Zurich University
of Applied Sciences

School of
Engineering

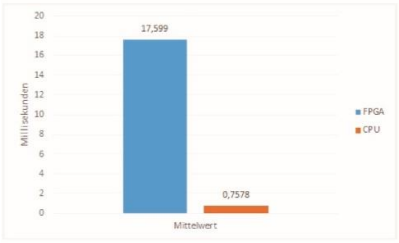
InES Institute of
Embedded Systems

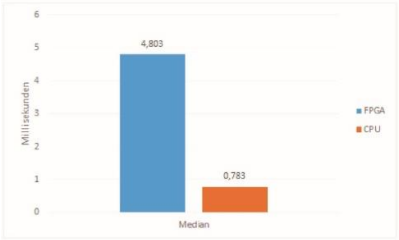
Inverse Kinematics Implementation in an FPGA

This thesis contributes to a project in which Trinity College in Dublin and the Institute for Embedded Systems in Winterthur collaborate. Trinity College is working on a service robot to help disabled and elderly people in their every day life. It is currently being evaluated, what kind of platform is best suited to control such a system. In this context, the Institute of Embedded Systems evaluates the performance of FPGAs.
The main question of this thesis is: How well does a forward-kinematics algorithm perform on an FPGA, compared to a CPU? This thesis deals with the topics: What is an FPGA, benchmark methodologies of CPU, GPU and FPGA, the implementation and execution on a FPGA. The results show that a CPU outperforms an FPGA in terms of the forwardkinematics algorithm. Generally, the conclusion is that a CPU outperforms an FPGA when it comes to sine and cosine functions.

Diplomand
David Marsden

Dozent
Hans Doran





The mean value and median of the test series of execution time of an forward kinematics algorithm on an FPGA and a CPU