Mobility in w-iLab.t Zwijnaarde

iMinds
ILAB.T

DESTINATION TOMORROW

CREW
Training Days

Vincent Sercu
Bart Jooris
Pieter Becue

Summary

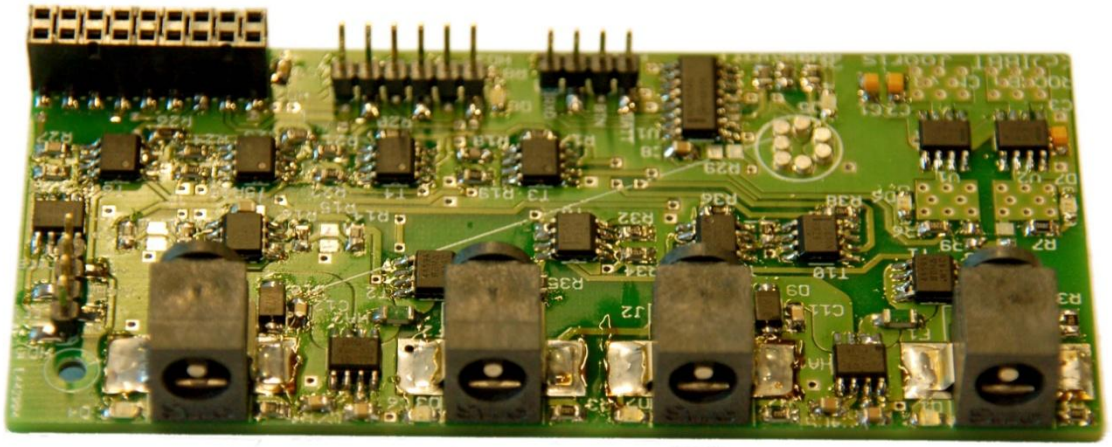
- Robot Specs
- Reservation and policies
- RobotDashboard (hands-on)
  - Basic & advanced features
  - Driving the bots
  - Exploring cams and other features
- Integration in OMF (hands-on)

Robot Specs: iRobot Roomba

- based on vacuum cleaning robot
- extended with:
  - iMinds Robotcontrol
    - In-house designed circuit board (Power ctrl)
    - radio for remote control (RM090)
  - Embedded PC
    - Powered by external battery pack
    - Webcam
    - Wireless interfaces :
      - 802.11a/b/g/n
      - Bluetooth
      - iMinds Rmoni sensor node (802.15.4)

