

Assessment of a natural interaction platform for people with speech impairment

The Microsoft Language Development Center (MLDC) was founded in 2005. The unique characteristic is its long-term plan to bring key language component product development to Europe. MLDC acts as an expansion branch of the Redmond-based product development group (under the Unified Communications' Group), responsible for speech in Microsoft and benefits from the experience, technological background and support of this group. The long term mission of MLDC is to perform local language development in Europe and other regions, starting with the Portuguese (and its variants such as the Brazilian Portuguese), for a range of Microsoft products and platforms.

Microsoft and IRIS

In this joint research project we had several Universities and Microsoft Portugal working together. MSFT contributes with its ample experience in speech, silent speech, natural language interaction and computer vision techniques, adding to its overall goal of stimulating industry through co-operations with academia and its citizenship initiatives.

The overall goal of IRIS is to provide a natural interaction communication platform accessible and adapted for all users, particularly for people with speech impairments and elderly in indoor scenarios. Human-Computer interaction with this platform will adopt the principles of universal design and natural user interfaces such as speech, silent speech, gestures, tactile and haptic devices,

pictograms, animated characters and personalized synthetic voices. The platform will provide a set of services that allow easy access to social networks, friends and remote family members, fighting social-exclusion of people with special needs or impairments. Application of these features will be performed in the context of serious games, virtual reality environments and assisted living scenarios.

In the context of IRIS, several experiments were made in collaboration with the Digital Living Spaces group of ISTAR-IUL which addressed the architectural design of environments for human use and exploration, as well as, interactive applications and systems. The most relevant experiment for this case study was about audiovisual space perception where the goal was to analyze the effects of environmental variables, such as sound, on users' space perception by looking at their movement, gaze behavior, physiological arousal and emotional response.

PROBLEM DEFINITION

One of the challenges was to collect as much physiological measures as possible in indoor and outdoor environments. For that purpose, we devised a setup composed by several physiological sensors (e.g. EDA, ECG), an eye tracker (which already included an RGB camera), and a GPS. The most challenging task was designing the outdoor setup. We expected some interruptions,

triggered by the connectivity or overheating issues.

WHY ERGONEERS?

Our decision in working with Ergoneers GmbH and in particular the **Dikablis Eye Tracker** device was influenced by the portability and stability of the system. These characteristics have been essential for our outdoors experimental conditions. We estimated technical problems during our experiment, so it was important for us to be sure, the vendor is in standby mode and reachable in case we need help and support.

RESULT

The exploratory research presented in this article, is based on an experiment which aimed at studying the influence of architecture elements and environmental variables in human motion behavior. We had hypothesized that landmarks were relevant in shaping the human motion behavior and their presence can be objectively assessed by using both kinematic data acquired from GPS and eye gaze information, namely the number of fixations and saccades, computed from captured eye-tracking data recorded with the Dikablis Professional Eye Tracker and the software solution platform D-Lab. To verify this hypothesis, objective and subjective assessments were conducted in an experimental setting. Eye-tracking data collection enabled us to assess the relevance of the presence of landmarks within the overall system and supported the calculation of gaze data (number of fixations and saccades that concur on a given landmark). The comparative analysis between integration value and gaze data, considered the landmarks whose integration values were the highest, gave an indication that those values are somewhat correlated and that landmarks with higher integration values showed also a higher number of fixations

and saccades. Future work involves the extension of eye-tracking data analysis during the complete path of each participant, so that we will be able to compare integration and gaze data for other landmarks, which were not considered in the current study.

[“The Dikablis Eye tracker has opened the door to novel experiments involving movement of the participants.”, says João Freitas, MSFT Team. “Getting precise Eye Tracking data was one of the main task for us in this research.”](#)

ABOUT ERGONEERS

Ergoneers GmbH was founded in 2005 as a spin-off from the faculty of Ergonomics at the Technical University of Munich. Today the company has a worldwide presence through three main offices in Manching (Germany), Geretsried (Germany) and Portland (USA) and through global sales partners; serving the Transportation / Automotive, Market Research & Usability, Science and Sports / Biomechanics application areas.

In addition to development, manufacturing and distribution of measurement & analysis systems for behavioral research and optimization of human-machine-interaction, Ergoneers also offers comprehensive expertise in each phase of your study.

The product portfolio primarily comprises of the 360-degree solution - D-Lab; an extensive software platform for capturing and analyzing human behavior. With its different software modules you can synchronously measure and analyze eye tracking, data stream, video, audio, physiological and CAN-Bus data. With the Dikablis Eye-Tracking system, Ergoneers provides the best hardware for professional Eye Tracking studies in real or virtual environments.