# CSC752 Autonomous Robotic Systems, Fall 2020

## *Assignment 1*

**Due date:** 08/31/2020, 1:15pm, before class starts.

There will be mandatory assignments based on topics discussed in class. Problems will be either theoretical or implementation-based. The programming exercises will include Matlab and Python/C++. The due dates will be available on the course web page and the assignment itself.

- **Assignment 1a (5 points)**: Reading material

  **Due date reading/discussion:** First/Second week.
  Recent advances in AI technology led to new markets and opportunities in important areas such as health, education, transportation, the environment etcetera. Machines have outperformed humans in the past decade with regard to certain specific tasks such as some facets of image recognition or the ability to win against humans in games like Jeopardy or Go. AI researchers expect further, even accelerated progress in some areas of artificial intelligence, e.g. in self-driving car technology. All this progress has been made in areass known to AI researchers as *weak* or *narrow AI*. Significant progress in *General AI* where machines will demonstrate broadly-applicable intelligence comparable to humans in the coming years or even decades is unlikely according to a recent AI study.

  Renowed AI researchers composed a recent study on artificial intelligence, published in September 2016. The study was produced by a panel of 18 mostly American scholars and experts. The authors looked at how specialized applications of AI might affect life in a typical North American city by the year 2030. It is called "Artificial Intelligence and Life in 2030" and may be seen as a new landmark report as it is the first of a series of reports that will be produced every five years as part of the "One 100 year study on artificial intelligence (AI100)".

  Read the following two reports for a discussion in class (2nd week).

  1. AI 100 report: `https://ai100.stanford.edu/2016-report`
  2. White house report: `https://obamawhitehouse.archives.gov/sites/default/files/whitehouse_files/microsites/ostp/NSTC/preparing_for_the_future_of_ai.pdf`

- **Assignment 1b (15 points)**: Implementation

  Get to know ROS by inspecting the simulation of a Husky robot.

  1. Setup the Husky simulation:
     `http://wiki.ros.org/husky_gazebo/Tutorials/Simulating%20Husky`
     Remember, our pre-installed ROS distro version is kinetic.
  2. Launch the simulation and inspect the created nodes and their topics using:
     ```
     rosnode list
     rostopic list
     rostopic echo [TOPIC]
     rostopic hz [TOPIC]
     rqt_graph
     ```
     For more information take a look at the slides or:
     `http://wiki.ros.org/rostopic`
     `http://wiki.ros.org/rosnode`
  3. Command a desired velocity to the robot from the terminal (rostopic pub [TOPIC])
  4. Use **teleop_twist_keyboard** to control your robot using the keyboard. Find it online and compile it from source. For a short git overview see:
     `http://rogerdudler.github.io/git-guide/files/git_cheat_sheet.pdf`
  5. Write a launch file with the following content:
     - Husky simulation with a different world: Include husky_empty_world.launch file and change the world_name argument from the directory /usr/share/gazebo-7/worlds.
     - `teleop_twist_keyboard` node

  You can check the changes by starting the new `.launch` file.