Zurich University
of Applied Sciences

School of
Engineering

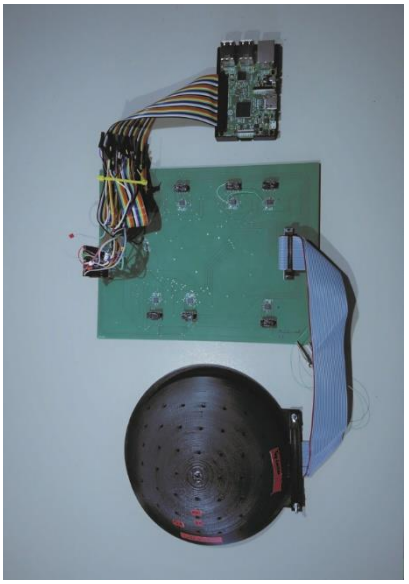
InES Institute of
Embedded Systems

FlyEye for 3d movement estimation

Diplomierende
James Kiwic
Stefan Küenzi

Dozent
Hans Doran

This bachelor thesis covers the topic of bioinspired vision systems using non-conventional algorithms and imagers inspired by the common fruit fly (Drosophila melanogaster) to detect dangerous movements, in respect to an industrial robot. The problem of having industrial robots and humans working in one another's vicinity has not yet been solved to a satisfactory level. Up until now, if robots and humans share a working area, the robot is either restricted to move at a fraction of the speed it could or it needs to be equipped with expensive sensory equipment such as highly sensitive torque sensors or vision systems which are very expensive and require a lot of computational power. There have been a number of developments in this field, but mostly they covered the topic of emulating an eye, as anatomically correct as possible. Whereas this feasibility study covered the topic of abstracting the anatomy and building a prototype which uses rather simple components to take an image. Then using a low-power algorithm to determine if movements have occurred within the field of view of the sensor. The result of this study is an exceptionally simple algorithm which can safely register all the potentially dangerous movements. As well as a functioning, reliable and robust device, with all the processing levels which are found inside a real fly eye, with which the algorithm can be tested. This prototype is the first step towards a simple and effective way of combining human- and robotic-workforces in an economical and safe fashion.



The finished prototype used to successfully prove the concept of imaging and motion detection building on the anatomy and inner workings of a compound eye.