

# Human Motion Recognition and Analysis using 6D Tags

Degree programme: BSc in Micro- and Medical Technology | Specialisation: Robotics

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External project partner: ProcSim Consulting Sàrl, Lausanne

**Excessive physical strain is one of the most common causes of musculo-skeletal disorders. The goal of this work is to detect human motion during manual assembly tasks with low-cost 6D tags from CSEM.**

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## Motivation

ProcSim Consulting is active in the area of logistics flows, manual production ergonomics analysis and optimization. Traditionally, the evaluation has been done using human observers that rate the quality of the workplace and recommend improvements to the workers posture and motions. ProcSim is currently evaluating sensor systems to replace the human observers. This allows to have an objective evaluation over longer periods of time.

As part of the research of the BFH roboticsLab, we are interested in understanding manual production motions in order to establish a baseline for robotic collaborative or standalone solutions for industry 4.0.



Operator with mounted and analysed tags in a sitting work position.

## Goals

In this project, 6D tags are used to detect human motion during manual assembly tasks. The analysis concentrate on arm motions and arm joint angles. In a first step, the 6D tag system is commissioned. An existing concept to attach the 6D tags to the body in a reliable, quick and comfortable way is refined. A concept to quickly calibrate the tags locations on the body is developed. The capabilities and limitations of the system are determined.

## Approach

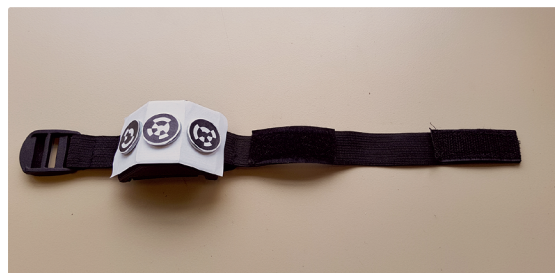
CSEM SA has developed 6D tags that can be attached to the body of the worker and tracked with cameras using machine vision. The 6D tags are a good candidate for ProcSim and the roboticsLab to detect human motions. The direction of the rotation on the horizontal plane is solved using 3 tags per attachment. The system is programmed in C# .NET.



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Concept of attachment to the human body and structural solution for the detection of the rotation direction.