RoboLab Real-time Rescue

TDDD07 labs

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Agenda

- Lab goals and scenario
- Lab environment
- Assignments
- Passing requirements
- Practical issues

Lab goals and scenario

Lab goals

- Hands-on experience with a real-time system
- Learn how to:
  - Schedule real-time tasks
  - Schedule communication on a constrained channel
- Train ability to present and document solutions

Scenario

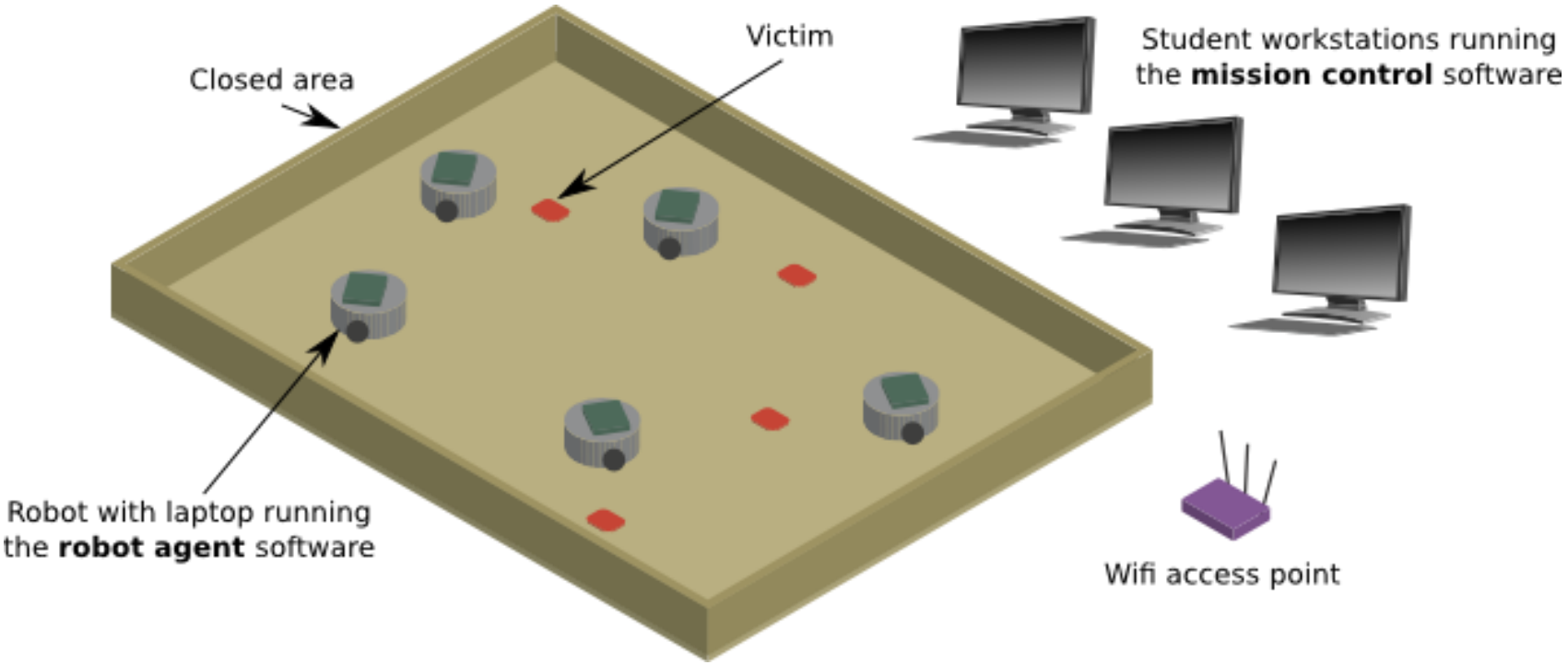
- Search and rescue
- Teams of cooperating robots

