Weekly Presentation

Week 37

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Overview

1. Project structure
   - Group members
   - Meetings
   - Time plan
2. Engineering problem
   - Idea generation
   - Litterature
   - Requirements
   - Flow charts

Group members

- Y-students
  - Martin Blaszczyk - Project leader and object detection
  - Edward Cedergård - Gripping tool
  - Niklad Dahlqvist - Gripping tool
  - Måns Norell - Movable base
- D-students
  - Edward Källstedt - Object detection
  - Albin Martinsson - Arrowhead and Git

Meetings

Apart from the planned meetings there will be planned *lab sessions* in the project room.

Monday meetings

- Status update
- Qustions for the seminar
- Gameplan for the seminar

Tuesday meetings

- Feedback review
- Group feedback
- Gameplan for the coming week

Overall timetable

Sep	Oct	Nov	Dec
Concept generation	Evaluation	Evaluation	
Theory	Prototyping	Evaluation	Finishing up
Simulation	Evaluation	Evaluation	
Prototyping	Final Design	Evaluation	

Time plan for September

Subproject	Week 1	Week 2	Week 3	Week 4
Arrowhead	Reading	Setup	API	Prototyping
Movable base	Reading	Modeling	Simulation	Implementation
Arm and grip	Reading	Kinematics	Simulation	Prototyping
Object detection	Reading	Testing	Prototyping	Evaluation

Github

Git is a great way to structure and sync a project. With commits it's easy to "backup" the code in case something goes wrong. All members will be able to have an insight into the project nad help eachother. Not all group members have used Git extensively so there's a learning curve in the beginning and how to structure the repo in a good way.

- Common repository for code, 3D-models and report
- Issues as a TODO-list and feature requests
- Still investigating the best way to do it

Idea generation

- A common picture
- Requirements
- Idea generation in subgroups
- Prototype and evaluation

The concept generation phase is an ongoing process so after evaluation some adjustments will be done depending on the performance of the design.

Litterature

Robotics, Vision & Control
Robert Corke

- Gives s good overview
- Covers most topics
- Good code examples

Robot Dynamics & Control
Mark W. Spong

- Popular in robotics
- More focused on the theory
- Covers basic robotic kinematics

Programming Robots with ROS
Morgan Quigley

- Good for beginners
- Explains most basic parts of ROS

Arrowhead Git

- Official documentation

Concept evaluation

Each part of the project has requirements to keep the project focused on the task. During the evaluation phase the concepts will have to achive the requirements which are considered *bare minimum*.

Robotic arm requirements

- Move the arm/claw to a specific coordinate in space
- Have 4 degrees of freedom in front of the robot.
- Detect if the object is grabbed
- Able to hold a object shape as a cylinder
- Pick up object if dropped during path*

Movable base

- Move to a certain point in space
- Overcome the factory platform
- Able to carry the arm
- Hold the camera and other sensors

