AI 4 Project course - Autum 2018

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Motivation

This project will attempt to create different mould and sensor configurations and applying artificial skin upon it. The idea with creating the artificial skin is to measure the magnetic flux going through, to be able estimate the position of an external pressure applied somewhere on the skin.

The idea behind this is to "teach" the skin controller to recognize a user's applied force and locate the position of the pressure. This will have different use cases in the health-care sectors as to measure the pressure applied during walking.

The project will entail how to get readings from the artificial skin and estimate the position and using different AI techniques for estimating position.

The main focus of the project will be on, how to develop an artificial skin from which the forces applied to it can be read by an embedded device and calculate the position of the pressure.

Different AI strategies will be investigated and tried during this project with the objective to get the best estimate of position.

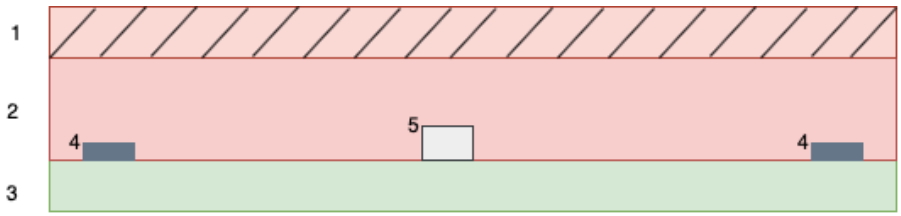

Fig. 1: *This figure shows a sketch of the elements the skin is going to be composed of. Layer 1. will be a mixture of iron powder and the artificial skin compound. Layer 2, will be made up of the artificial skin compound. Layer 3, is a PCB where the flux sensors(4) and the magnet(5) will be mount.*

1 Task definitions and description.

The project will be divided into different sup-tasks. the task will be the following.

1.1 Look into sensors

Find out which sensors can be used, and how they can "fused" with the skin material.

1.2 Build artificial skin

The first part of the project will be to create the artificial skin. To create the artificial skin, different skin thicknesses, magnet strength and skin compound to iron powder ratio, will be investigated

1.3 Data acquisition

Data will be acquired by measure the voltage change from each sensor which correspond to a change in flux. This will have to be mapped over to a position in the artificial skin which correspond to the point of where the pressure was added.

1.4 Point Classifier

The Point classifier will take the output from the magnetic flux sensors, in order to determine were the "skin" has be pressed. The classifier will be created using a neural network, which could be trained using supervised learning as an example.

1.5 Demonstration setup

Several prototypes will be created with different "skin" thickness', amount of sensors and configuration of sensor's to find more information about the different parameters and their importance and the precision/robustness of AI techniques.

2 Time frame

The first estimate of the project can be seen in figure 2 and will be changed and expanded when more task become clearer. The project workload is set at 10 ECTS so the actual manufacturing of the prototypes will not be in-depth research where as the AI mapping algorithms will be investigated more thoroughly.

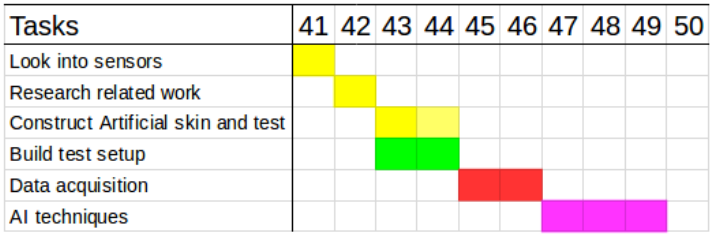

Fig. 2: *This is the preliminary Gantt chart but did will properly be modified on the go when different tasks shows themselves.*