Video

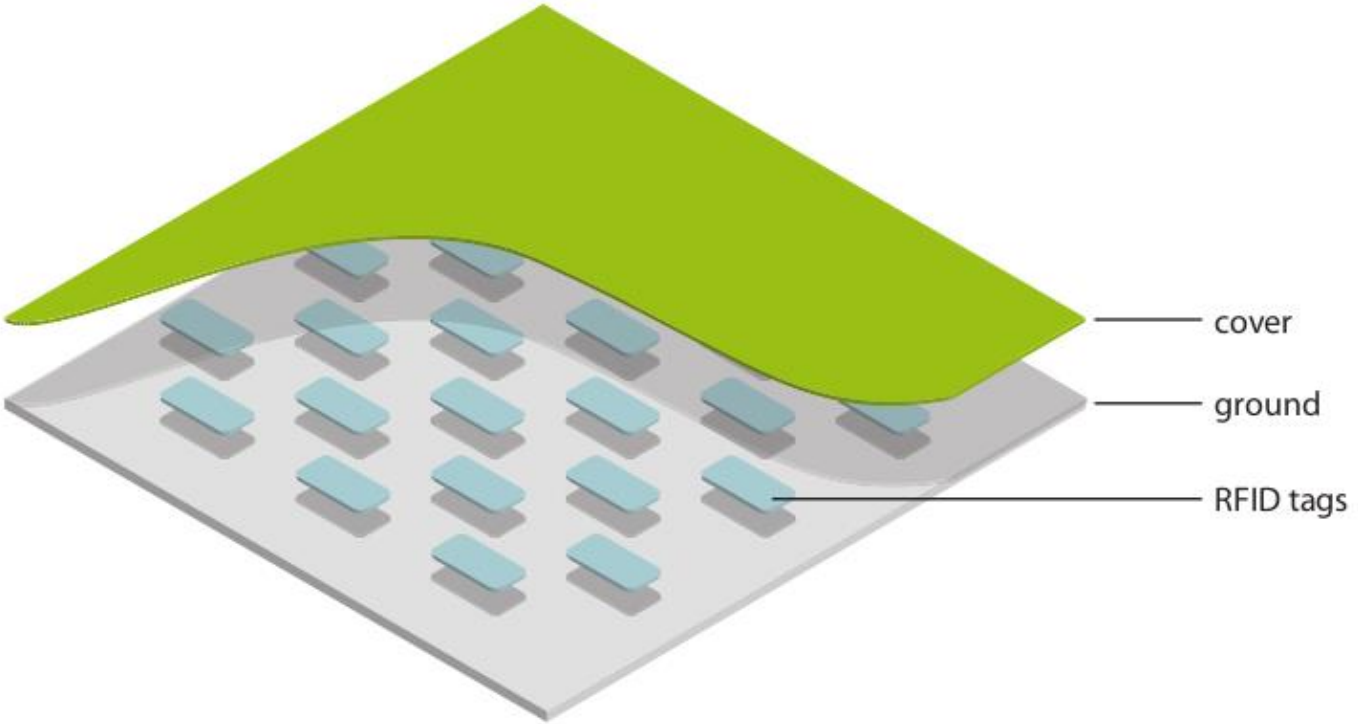
https://www.youtube.com/watch?v=FrgEbx6esYE

