Project 2: evolutionary design

The project can be done in pairs or individually. The report and the modified Framsticks scripts (if applicable) should be sent to kmiazga@cs.put.poznan.pl until **midnight of 26.01.20**. The evolutionary goals (from the first point) should be unique between the groups - decide on them, and send them by email **until the end of the year**.

Template of the report:

1. In the experiment, the evolutionary goal will be... (here comes your goal of choice, e.g. a combination of two simple goals: creatures that are tall / jumping / fast in water / fast on land, simulated under low / high gravity with MechaStick / ODE + small / big / some specific size, expressed as the volume of the bounding box / number of parts / number of joints etc.) – IV.3 in the tutorial.
2. Turn on the option `Parameters→Error handling→Don't simulate genotypes with warnings` ☑. Save the parameters in a .sim file (or the initial state in an .expt file) and use the CLI (command line interface) to run batch computations (IV.6 in the tutorial, especially IV.6.13). The simplest script for that task would be:

```
FOR /L %%N IN (1,1,10) DO frams "im settings.sim"
"Math.randomize();" "Simulator.init();" "Simulator.start();"
"while (ExpState.totaltestedcr<1000000) Simulator.step();"
"sa end_%%N.expt" "-q"
```

3. A list of modified (as compared to the defaults) values of the parameters and the script fragments. The termination criterion (do not use a criterion based on the number of steps of *simulation*; instead, use the number of evaluated creatures, fitness value or the stagnation of fitness).
4. Comparison or the results for two (or more) combinations of parameters. For example: different sizes of the population, different genetic representations (f0/f1/f4/fH), crossover or mutations-only, etc.
5. Fitness plot: two (or more, if you are comparing more parametrizations) bars (boxplot or violin plot), each based on 10 repetitions of the experiment. Similar plot for the time spent on computations (measured from outside of the CLI).
6. Fitness plot separately for each evolutionary run (10 lines of the same color for every parametrization; time, i.e., the number of the evaluated creatures, on the horizontal axis; the fitness on the vertical axis). Turn on `Experiment→Parameters→Extras→Log fitness=Every 10 evaluations` (or `Every evaluation`).
7. Quantitative conclusions (based on the bar plots and fitness-in-time plots).
8. Qualitative conclusions: what is the behavior of the best creatures? Do they have some special genotypes? Are the results in line with your expectations? If not - why? If the evolved creatures move in an interesting way or showcase some interesting behaviors, you can record them and upload the video to YouTube.