PhD Interview

Model-based System Engineering, Continuous Deployment and Runtime Validation

Farid Alijani

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Education

- **Lund University,** Sweden
  - Nordic Exchange Program, Control and Robotics Engineering 2015 – 2016
    - Dissertation: Autonomous Vision-based Docking of a Mobile Robot with Omnidirectional Platform
    - Supervisors: Prof. Anders Robertsson and Prof. Aki Mikkola

- **Lappeenranta University of Technology,** Finland
  - MSc, Mechanical Engineering, 2013 – Present
  - Expected GPA: 4.17 / 5.00 (Distinction)
    - Major subject: Mechanical Engineering (Design)
    - Minor subject: Electrical Engineering (Industrial Embedded Systems)

- **Azad University of Tehran Central Branch,** Iran
  - BSc Mechanical Engineering, 2008 – 2013
    - Dissertation: Position and speed control of DC motors; designing a robust PID controller
    - Supervisor: Prof. Armen Adamian
  - GPA: 17.26 / 20 (First Upper Class)

Research Background

- Robotics Lab, Dept. of Automatic Control, Lund University, Sweden
  - MSc Thesis Researcher, January – October 2016

- Emmaus Freriksdal, Lund, Sweden
  - Trainee , February – June 2015
  - Upgrading textile containers hardware to weigh contents and send data to servers in real-time

- Laboratory of Intelligent Machines, Lappeenranta University of Technology
  - Research Assistant, January – September 2014
  - Virtual strain gage and stress feedback in online prediction of fatigue life working machines

Skills

- Teaching:
  - Automatic Control Engineering,

- IT:
  - Microsoft Visual Studio, C/C++, Java, Python,
  - OpenCV, Qt Creator, MATLAB, Simulink, VHDL, Xilinx ISE, Eclipse,
  - Linux, ROS, MSC ADAMS, dSPACE.
  - Familiar with: LabVIEW, SolidWorks, ANSYS, FEMAP/ Nx Nastran, Modelica.
  - GitHub profile: https://github.com/mrgransky

Courses

❖ Mech. Engineering

- ❑ Advanced Production Engineering
- ❑ Control of Mechatronic Machines
- ❑ Design Methods & Applications of Machine Element Design
- ❑ FE – Analysis
- ❑ Machine Dynamics
- ❑ Mechatronics Project Course
- ❑ Simulation of Mechatronics Machines
- ❑ Mechatronics, Industrial Product Design
- ❑ Research Method & Methodologies