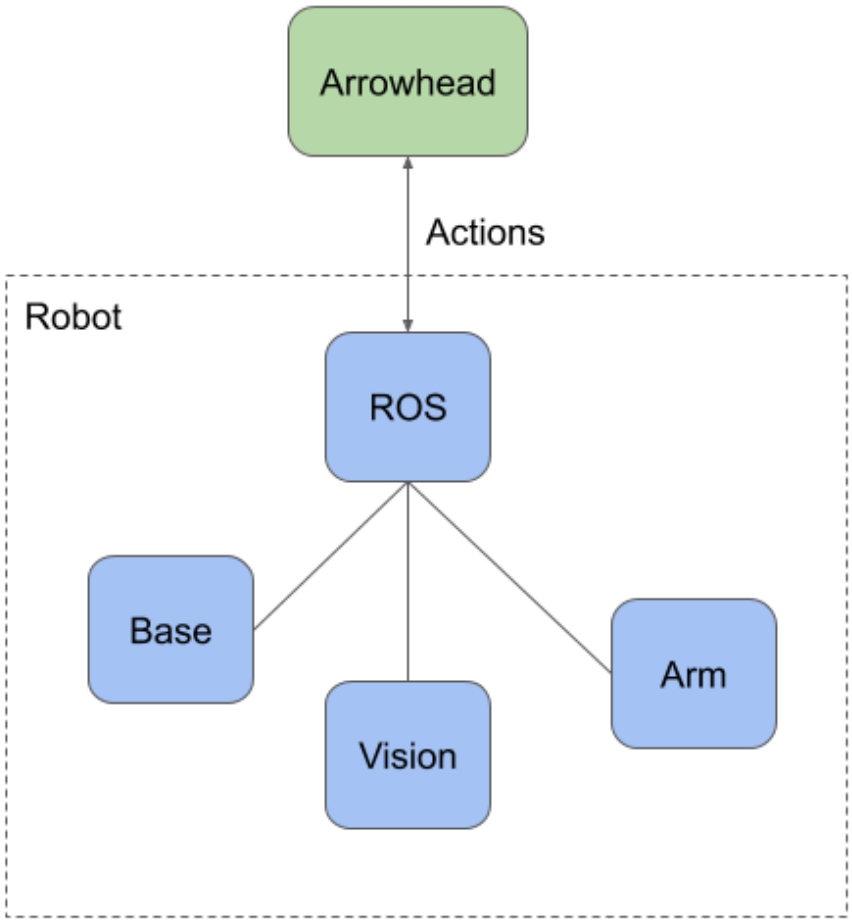
Object detection

- Given a distinctly colored line along the floor be able to track it and feed back an accurate measurement of how much the robot deviates from said line.
- Camera input should be filterable by RGB pixel values.
- The system should be able to recognize and read of QR Codes.
- It should be possible for the system to keep up with and process a continuous video stream in real-time.
- An accompanying GUI should exist where the raw video stream can be seen adjacent to a video stream where detection is active.
- Feed position data to the other systems

Arrowhead

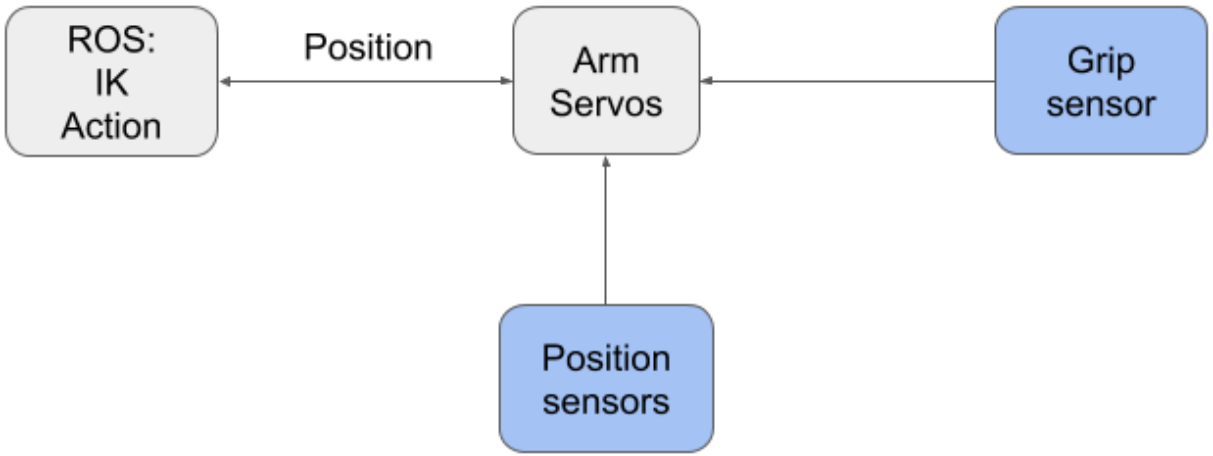
- Have a raspberry pi as a plant, giving the robot a clear directive that the piece is ready for pick up.
- Have authorized communication between the robot and the plant.
- Being able to detect if the piece is ready for pick up or not using a distance sensor at the end of the conveyor belt.
- The robot should be able to tell the plant if the piece is not picked up properly.
- The robot should be able to tell the plant after a succesfull pick up.