Lab environment

RoboLab room



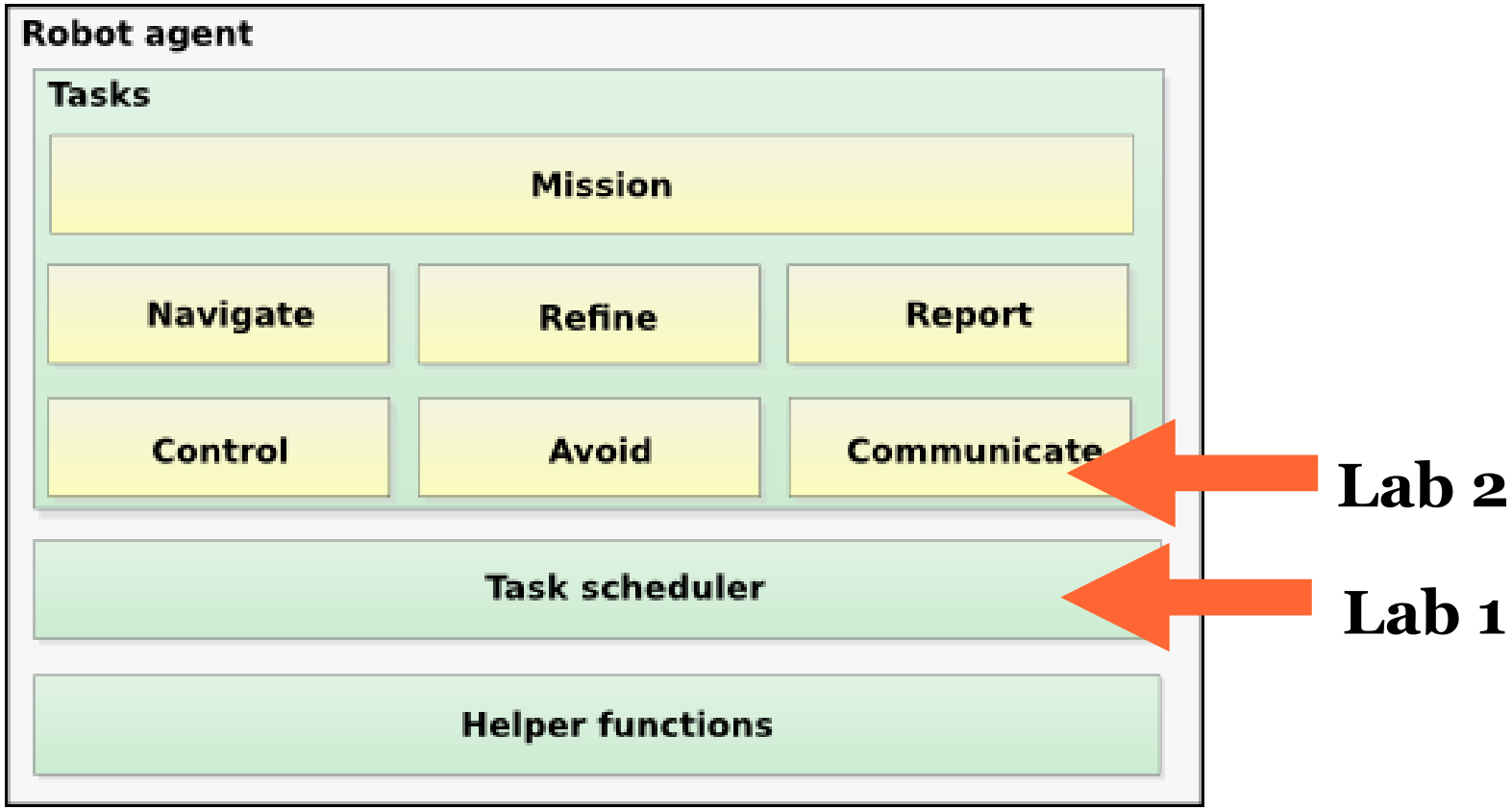
Localisation



Robot agent overview

- Written in C
- Runs on Linux
- Single process, multiple tasks
  - Internally scheduled
  - Straightforward implementation
  - No preemption

Robot agent architecture



Assignments

Overview

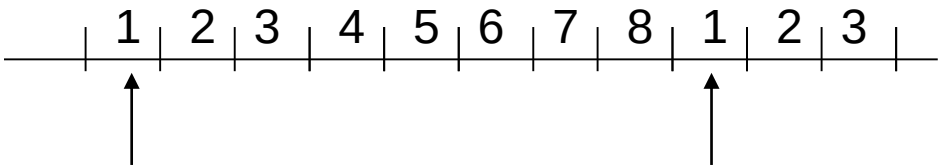
- Lab 1
  - Analyze real-time properties and design a schedule
- Lab 2
  - Enable real-time communication on a shared channel
- Lab 3 *(gives bonus points for the exam)*
  - Analyze and implement fault tolerance

Lab 1 assignments

- Measure the tasks' execution time
- Determine the minimum and maximum acceptable periods
- Design a schedule
- Evaluate and measure

Lab 2 overview

- Shared communication channel
- One slot for each robot (TDMA-like)



- Server sends ”go ahead” if transmissions are correct
- Robots stop unless go ahead is received

Lab 2 assignments

- Make the communication task run in the pre-defined time slot
- Prioritise messages and send only those that fit in the slot
- Test your solution together with one or more other robots
- Evaluate

Lab 3 assignments

- Identify fault models
- Suggest mechanisms to detect and manage the faults
- Implement them

Passing requirements

Overview

- Lab 1
  - preparatory questions
  - demonstration
  - code submission
- Lab 2
  - preparatory questions
  - demonstration assistant
  - code submission
- Lab report

Preparatory questions

- Read the compendium!
- Separate questions for labs 1 and 2

- Answer preparatory questions before the labs
- Send to your lab assistant at least **3 hours before** the lab session

- The lab assistant will reply with the required information to be able to start the system

Lab report

- Use the spellchecker!
  - Any report obviously not spellchecked will be sent back directly
- Proper structure and consistent formatting
- Read the compendium for report requirements
  - All the points have to be covered in order to pass!