❖ Elec. Engineering

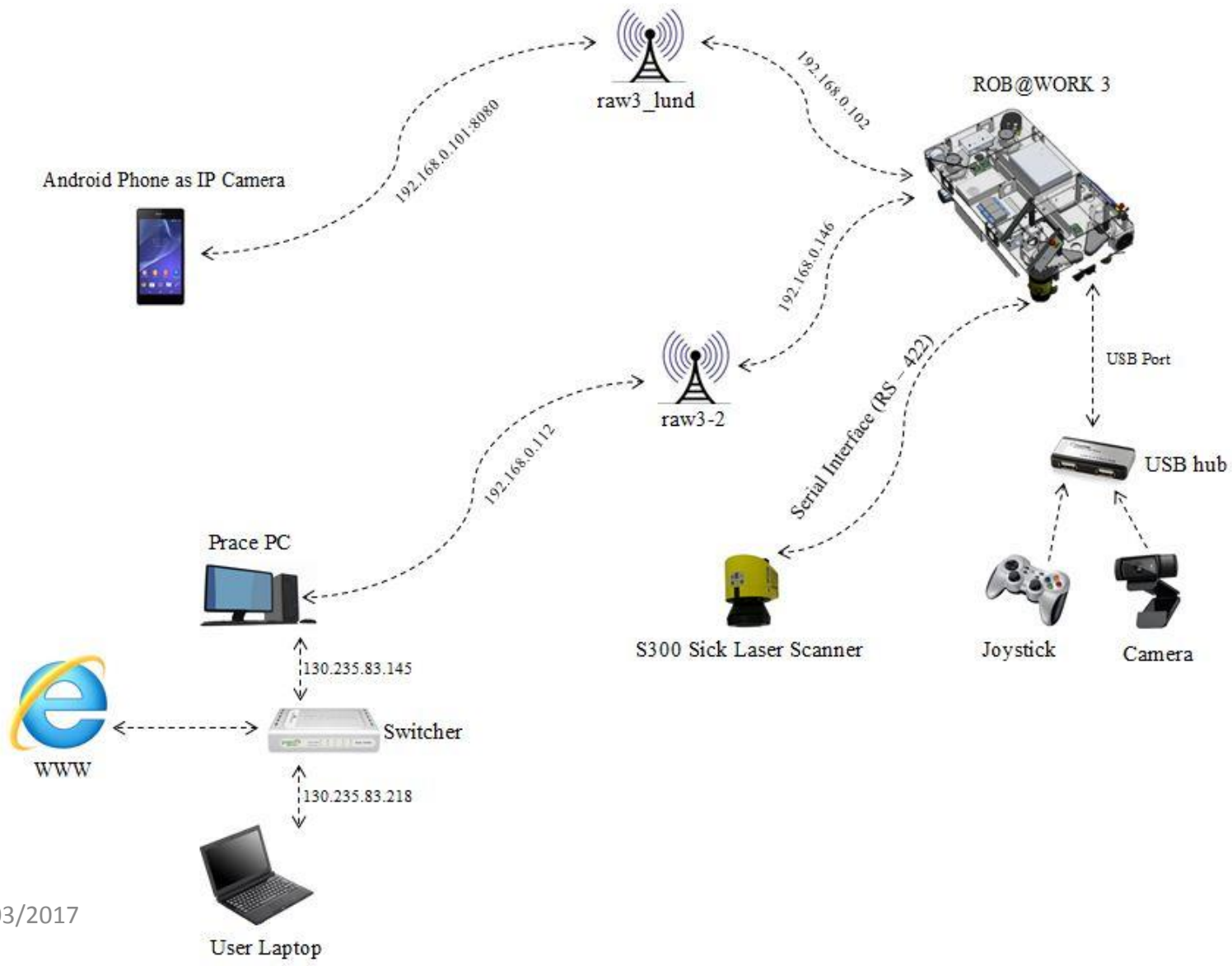
- ❑ Digital Control Design
- ❑ Electrical Motion Control Systems
- ❑ Advanced Course in Electronics
- ❑ Intro to Embedded System
- ❑ Embedded System Design
- ❑ Electromagnetic Compatibility in Power Electronics
- ❑ Real-time Systems

❖ Computer Science

- ❑ Pattern Recognition
- ❑ Design of Experiments
- ❑ Project in Automatic Control
- ❑ Service Robotics
- ❑ Artificial Intelligent Control

MSc thesis

Autonomous Vision-based Docking of a Mobile Robot with Omnidirectional



MSc thesis

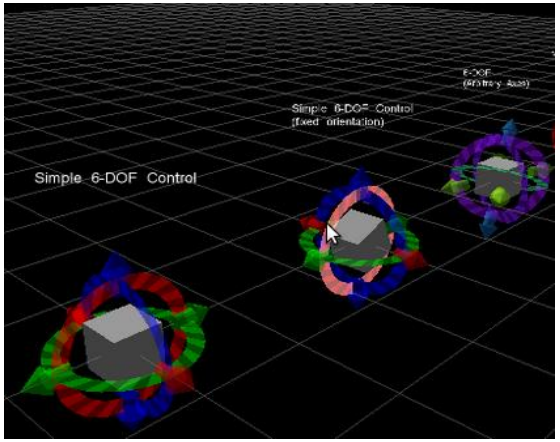
- Content
  - Navigation
  - Feedback Control System
    - Sensor Integration
  - Machine Learning
    - Reinforcement Learning
    - Optimal Action Selection Policy
    - Reward Distribution

