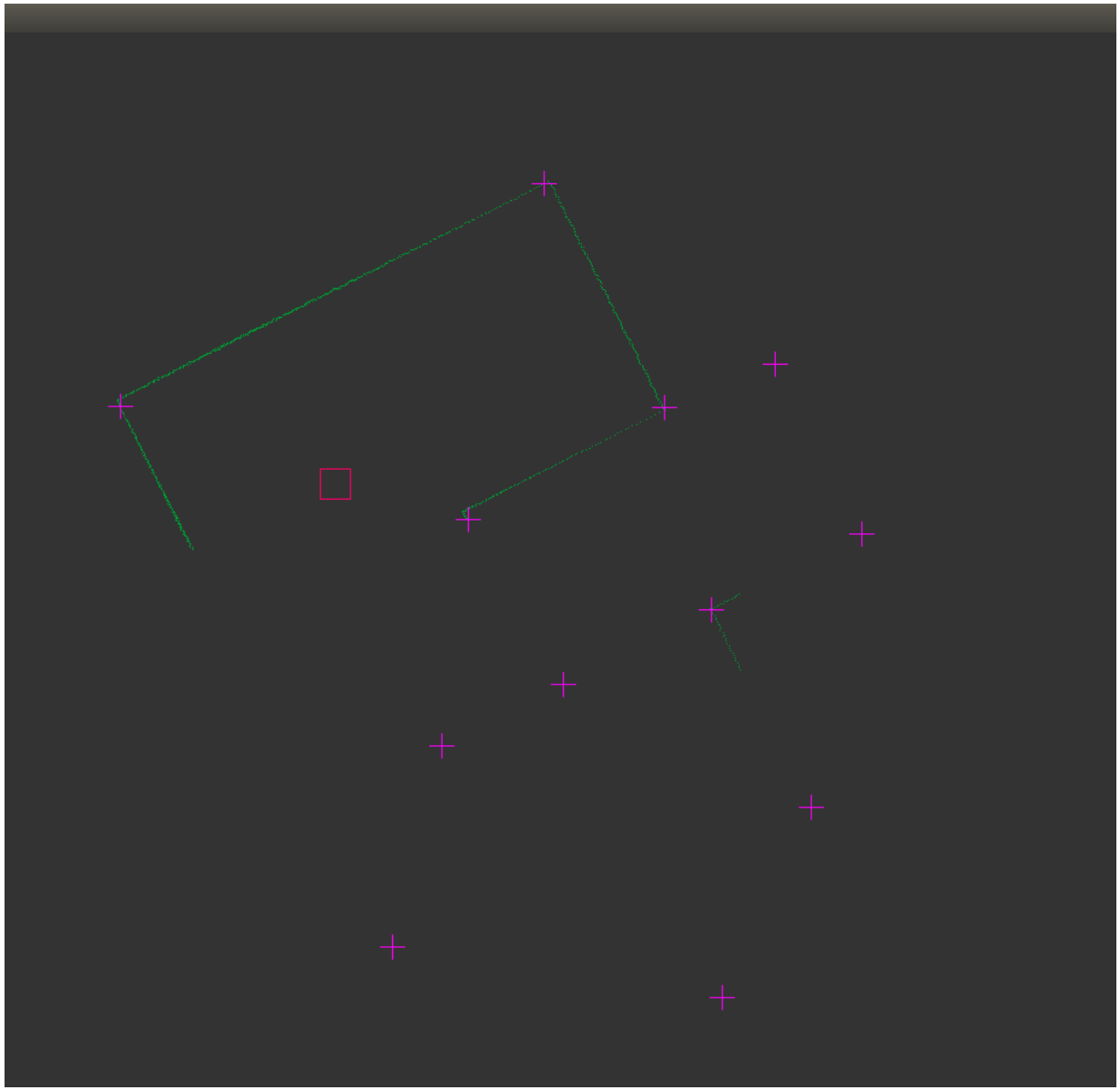
- Choice for three threads:
  - Detection
  - Strategy
  - Movement
- Interaction between threads
  - Via world model
  - Via communication channels