Deadlines

- Demonstration: **2017-12-11**
- The report and source code: **2017-12-12**
- Lab assistant gives comments, you have **one opportunity** to hand in corrections
- Corrected version: **2018-01-12**

Practical issues

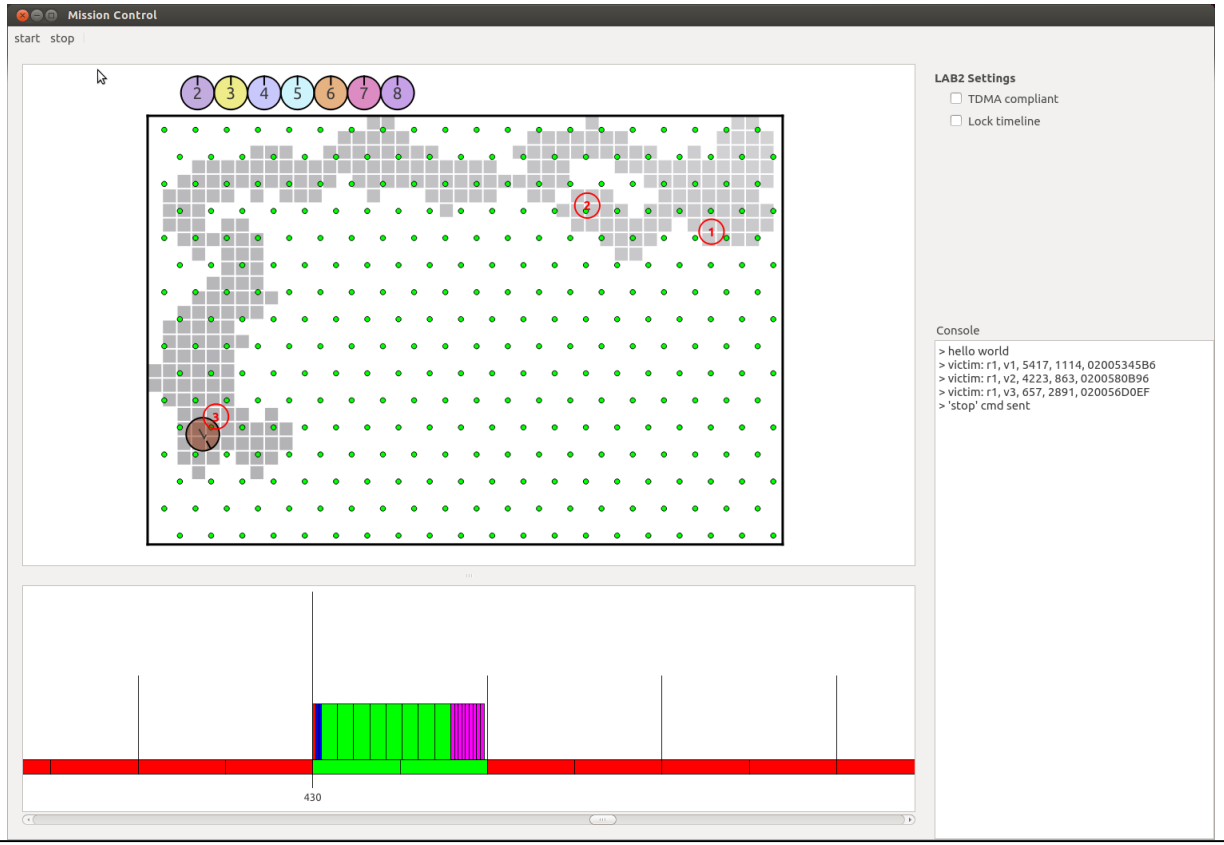
Lab registration

- Sign up for labs: **deadline Nov 1**
- Room: close to SU01
- Please attend the labs
  - Access to robots only during scheduled hours
- Be careful with the equipment
- Keep the order