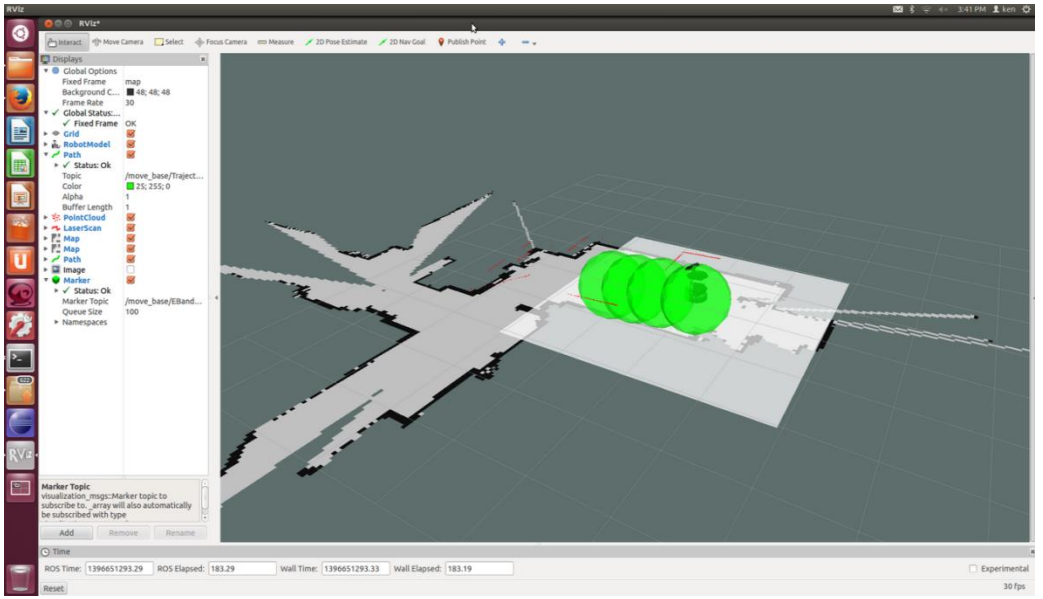
Navigation

- Generating geometric map of the robotics lab

- Tracking precise location of dynamic obstacle
  - 2D radial laser scanner

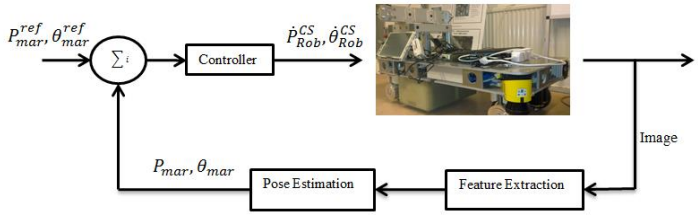
- Path Planning (3D visualization software Rviz)
  - Built-in Kalman Filter module
  - Target is identified by an interactive marker (3 DOF)