In-depth explanation: World model

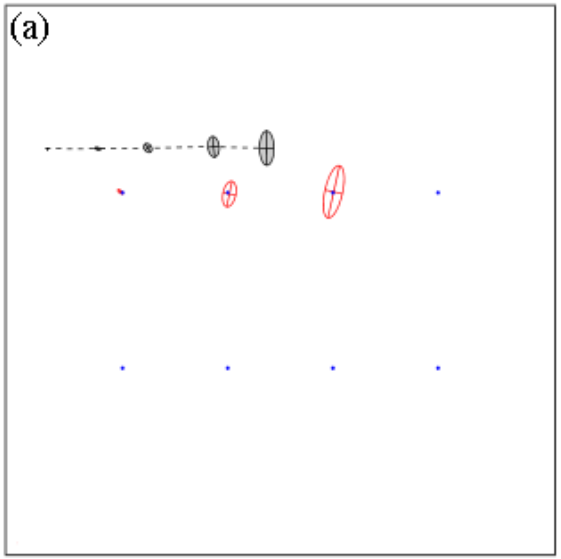
- Accessibility of variables
  - Robot pose, landmark positions, near-range laser data, robot state
- Advantages:
  - Faster (especially with large variables)
  - Easier to code and comprehend
- Disadvantages:
  - Less ‘neat’
  - No idea how recent information is
    - Solved by extra communication

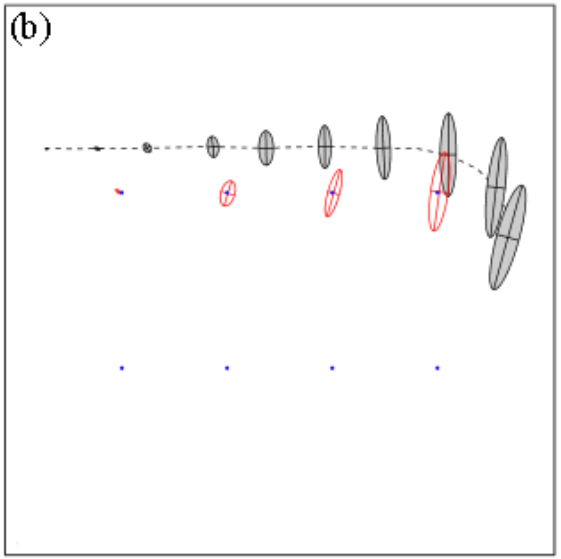
In-depth explanation: Detection

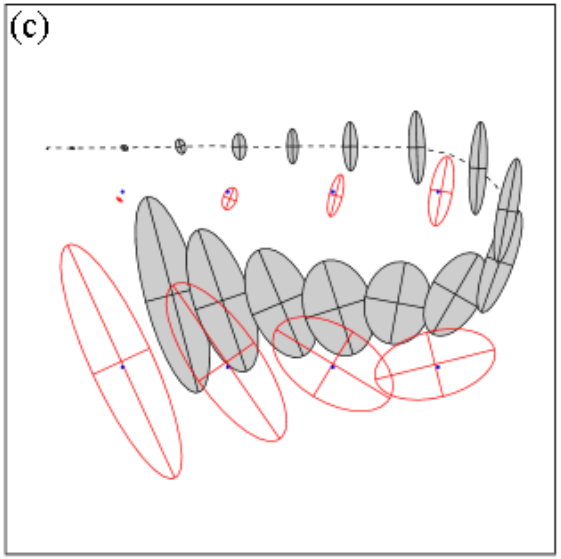
- Main idea: use edges as landmarks
- SLAM using Kalman Filter
  - Movement prediction by odometry
  - Correction by landmarks (laserdata)

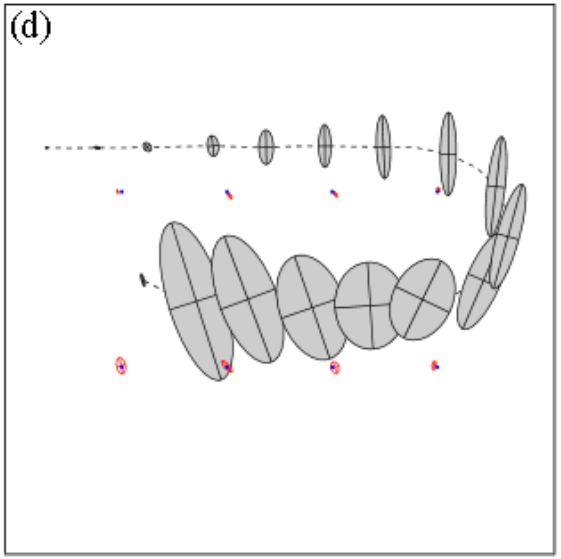


Detected landmarks


(a)


(b)


(c)


(d)

In-depth explanation: Strategy

- Keep track of past nodes with NWSE system
- Depth-first search
- State machine (discrete)
- Create reference (relative coordinates) for movement module
- Monitor distance to reference

In-depth explanation: Movement

- Handles all inputs to PICO
- Potential Field (PF) for collision avoidance

Questions ?