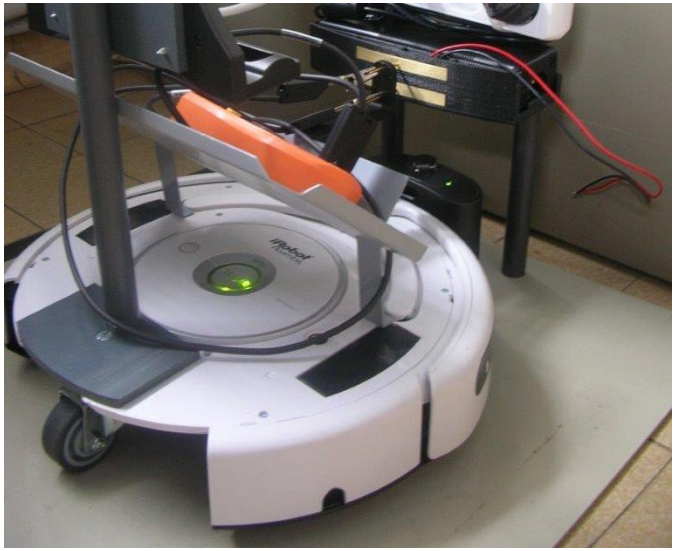
Robot Specs: iMinds Robotcontrol

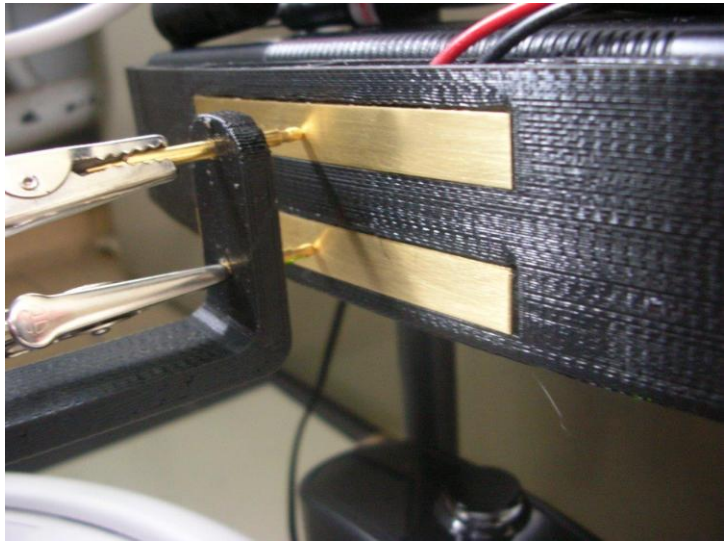
- In-house designed
- Power distribution
  - Charge battery pack through Roomba dock (modified)
  - Power On/Off embedded PC
- Toggle robot “eyes” (leds)
- Expansion pins
  - Radio for remote control



Robot Specs: Charging

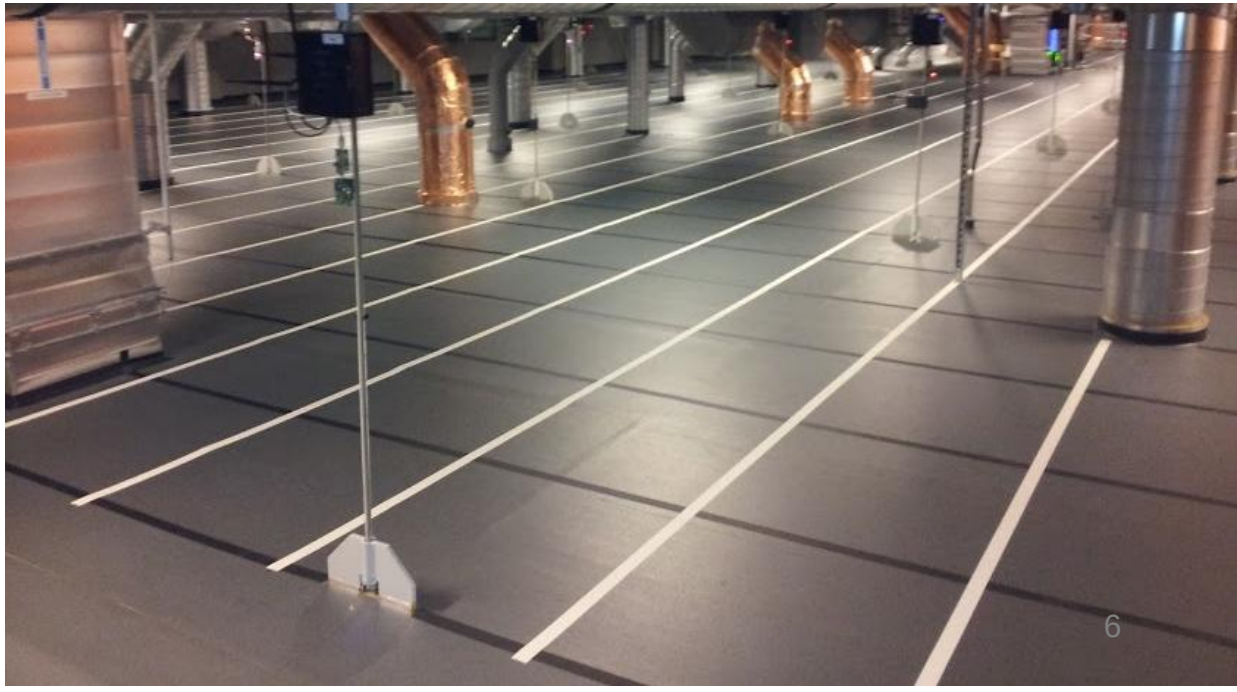
- In-house designed (3d printed)
- Charging both robot and external battery pack in parallel