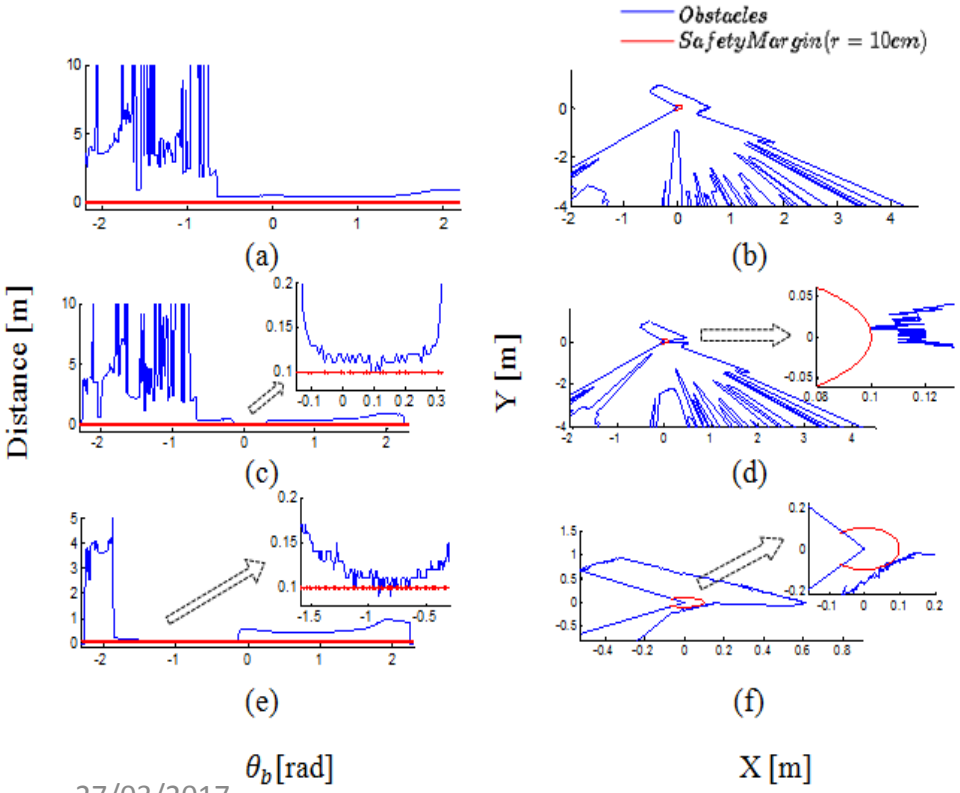


Feedback Control System

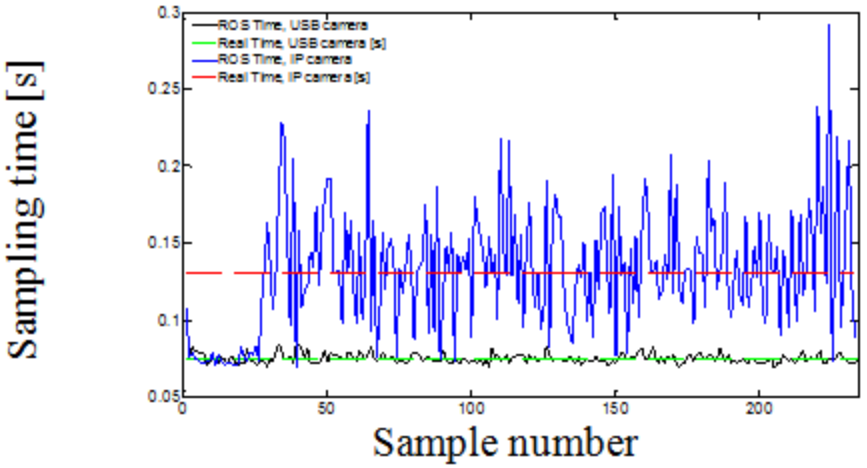
- Sensor Integration



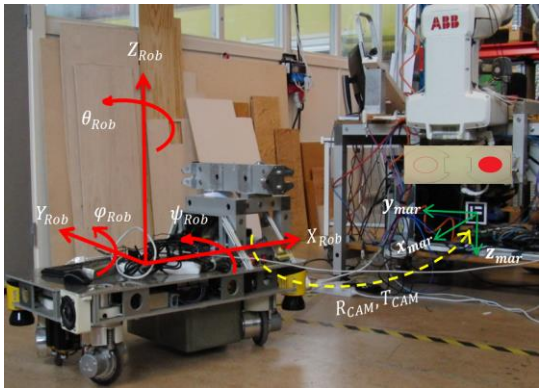
– Laser Scanner Sensor

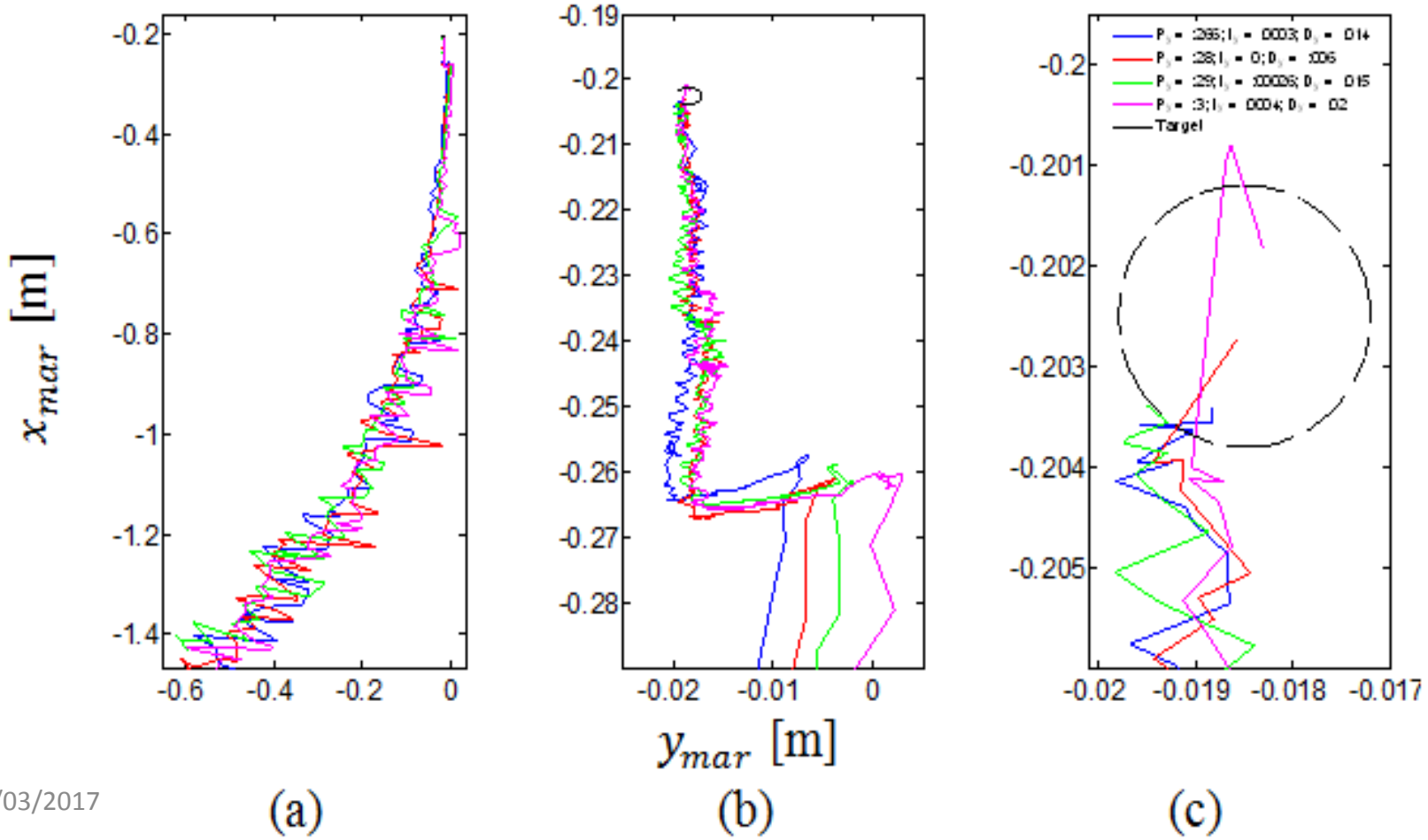


– Vision Sensor



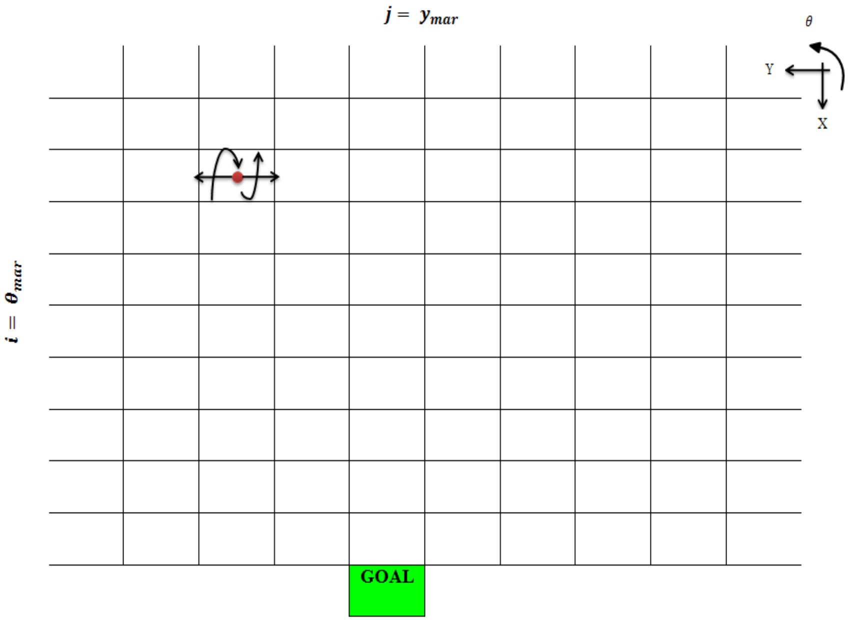
