Intelligent Cyber Physical Systems for Smart Industries
Activity of the CINI LN-ESSM @ University of Messina

Dario Bruneo

Department of Engineering
Università degli Studi di Messina
Messina, Italy

Staff@UNIME

- Università di Messina - Nodo Locale del Laboratorio Nazionale CINI ESSM

- Staff:

- Dario Bruneo

- Antonio Puliafito

- Francesco Longo

- Salvatore Distefano

- Marco Scarpa

- Fabrizio De Vita

Research Fields

- Design, development, and deployment of **embedded AI techniques**, mainly based on deep learning, for Cyber Physical Systems

- Smart Manufacturing
  - Predictive maintenance
  - Anomaly detection
  - Security

- IoT/networking
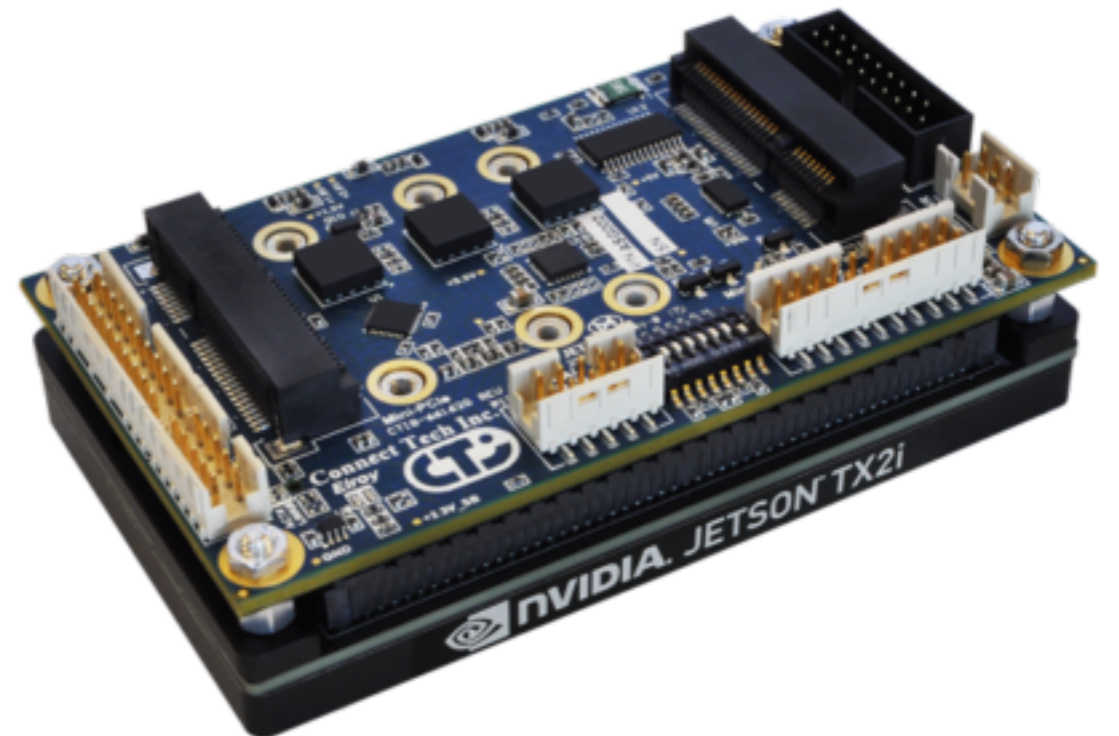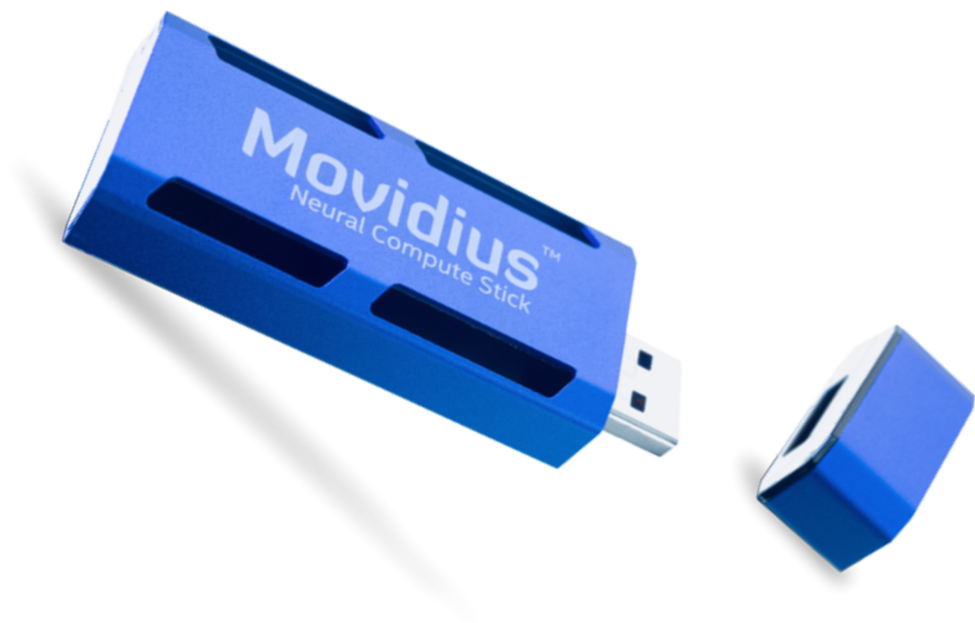 - Deep Reinforcement Learning techniques for 5G technologies

