

## Title

Detecting and Compensating for Anomalous Readings in a Sensornet

## Data

Sensornet data from CMU campus: <http://www.cs.cmu.edu/~gustrin/Research/Data/>

## Description

Sensors much like the ones in sensornets are commonly used in robotics. By detecting anomalous readings from sensors on a robot we can deter the robot from over reacting to outlier or anomalous readings; and perhaps we can keep the robot functional until a broken sensor can be replaced. A robot can act in a variety of dissimilar environments (Earth vs Mars) but its actions, based on sensor input, must remain sound regardless of the changes in the environment.

I aim to develop an algorithm to learn a model of normal operation and an algorithm to compensate for anomalous or broken operation of the sensors, thus allowing the robot to operate normally in a variety of environments.

## Software

All software will be created by me.

- An algorithm to learn a model to represent normal operation for a sensor
  - If this algorithm is efficient enough the robot could learn in real time from new data from a new environment.
- An efficient algorithm to classify a set of sensor readings
  - This algorithm will be used by the robot in real time for detecting anomalous readings.
- An algorithm to compensate / smooth anomalous readings
  - This algorithm will use the learned model to scale (or omit) anomalous readings to more feed the robot “reasonable” readings.
  - If multiple anomalous readings are recorded from the same sensor contiguously, the learned model will take over all readings of the sensor to compensate for a broken sensor.

## Related papers

<http://www-2.cs.cmu.edu/~gustrin/Publications/IPSN2004/ipsn2004.pdf>

<http://www-2.cs.cmu.edu/~gustrin/Publications/VLDB04/vldb04.pdf>

## Team

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## Expected Outcome

The expected outcome is at minimum an algorithm that can efficiently detect and report anomalous readings from sensors. The compensation and smoothing algorithm will be attempted, but completion before the deadline will be close.