FFI Forsvarets forskningsinstitutt
Norwegian Defence Research Establishment

Master Project Proposals

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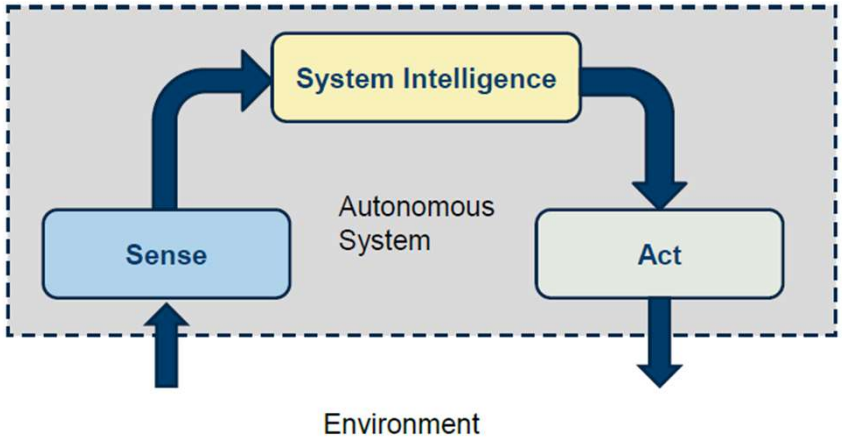
Deep Learning for Building Autonomous Systems

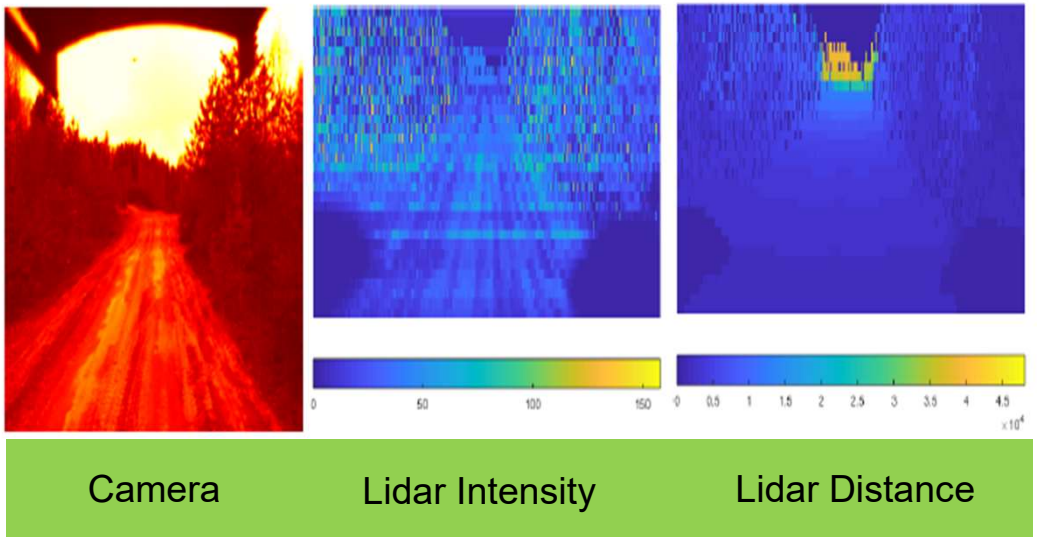
- Platforms
  - Unmanned Ground Vehicles (UGV)
  - Unmanned Surface Vehicles (USV)
  - Autonomous Underwater Vehicles (AUV)

- Deep learning
  - Sense (Perception/Situation understanding)
  - Act (Control/Generation of control commands)
  - End-to-end learning (Combined perception and control)



OLAV – FFI's Unmanned Ground Vehicle

OLAV



Sensors

Deep Learning for Controlling a UGV

Challenge: Situation perception through automated analysis of sensor data and conversion to steering parameters