- Smart Cities
  - Object detection and Tracking
  - Heterogeneous sensor perceptions and fusion
  - Indoor localization
  - Traffic monitoring

Challenges

- Heterogeneity of the input sources

- Limited computing power

- Respect of real time constraints

SmartMe.io

- Innovative startup and spin-off of UniME

- Focusing on Intelligent Cyber Physical Systems adopting Open HW, Open SW, Open Data

- Partnerships
  - Analog Devices
  - LoMA.srl
  - Ferrari
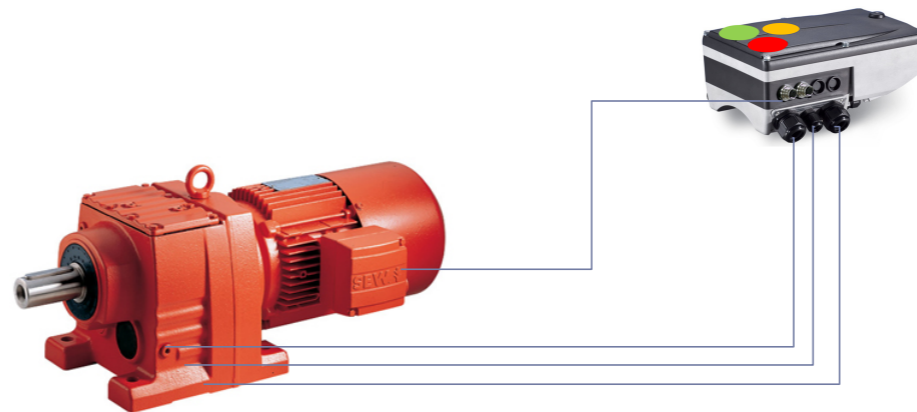 - Generali
  - Nvidia
  - ST microelectronics