General flow

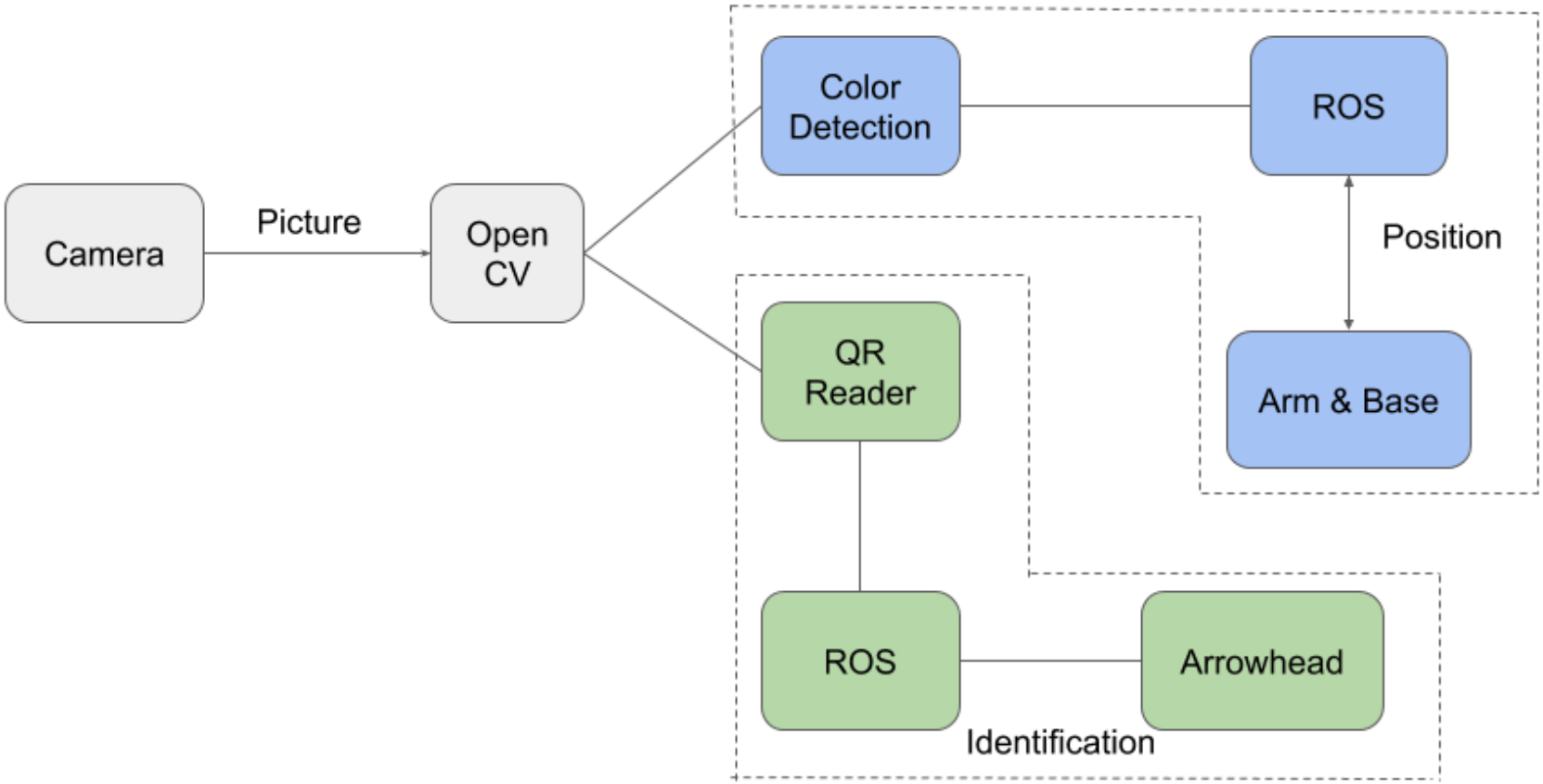


Moving base flow

Robotic arm flow



Object detection flow



Challenges / Unknowns

- Processing power
- Complexity
- Hardware failures
- Losing focus

Questions?