- Potential Topics and Issues
  - More complex maneuverings than just following the road
  - Follow a person/another vehicle
  - Sensor fusion
  - 3-D processing (eg: Point clouds, Stereo images)
  - Interpretability and safety

ODIN and FRIGG- FFI's USVs

ODIN

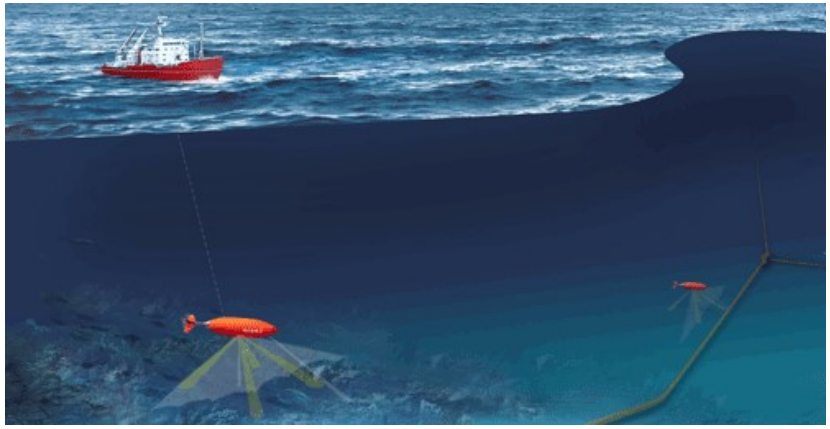
RADAR Scan

Deep Learning for USV

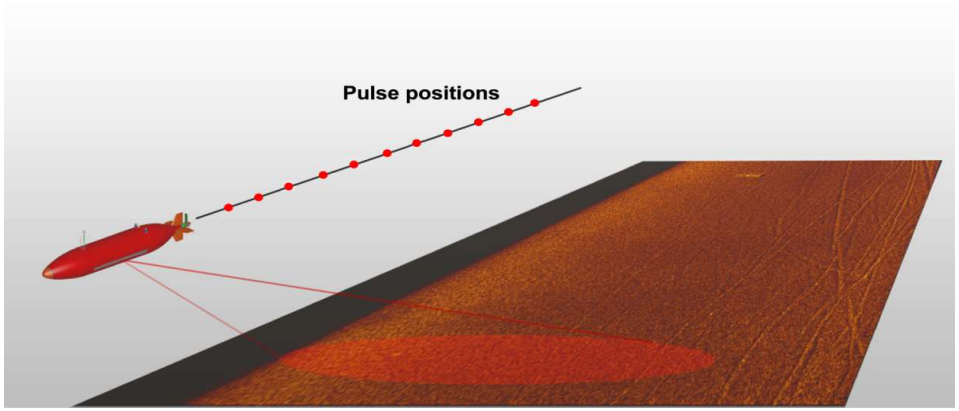
Challenge: Situation perception through automated analysis of sensor data and conversion to steering parameters

- Potential Topics and Issues
  - Learn to avoid dynamic obstacles
  - Learn to create formations with two USVs
  - Inverse Reinforcement Learning

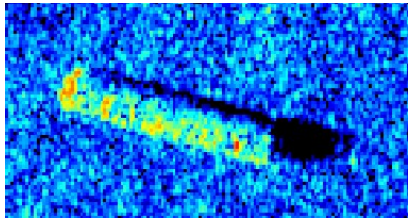
HUGIN- FFI's Autonomous Underwater Vehicle (AUV)



HUGIN



Synthetic Aperture Sonar (SAS) Imaging



Sonar Image

Deep Learning for AUV Perception

Challenge: Situation perception through automated analysis of sonar imagery

- Potential Topics and Issues
  - Object detection and classification (Automatic Target Recognition - ATR)
  - Multimodal processing
  - Change detection
  - Generation and use of simulated data (GAN)

THANK YOU!