1 Informations to run the code

In order to execute the code, it is sufficient to run the MATLAB file *main_snake*.
The code offers the possibility to change the goal position, the parameters of the snake robot, and the number of times the optimization variables are allowed to change (*n_vary*). Also simulation parameters can be changed like running time, sampling time, initial conditions, etc. . It is important to choose a running time coherent with the goal position, further goals need longer simulation times to be reached.
Attention is required also with codegen. There are specific lines in the code *main_snake* whose purpose is to generate the code. Once the code is generated and if nothing needs to be changed, it is not required to generate it again, and the already compiled *_mex* files can be directly employed as they are.
In the *main_snake* file, it is also possible to set which plots will be displayed at the end of the optimization. In particular, going in the last section and changing the values of the variables in the space between the dashed lines from 0 to 1, will cause the relative diagram to be showed at the end of the procedure. For example if the variable *plot_of_com_traj* is set to 1, the diagram showing the entire trajectory of the center of mass of the robot through the entire simulation will appear at the end of the computation.

The available diagrams are:

- COM trajectory
- all joint angles ϕ_j and their constraint value
- few selected ϕ_j (e.g ϕ_1, ϕ_4, ϕ_5) and their constraint value
- com speed in x direction
- com speed in y direction
- module of com speed
- all 4 serpenoid curve parameters (α, ω, β and γ) behaviour in time with respect to their saturation constraints
- few selected components of u.

N.B.: Other parameters are thought to be user chosen, please refer to the file *report_snake_robot* and the comments in the script to understand which (and how) parameters can be changed.