

Embedded Development

iTEC 2018

This year's topic is to explore neural networks in an embedded setting. People are wary of what the future artificial intelligence might have in store for humanity, we believe the technology has the potential to be used for good or ill, and we challenge you to find interesting use cases which will benefit humanity. You will have to build a robot that is capable of "seeing" and interacting with the world around it, making full use of the Intel Movidius Neural Compute Stick (NCS)'s features.

For the duration of the contest you'll each have access to the following HW kits:

- Robot car kit (wheels, chassis, motors, drivers, batteries)
- Raspberry Pi
- Raspberry Pi Camera kit
- Intel Movidius Neural Compute Stick (NCS)
- Power bank
- Misc cables and wires

The parts listed above should be sufficient to get a fully functional, "seeing" robot. At the end of the competition, all provided parts must be returned to the organizers.

The following steps are pretty much what you have to:

- Assemble your robot.
- Connect to it via SSH/MobaXterm.
- Get your motor drivers running. Give your robot a spin.
- Install the camera and take a picture of yourself, without electrostatically discharging into it.
- You should already have OpenCV, Intel Movidius NCSDK and other useful packages already installed on the Raspberry Pi. You'll need Ubuntu 16.04 on your laptop/virtual machine to be able to install Intel Movidius NCSDK.
- Familiarize yourself with:
 - https://movidius.github.io/ncsdk/vm_config.html
 - <https://movidius.github.io/blog/mvNCCheck/>
 - <https://github.com/movidius/ncsdk>
 - <https://github.com/movidius/ncappzoo>
 - https://movidius.github.io/ncsdk/ncapi/ncapi2/py_api/readme.html
 - https://movidius.github.io/ncsdk/ncapi/ncapi2/c_api/readme.html
- Run the MobileNets example which should already be installed, it will take a picture and draw bounding boxes around 20 classes of objects from the Pascal VOC dataset.
- Be as creative as possible with your usage of the Intel Movidius NCS on the robot.

What your robot has to actually do is up to you, however we encourage you to come up with creative ways to use the Intel Movidius NCS. Some examples could be:

- Have the robot move around between objects and stop at one type of object.
- Have it follow a person, but not follow strangers.
- Have it drive on a road and not veer off course.

Guidelines, rules and hints:

- You may use any neural networks that you can get access to and run on the Intel Movidius NCS. There are no restrictions regarding this.
- You may add, modify or not use any components or use any parts that you have brought yourselves, if you believe this will help you get better results.
- Compute only on the embedded platforms you were given (Raspberry Pi & Intel Movidius NCS).
- Highlight the Intel Movidius NCS and it's potential, try to focus your project around it.
- No cloud computing.
- Try to use as much of your own code as possible. If you do use external source code, make sure you understand it first, and can prove this to the jury if questioned.
- You will be judged based on the level of completeness of your project, the technical depth, quality and understanding of your implementation, the creative usage of the Intel Movidius NCS, as well as the "coolness" of your robot and presentation.
- Your progress will be recorded during the competition, and points will be partially awarded at these moments as well.
- There are no spare parts available. If you break anything critical, there's a very high chance you're out of the competition.
- Play fair. Any unsportsmanlike behavior will be penalized.
- Have fun. You will spend almost 2 days working on your project. Might as well enjoy it.

Good luck!