Tobii Research

# Research Question for the Internship:

## Thesis projects: Blink detection algorithm, Gaze pattern analysis

Tobii Pro supplies eye tracking-based solutions for testing and analysis purposes. Tobii’s solutions are used to develop and enhance product design and interface by giants like Google, Microsoft, Unilever and Sony. Eye tracking is also used by researchers in a variety of academic disciplines. If you want to work with innovative, market-leading products, we may have just the job for you!

We are looking for two skilled students for two different thesis topics:

**Developing an algorithm for blink detecion in eye tracking data**

Eye tracking data has the potential of telling us everything about our eye movements and where we look, our gaze point. Usually, event detection algorithms are focused on discerning if the gaze was still (fixation) or was moving (saccade). However, blinks are an important and common event that are not usually detected by these algorithms. We would like to develop an automatic algorithm that is able to detect blinks based on eye tracking data. To do this, we would like you to conduct an exciting thesis project for us where eye tracking data is collected together with EEG data and high speed camera recordings to determine how eye blinks are recorded in the three different systems. The eye tracking data will be used to develop a blink detection algorithm and the EEG data and high speed camera recordings will be used to evaluate the quality of the blink algorithm proposed.

**Gaze pattern analysis for detecting information processing**

When we take in and process large amounts of visual data, for example information on rich web pages, our eyes tends to move in certain patterns. The fluency that a web site visitor experiences can be studied by using objective measures (such as processing speed and accuracy) as well as subjective self-report measures of effort. Complementing these measures, we are exploring the use of eye tracking as an objective implicit measure of measuring/detecting the experienced fluency during information processing. Eye tracking allows researchers to identify different eye movements and information processing patterns. In this thesis project we would like to study whether eye tracking can capture differences in strategies used to process information while experiencing fluency or disfluency on web sites. To do this we would like you to conduct a thesis project for us where eye tracking data recorded from users interacting with different web pages is used to define, test and evaluate several algorithms for detecting different eye movement patterns when users experience fluency and disfluency while interacting with web pages.

**What we are looking for?**

For these two projects we are looking for two highly motivated students (preferably MA level) with good signal processing and programming skills (Matlab, Python or similar). You should be able to complete the project preferably during the first half of 2015.

**How to apply?**

Please apply by submitting your CV and a short cover letter in English explaining your background and skills relevant to the project you are interested in.

Dr Gustaf: Eye Movements and Perception

1. Computational linguist , phd : to evaluate readability on mobile devices
2. Is eye a mirror of the soul? but it is definitely a mirror of the brain.
3. The front of the eye develops from the skin whereas back of the eye develops from the brain.
4. Processing visual stimuli takes a lot of the brain activity.
5. Camera Obscura: back side of the box , reversed image of the object.
6. Camera homosapiens: same but complex.
7. Eye socket: made up of seven bones and is shaped like pyramid with inward directed.
8. Eye size: ping pong ball, 24mm diameter, and fills 25% of the orbita.
9. The rest is occupied by fat, muscles, tendons, nerves, blood vessels, and tear ways.
10. Eye muscles: four straight muscles and two oblique muscles.
11. Upper, lower, external and internal and one additional straight lid for upper eye lid
12. Eye balls: fairly dense ball with walls made up of multiple layers.
13. The sclera encircles the eye and outmost it consists of conjunctiva, a muscle tissue inside the eye lid
14. Optic nerve: back, transparent cornea:front (no blood vessels)
15. Cornea: transition from air to liquid that breaks the light most. 2/3 of eye’s refractive power occurs in this transition.