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ADVANCED TECHNOLOGIES.
**LIKE EARS, EYES,
VOICE AND A BRAIN.**

Are you looking for a New Mission?

Your mission is to gain practical experience while working on your diploma thesis? We are happy to support you with our know-how and experience while working on different projects.

Mission Embedded develops and supplies high-reliability embedded systems for professional applications in safety-critical environments such as:

transportation, industry, air traffic management and medical technology.

Together with the *Christian Doppler Laboratory Embedded Machine Learning* at Vienna University of Technology, we offer a research opportunity for the following Master thesis topic. We are also open for cooperation with other universities and institutes.

MACHINE LEARNING ON EMBEDDED SYSTEMS:

OPTIMIZING OF SIAMESE OBJECT TRACKING NETWORKS

The Christian Doppler Laboratory Embedded Machine Learning does research on Deep Neural Networks (DNN) in resource constrained embedded devices. It studies how energy consumption and resource usage can be minimized while keeping high accuracy. The solution space is characterized by architecture parameters, DNN optimization and transformations, implementation platform configurations, and mapping options. This design space is huge, poorly understood, and it is rapidly evolving.

One-shot learning is a method in the field of machine learning where certain properties about a category of objects are learned using a single sample.

This type of machine learning method makes it possible to solve special tasks in the field of computer vision. An example of this is the task of visual object tracking, where massive improvements have been achieved in recent years with the help of siamese networks. These networks achieve first-class results, but due to their complexity they are only suitable for real-time applications to a limited extent. The objective of this thesis project is to use

a state-of-the-art siamese object tracking network, optimize it for a specific target platform and analyse the impact of different optimization strategies on this special type of CNN. This thesis project consists of the following steps:

- Select one of the state-of-the-art Siamese object tracking network, e.g. SiamRPN++
- Select at least two common CNN optimization methods and/or frameworks (e.g. pruning, quantization, shunt-connections etc.) and implement them for the target network architecture
- Benchmark the optimization techniques
- Analyze their impact on the network architecture

This thesis offers you an excellent opportunity to get into the hot topic of deep learning.

It allows you to become an expert in configuring neural networks. Moreover, you acquire critical skills in using neural networks in embedded systems and resource constraints.

Some of the M.Sc. projects may be combined with a part time position.

Are you ready for your New Mission?
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