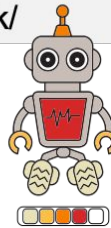




# Anomaly Detector Network

Aristotle University of Thessaloniki





# Anomaly Detector Network usage

- The network is a simple fully connected neural network consisting of 2 hidden layers with 5400, and 1080 neurons respectively.
- It accepts 10 x lidar consecutive readings taken from the TurtleBot4 stacked (`torch.tensor(1, 10, 1080)`).
- It was trained on simulated data, with a 64ms time increment, which translates to 15 readings / second.
- The readings taken from the Turtlebot4 have these entries obscured by the chasis of the Turtlebot4:
  - [764:799]
  - [845:868]
  - [882:884],

which should be replaced with the mean values of the surrounding non-obscured readings (e.g. the value in index 764 should be replaced with the mean value of [759:763]).





# Anomaly Detector Network usage

- The actual readings contain '*inf*' values for:
  - readings that are further away from the max lidar range
  - occasionally miss readings
  - readings that are caused by an obstacle on the lidar (anomaly)
- These transformations to the readings are needed:
  - if the surrounding from the '*inf*' entries values are close to the max lidar range ( $>11$ ), these values should be replaced with the max lidar range (12)
  - The rest of the '*inf*' readings should be replaced with a value of *100.0*, since those are either miss readings or an actual anomaly (an obstacle right next to the lidar).
- Finally, the data is normalized, by dividing each entry by the max lidar range (12).
- The network outputs 0 for normal readings and 1 if an anomaly is detected.

