

# Telerobotics: UWSim

## Assignment : Teleoperation and Errors

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### 1 Teleoperation commander node

The simulator UWSim [2] developed by the university Jaume I to simulate underwater robotic operation, like object recovery or underwater manipulation performed by the robot called “Girona 500” [3] for the European project “Triton”. Attached to this report there is a keyboard commander (called *“PF\_teleop\_sansebastiano.py”*) to guide the Girona 500 by means of velocity inputs or thrust inputs. Since this kind of robot has 5 DOF and motors can rotate in both directions, 10 different keys are required. After some attempts I met a pretty comfortable combination to use the robot. When the node starts, it asks you if you want to give inputs by means of thrust or velocity commands. Then, the keyboard commands are displayed on the shell. In case the user misses a valid key, an error string will appear; if the user misses it for more than ten times the shell would be refreshed to guarantee the visibility of the key commands.

### 2 Teleoperation in various scenarios

In the package pipefollowing provided there are 3 scenarios and each of them has 2 possible behaviours: one kinematic (1,3) and one dynamic (2,4). In the following graphs there are the absolute error path and the integrated error squared path coming from a user trying to follow a line printed by the benchmark option. As evident, the dynamic scenarios are harder and the errors are higher in scale, while the error trend is similar.

#### 2.1 Graphs

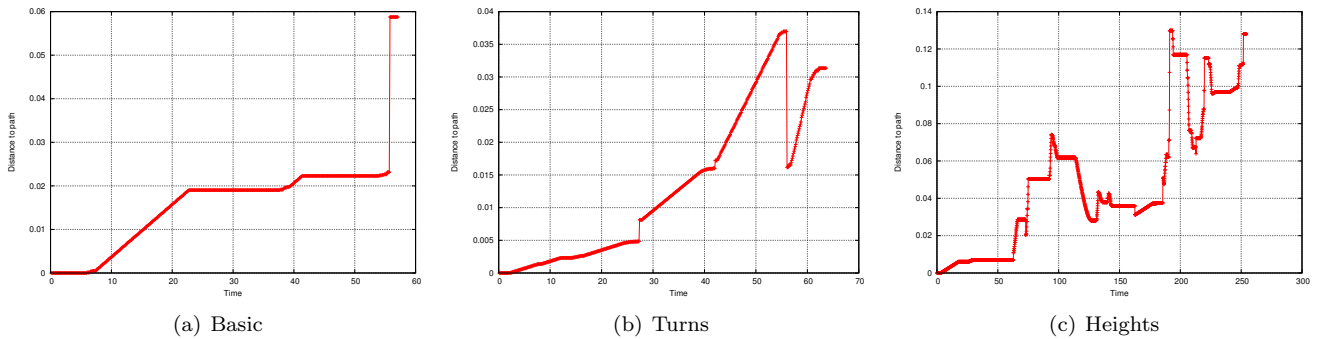


Figure 1: Error Kinematic Scenario

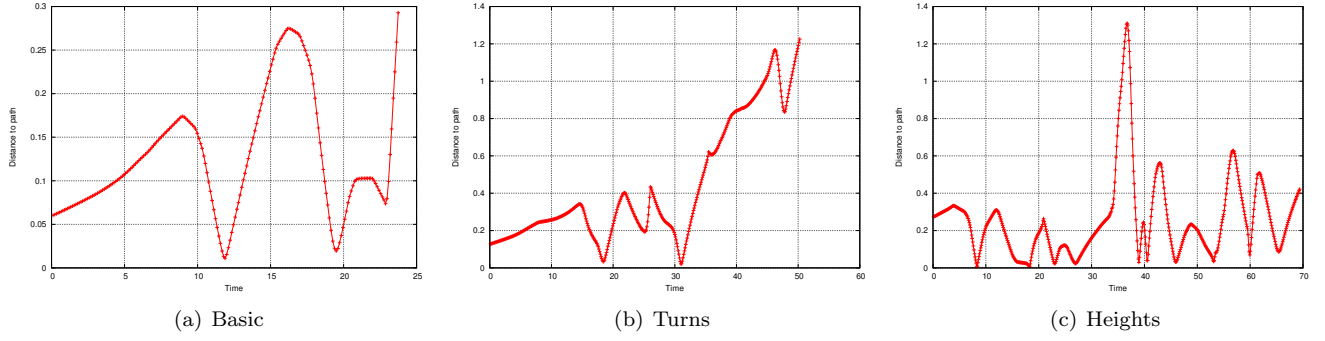


Figure 2: Error Dynamic Scenario

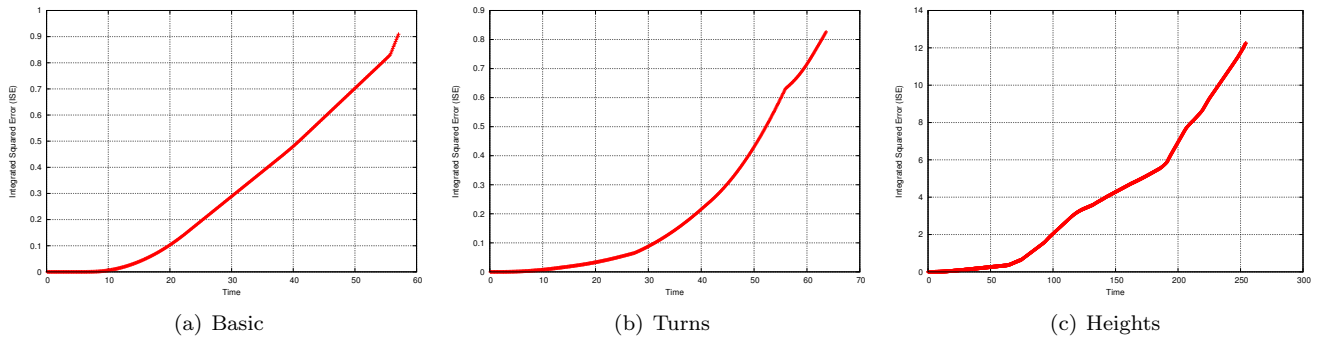


Figure 3: ISE Kinematic Scenario

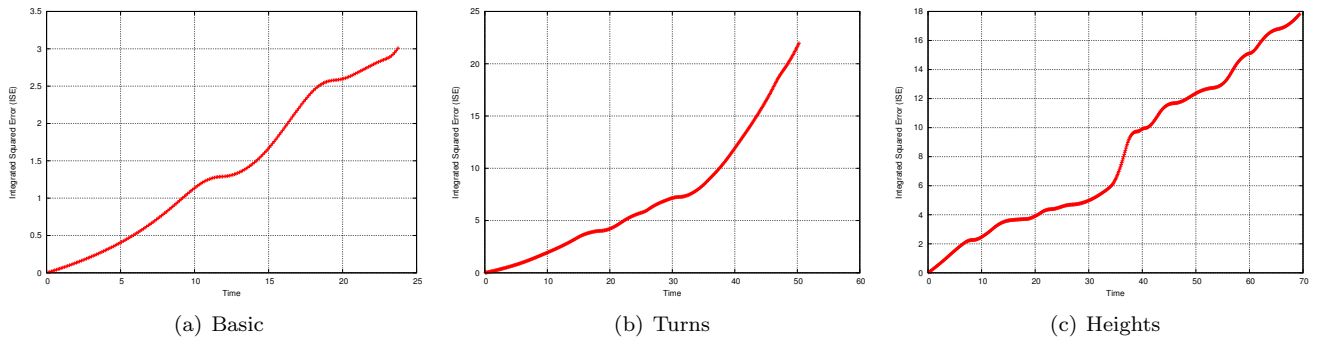


Figure 4: ISE Dynamic Scenario

## References

- [1] Lessons and notes of prof. José V. Martí, James I University
- [2] Wiki.ros.org. (2016). uwsim - ROS Wiki. [online] Available at: <http://wiki.ros.org/uwsim>
- [3] Ribas, D., Palomeras, N., Ridao, P., Carreras, M. and Mallios, A. (2012). Girona 500 AUV: From Survey to Intervention. IEEE/ASME Transactions on Mechatronics, 17(1), pp.46-53.