

## **Real life robot optimization system**

### **Why is this an interesting project?**

The project described below allows you to learn skills in many different areas. It includes work on hardware such as motors, sensors and probably our 3d-printer. On the software side you will combine the hardware implementation with different algorithms. And finally you will run experiments on real robots with the implemented system.



You will work in the [Locomorph](#) team. Please read more about this EU-funded project by following the link.

### **Problem statement**

Current state of the art robots, especially in the field of locomotion, still need a lot of tuning to find control parameters. Such parameters are manifold e.g. The speed and phase difference of certain joints, the feedback of sensors on this parameters etc... This tuning is currently often done in repetitive testing by hand guided by intuition or, on the other side, with the help of optimization techniques in computer simulations. Only very rarely optimization techniques are used on real physical robots mainly because of two reasons (1) the number of trials often needs to be very large which makes it a very time-consuming task (2) the large number of trials can lead to mechanical failure of the robot.

### **Project description**

The goal of this project mainly tackles problem number 1 by automating a lot of the repetitive work needed for real life optimization. To weaken problem number 2 the system can also be used in combination with optimization in simulation. Further it allows to check the accuracy of the simulation.

The system consists of a pulley-system attached to the ceiling. Cables are attached to the pulleys as well as the robot. The robot can thereby be put to its initial position automatically. Further there is a camera attached to the ceiling that allows to determine the robots speed and trajectory.

## Goals

The goals of this project are to:

- set up the necessary hardware
- program motor controller board
- set up interface with computer
- program system to pick up robot and put it back to its original position
- program system to set the length of the cables according to the position of the robot
- set up robot trajectory and speed monitoring
- set up interface to optimization framework
- maybe program optimization framework

if time:

- Do optimizations on a topic yet to be defined.

## Requirements

You should be a motivated student with programming and good real world problem solving skills. The Thesis should be written in English.

## Contact

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