

# 3D sensor network for accurate sign language recording in space and time

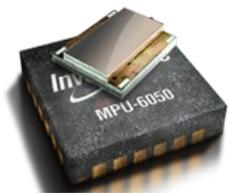
*Capstone project*

## General description

Capstone project is a process type study course during which multidisciplinary group of students aims to solve a real-life problem from industry or academia. The Capstone project in question gives students an opportunity to combine knowledge of electronic engineering and manufacture, with 3D manipulation algorithm design, to produce a high-accuracy wearable 3D sensor network, with initial application in academic research. The project in question begins 15th of October 2012 with a joint project group meeting.

## Objective

The overall objective of the project is to design and build a *wearable 3D sensor network* that allows precise recording of the position of both arms and hands, including each finger separately, as well as the upper body. This sensor network will be used in a project within the language technology group at the Department of IT, for accurate recording of human sign language in 3D space and time.



The network will be built using a number of interconnected 6DOF (3D accelerometer combined with 3D gyroscope) MPU-6050 sensors, placed at strategic locations: fingertips, back of hand, arms, chest, forehead... Data from the sensors will be gathered over serial line and software post-processed, to aggregate the raw readings of the sensors and translate them into position in time and space.

The project will face a number of challenges: design and manufacture of the data gathering circuitry with the tiny footprint of the MPU-6050 sensor, dealing with signal noise and sensor drift, aggregating the readings and mapping them into a realistic 3D position data,...

## Future prospects

The successful completion of the project will lead to a device and algorithms for highly accurate measurement of hand and upper body position. Apart from the initial application in sign language research, the network can be used in any other application which can benefit from such a possibility: game control, instant-feedback sports training (here is a possibility to collaborate with an existing project for swimmer training), animation,...

## Participation

The project will combine students with interests in electronic circuit design and manufacture, microcontroller programming, 3D manipulation algorithms, signal processing, 3D graphics and games, ...and any other interest from which the project might benefit.

Steps to participate:

1. An info meeting for students interested in getting to know more about the project will be arranged on Monday 1.10.2012, at 16.00 in room B2039. Attend if you can.
2. Send an initial brief application describing your experience and interests to Filip Ginter (ginter@cs.utu.fi) **no later than October 4, 2012.**
3. Prospective students will be interviewed in mid October, and the project will be officially launched with a group meeting.

Depending on the level of your participation, you will receive 10-15 credit points. Our objective is to complete the project by the end of the academic year 2012-2013.