Feedback Control System

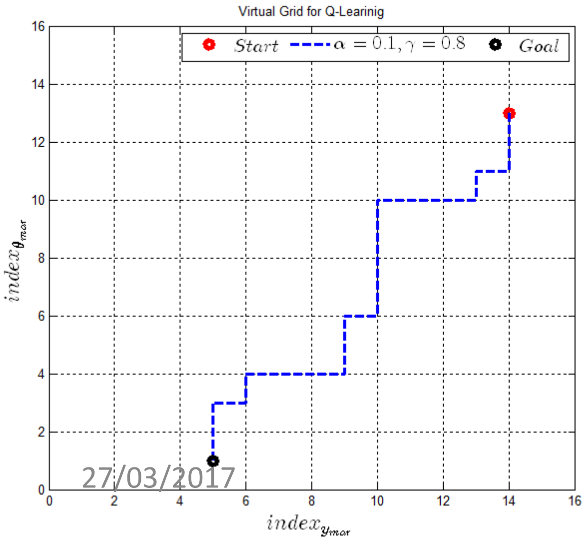


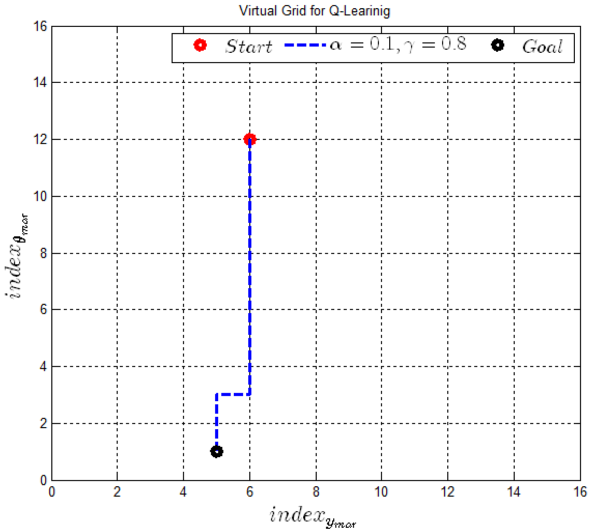


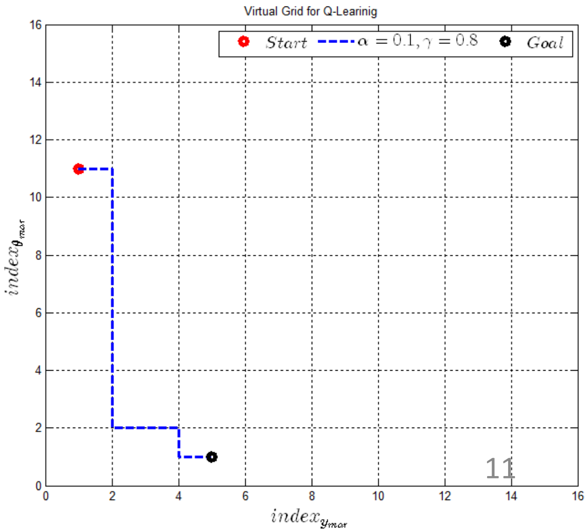
Machine Learning

- Reinforcement Learning
  - Model free Q-Learning
  - Optimal Action Selection Policy
  - Set of actions → Velocity
  - Maximize Reward
    - Helpful Behavior → positive
    - Harmful Behavior → negative









Publication

- Lund University Library → (link)
- International Journal on Information Technology (IREIT) → Submitted Dec. 2016
- Lappeenranta Univ of Tech → (link)

Thank You