Human pose estimation and activity recognition using thermopile sensor array

Master Thesis

May 13, 2025

In the project SensIR our research group is aimed at developing a Transformer-based deep learning model for human pose estimation, activity recognition and fall detection for the application of indoor monitoring with a thermopile sensor array. The sensor specifications are available here: https://www.heimannsensor.com/60x40-array

In this project, two of such sensors are connected to an edge device that is equipped with additional deep learning hardware (FPGA acceleration device). The developed deep learning model should run on this hardware at >20 fps.

The student's work could contain some or all of the following steps:

- Literature research on state-of-the-art deep learning methods for pose estimation and activity recognition, as well as specific implementations for edge device or embedded hardware
- Participating in data acquisition with the said device
- Defining a suitable network or networks and train the network with synthetic data
- Evaluation of the trained model on real-world data
- Compare the model with sota methods
- Optimize the model for the FPGA

Requirements:

- Good understanding of computer vision
- Preferably good results in Computer Vision 1 or Image Processing and Pattern Recognition
- At least basic understanding of deep learning
- Good programming skills in python and/or C/C++

Contact information:

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