F20RO/F21RO **– Intelligent Robotics**
Assignment 2 – Robotics Project

Topic:
Visual attention and closing the interaction loop between the robot-simulation (its point of attention) and a visual input. Implement parts of your own attention system. Please make sure that every member of the group is implementing a reasonable amount of code. Each member will have to present his or her own part of the program in the demonstration and explain his or her source code. Please, see submission details at the end.

Overview:
In this assignment you will be using the iCub Simulator with YARP and code a piece of C++ software that shall be able to:

1. Read-out the image from the iCub **camera video stream** into your program (see lab sheet 3)
2. The simulator needs to look at the screen while a video/ camera feed will be shown to it (see lab sheet 2.1,2.2).
3. Apply **linear filter** on these images, using openCV (see lecture 2 page 12-13), e.g. threshold for colors/color map or the sobel-derivatives, edge detection, show the results in yarpview windows (see lab sheet 1, 3).
4. Apply **face detection** on these images using openCV.
5. Apply an **object detection** system, e.g. the circle detection (see lecture 2 page 12-13) or a marker detection (e.g. AR_marker,http://docs.opencv.org/3.1.0/d5/dae/tutorial_aruco_detection.html).
6. Control the iCub_sim head with your program to show the focus of attention of the system (focus of attention should be arbitrated by a **finite-state machine** (**FSM**) or **finite-state automaton** (**FSA**, plural: *automata*), **finite automaton**, or simply a **state machine**, e.g. turn towards the circle/marker when it can be seen on your camera/video input, using e.g. the test_grabber (see iKinGazeControler/xd:i port, lab sheet 2.2, 3) or toward the face you can detect when there is one.
7. Control the iCub_sim arm to wave and/or to present a **gesture** when it is seeing a particular circle or marker or face.

Submission information:
For the submission one group member will have to submit the source code of the group (C++, and CMAKEList.txt). Inside the source code you will need to indicate, using the comments, ownership of each group member.
1200 words report (containing the description of your software (including ownership), the rationale for the decisions taken towards the options and problems you could not overcome in your coding).

You will need to create a 5 min presentation for the group demo.

The demos will take place in the Lab Room EM 2.50 during the Thursday Lab slot of Week 11 (22nd of March, 2018) starting promptly at 16:15 am.

For MSc students only:
They will need to submit further 450 words as summary on the paper of Breazeal, Cynthia, and Brian Scassellati. "How to build robots that make friends and influence people." *Intelligent Robots and Systems, 1999. IROS'99. Proceedings. 1999 IEEE/RSJ International Conference on*. Vol. 2. IEEE, 1999.

This should be submitted alongside the group submission.