http://smartme.io

- Awarded at:
  - G7 Trasporti, Cagliari 22 June 2017
  - SMAU, Milan 22 October 2017
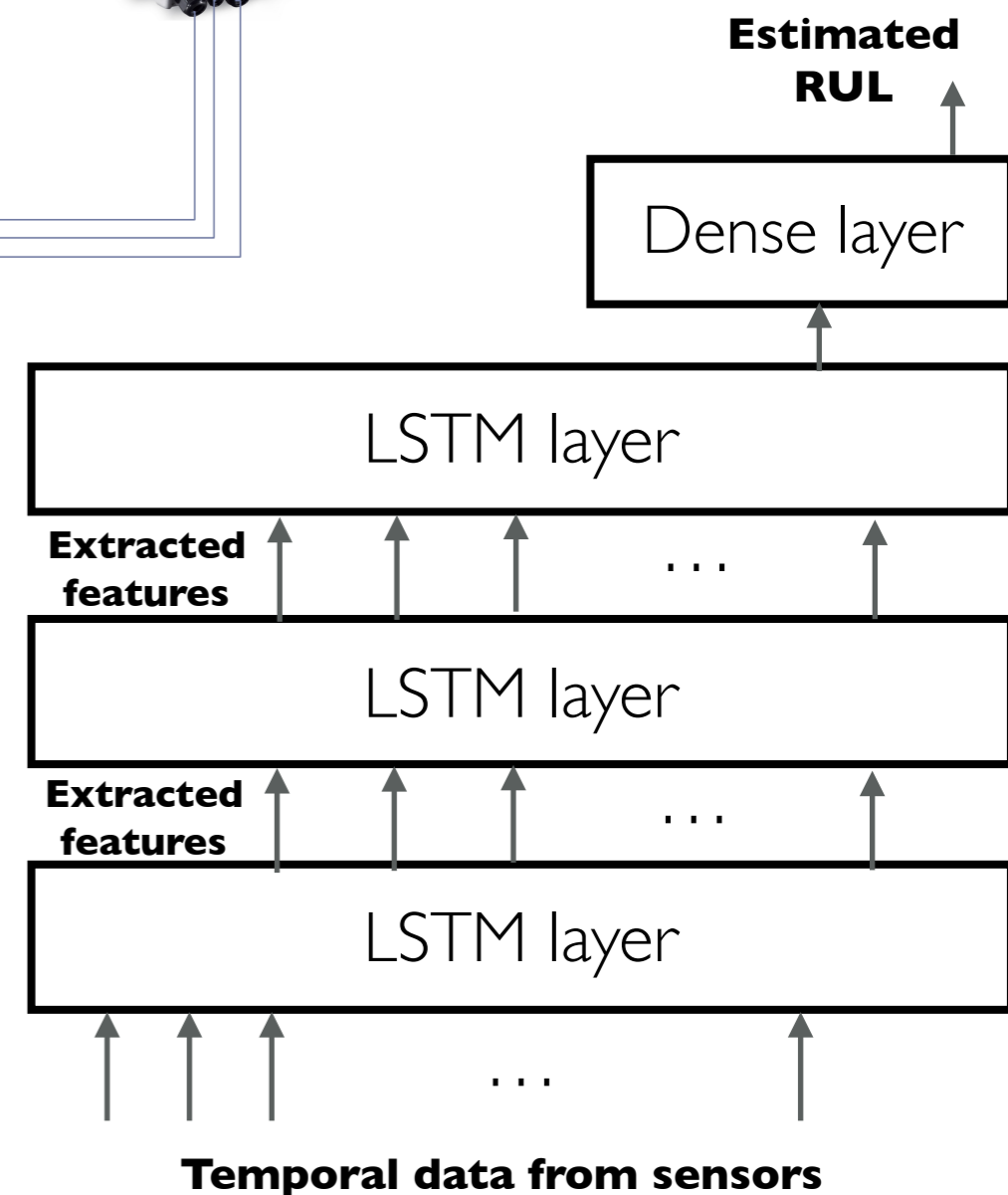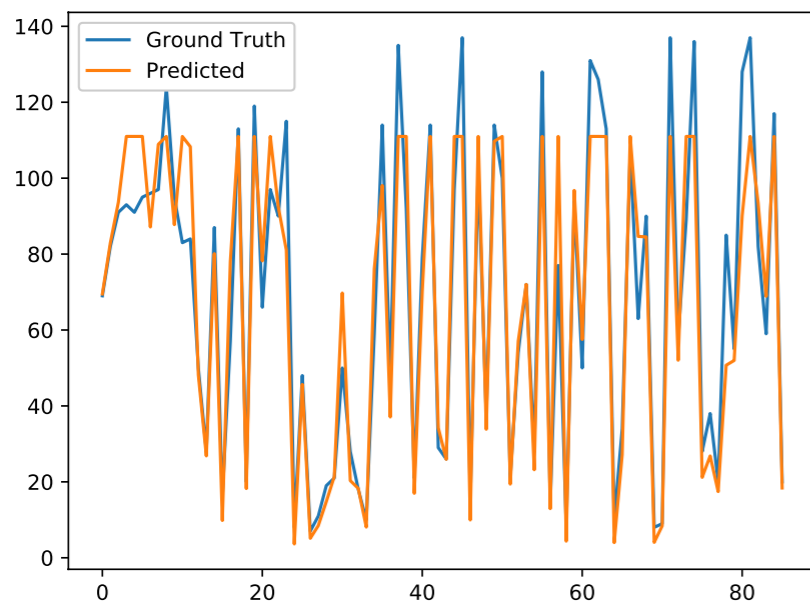 - Legambiaente, Rimini 13 November 2017