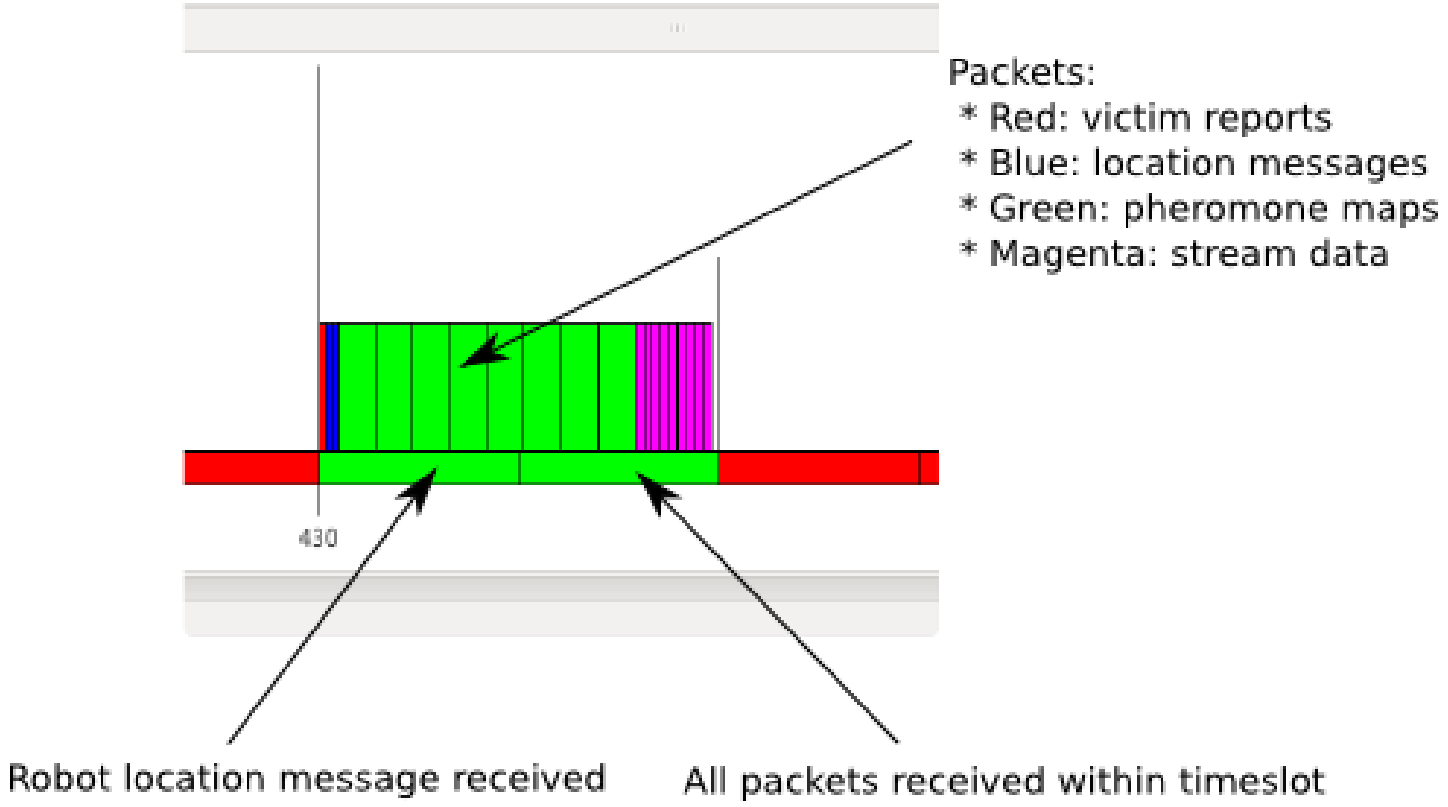
Submitting solutions

- Two addresses for each lab assistant, see web page!
- Format for email subject:
  - ”TDDD07, Group X, Y for lab Z”
  - X = [A|B|C][1-6]
  - Y = {preparatory questions, code, question}
  - Z = {1,2,3}

A guide to the GUI



Packets


Packets:
* Red: victim reports
* Blue: location messages
* Green: pheromone maps
* Magenta: stream data
430
Robot location message received
All packets received within timeslot

Final notes

- Prepare!
- Investigate!
- Have fun!

http://www.ida.liu.se/~TDDD07/

www.liu.se

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