Robot Specs: environment

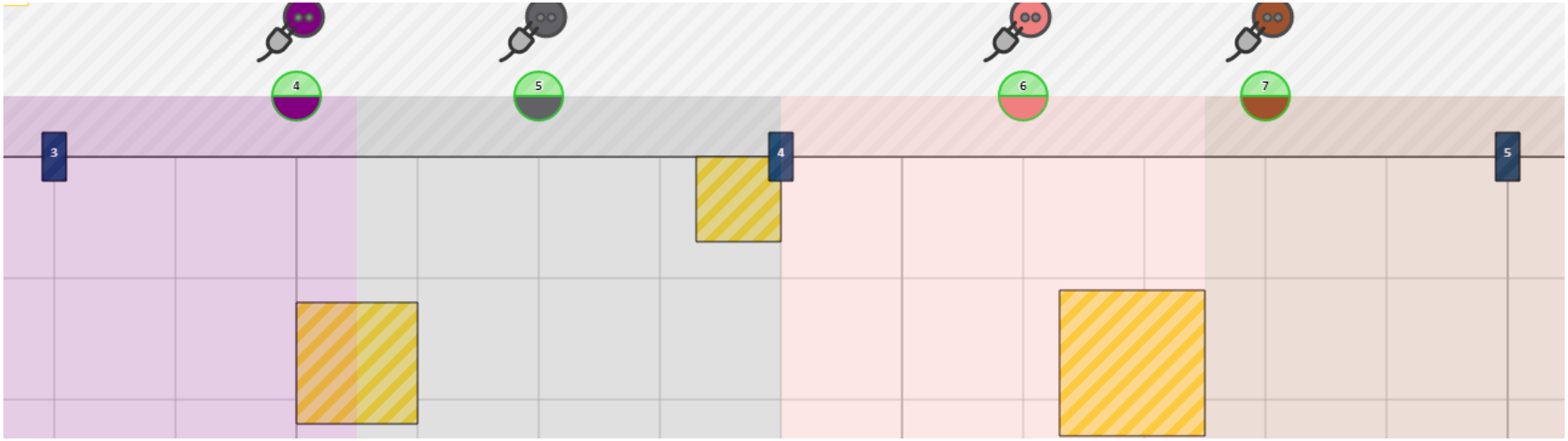
- High accuracy positioning algorithm
- Full control over mobile experiment node (PC + Sensor)
- Fully integrated into testbed (OMF)
- Fully controllable robot behavior
- Mobile node locations stored with OML or can be queried via REST



Robot Specs: future

Reservation and policies

- Reserve robots in same way as normal nodes
- Avoid cross-experiment collisions: keep to lane



RobotDashboard

- Easy path generation
  - Auto-detection of collisions
    - Between robots
    - With obstacles
    - Time-sensitive
  - Loading/saving coordinate files
    - → Used in OMF Experiment Description
  - Comes with built-in simulator
  - Helpers to check status / view cams / toggle testbed lighting

RobotDashboard

- Location: http://robotcontrol.wilab2.ilabt.iminds.be (10.11.19.100)

Integration in OMF

- Save a scene into the right format (export for OMF)
- Paste CSV info in a file on EC
- Use RobotCTRLComm.rb
- Provided OEDL in /users/vsercu/robots/oedl.rb on experiment controller (ec.wilab2.ilabt.iminds.be)

OEDL (1)

```
$Rcnode = 'node0.tbdevel.wilabadmin.wilab2.ilabt.iminds.be'
$Scriptdir = Dir.pwd
$CSV_file = 'robot_coordinates.csv'

########## APP-DEF ##########
defApplication("RobotCTRLComm","Helper script to talk to robotcontrol") do
|app|
    app.path = File.join("#{$Scriptdir}", 'RobotCTRLComm.rb')

    app.defProperty('file', 'file which contains the coordinates', nil,
{:dynamic => false, :type => :string, :use_name => false})

    # a dummy measurement definition
    app.defMeasurement('rbt_measure') do |mp|
    end
end

}
```

OEDL (2)

```
########## GROUPS ###########
# the 'robotcontrol communicator node'
defGroup('RCtrlComm', "#{$Rcnode}") {|node|
  node.addApplication("RobotCTRLComm", { :id => 'rcc' }) {|app|
      app.setProperty('file', File.join("#{$Scriptdir}", "#{$CSV_file}"))
      app.measure('rbt_measure') # must measure this dummy measurement else
no EXPID/NODEID etc is passed
  }
```

OEDL (3)

```
####### EXPERIMENT FLOW ##########
onEvent(:ALL_UP_AND_INSTALLED) do |event|
  allGroups.startApplications

  wait 1
  info "Performing an action: Turning on left eye of robot 2"
  group('RCtrlComm').sendMessage('rcc',
    '2;openlefteye'
  )

  info "Starting path"
  group('RCtrlComm').sendMessage('rcc',
    'START_DRIVE'
  )
  allGroups.stopApplications
  Experiment.done
end
```

Thanks for your attention!

Questions?

iLab.t Wilab2 Team:
bart.jooris@intec.ugent.be
pieter.becue@intec.ugent.be
stefan.bouckaert@intec.ugent.be
vincent.sercu@intec.ugent.be