Predictive Maintenance

- Using multiple sensors to predict Remaining Useful Life (RUL) of Industrial Plants based on gear motors

  - Vibration
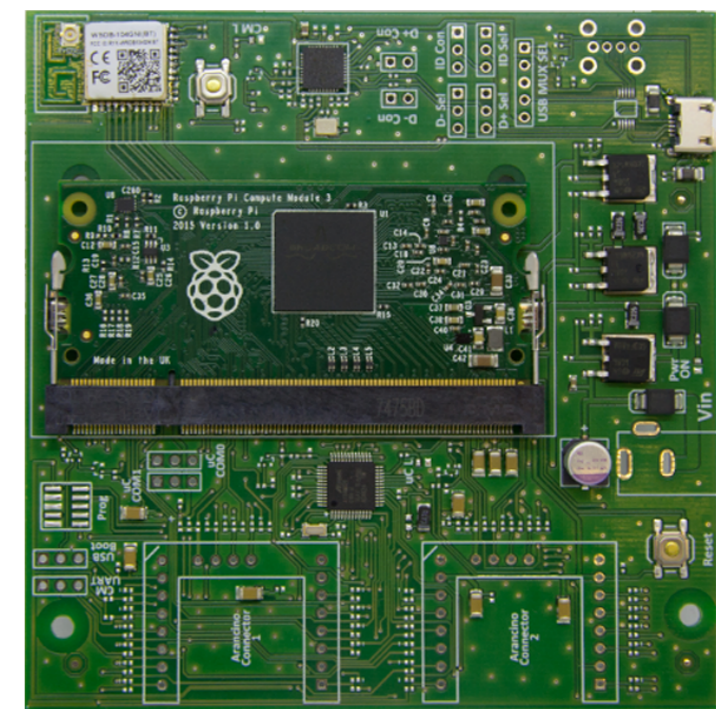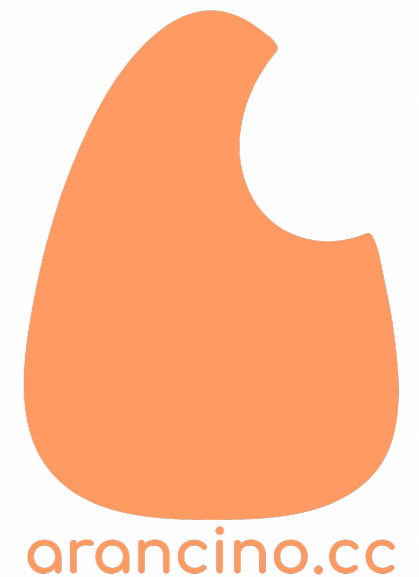 - Noise
  - Temperature
  - Oil

- Long-short term memories

  - Recurrent Neural Networks

Estimated RUL

Dense layer

LSTM layer

Extracted features . . .

LSTM layer

Extracted features . . .

LSTM layer

. . .

Temporal data from sensors

Arancino

- Embedded system for Mobile Edge Computing

- Real time + Embedded Linux

- Raspberry Pi 3 Compute Module, Broadcom BCM2837 1.2 GHz, 1 GB RAM LPDDR2, 4 GB eMMC

- Atmel SAM D21, ARM Cortex-M0+, 256KB Flash, 32KB SRAM, 48 MHz

- Wi-Fi + Bluetooth

arancino.cc

THANK YOU!

Dario Bruneo

Department of Engineering
University of Messina (Italy)

dbruneo@unime.it

dariobruneo

http://mdslab.unime.it

http://orcid.org/0000-0002-6080-9077