Visual Navigation for Flying Robots

Exercise 3 – Control

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Course Evaluation Forms

- Please fill them out now and return after exercise
- We are very interested in your feedback
  - Suggestions for improvements
  - Anonymously or not anonymously
  - In person/via evaluation form/by email/…

Organization: Exam Dates

- Registration deadline: June 30
- Course ends: July 19
- Examination dates: August 9+14 (Thu+Tue)
  - Oral team exam
  - Sign up for a time slot starting from now
  - List placed on blackboard in front of our secretary

VISNAV Oral Team Exam

Date and Time	Student Name	Student Name	Student Name
Tue, Aug. 9, 10am			
Tue, Aug. 9, 11am			
Tue, Aug. 9, 2pm			
Tue, Aug. 9, 3pm			
Tue, Aug. 9, 4pm			
Thu, Aug. 14, 10am			
Thu, Aug. 14, 11am			
Thu, Aug. 14, 2pm			
Thu, Aug. 14, 3pm			
Thu, Aug. 14, 4pm			

Submissions

- 9 submissions
- Evaluation
  - Control in local frame vs. control in global frame
  - No conversion from global frame to local frame (wrong in 3 solutions!)
  - Angle normalization missing (1 solution)

Sheet 4: Project Proposal

- Choose your final project
- Prepare 3-5 slides for 5(!) minute presentation
- Agenda
  - June 21: Proposal presentation (next week!)
  - July 5: Mid-term presentation
  - July 19: Final presentation (with demo/video)

What is good project?

- Open (challenging) scientific problem
- Catchy topic / cool application / visionary
- Try out a (novel) method on real robot

Further (desirable) properties:

- Solvable (by you/your team)
- Scalable (dividable into sub problems, or can form the basis for subsequent project)
- Relevant

Project Presentation - Structure

1. Motivation / application
2. Problem specification
3. Approach
4. Implementation plan
5. Future work

Project Presentation - Structure

1. Motivation / application
   - Illustrate what problem you want to solve
   - Argue why this problem is important/relevant
   - Add an image or sketch, visually appealing
   - This slide needs to draw the attention/interest of the audience
2. Problem specification
3. Approach
4. Implementation plan
5. Future work

Project Presentation - Structure

1. Motivation / application
2. Problem specification
   - State your research question
   - Specify the problem (mathematically)
   - Argue why it is challenging/open
3. Approach
4. Implementation plan
5. Future work

Project Presentation - Structure

1. Motivation / application
2. Problem specification
3. Approach
   - How do you want to solve the problem?
   - Give some technical details
4. Implementation plan
5. Future work

Project Presentation - Structure

1. Motivation / application
2. Problem specification
3. Approach
4. Implementation plan
   - Break down the problem into tasks
   - Specify milestones
   - Formulate the challenges/risks (and possibly contingency plans)
5. Future work

Project Presentation - Structure

1. Motivation / application
2. Problem specification
3. Approach
4. Implementation plan
5. Future work
   - Discuss potential applications
   - Discuss future research directions (e.g., towards the master thesis)

A Few Ideas for Your Project

- **Your own idea – be creative!**
- Add magnet to quadrocopter for picking objects
- Marker-based SLAM (with unknown marker map)
- Estimate position from natural features (no marker)
- Depth map estimation (covered next week)
- Person following (colored shirt or wearing a marker)
- Flying camera for taking group pictures (possibly using the OpenCV face detector)
- Fly through a hula hoop (brightly colored, white background)
- Navigate through a door (brightly colored)
- Navigate from one room to another (using ground markers)
- Avoid obstacles using optical flow
- Landing on a moving platform
- ...

Open HiWi Position

- Dissemination of our research
- Tasks would include
  - Ask people about cool research results
  - Produce Youtube videos
  - Write small posts and put on social media (our website, Facebook, Google+)
- No background in computer vision/computer science required
- Tell your friends/flatmates/…