

Network Institute Tech Labs

Newsletter Summer 2015

Time for an update from the Network Institute Tech Labs. In this newsletter some new and exciting projects as well as some familiar projects that are still running. Of course our new equipment will get some attention too.

As always, please do not hesitate to make suggestions for the next Newsletter, to ask for advise or help. The Tech Labs are there to help you do you work using modern technology. We have yet to let down anyone asking for our help! If you need to get in contact with the Tech Labs, please email Marco Otte (m.otte@vu.nl) or look at the Network Institute website: www.networkinstitute.org.

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Research

EvoSphere – Evolving real robots

This project explores the feasibility of evolving robots, which function under control of an internal code (“DNA”), in real time and real space, based on 3D printing technology. The interdisciplinary and interfaculty research facility is called: EvoSphere. The EvoSphere will be a sophisticated research facility for a great variety of disciplines, including Computer Science, Biology, Sociology, Law, and more.

At the moment the first modular robot is waiting to see first light by printing its components, installing its engines and uploading its AI core. The Tech Labs use the 3D printers available there to 3D print the different modules of the robots in plastic. These modules can be linked together to form the robots that will interact with each other in the EvoSphere. Genetic mutations in the physical elements of the robots will be achieved by adjusting the existing modules and printing these to form the next generation robots.

At the moment the Tech Labs are fine-tuning the current LeapFrog Creatr HS 3D printer and another 3D printer (Felix) is on its way.

Reseachers: Guszti Eiben, Berend Weel, Jaap Heringa, Marco Otte



Upside-down Virtual Reality

To gain deeper insight into how realism and presence is felt inside a virtual environment, the Tech Labs created a modern house nicely furnished with what you would expect in a standard family home. This was done using the Unity Pro development engine and the Oculus Rift DK2. The house had three floors and for this experiment only the ground floor, with the kitchen, dining area and living room, and the master bedroom on the first floor were accessible. The participant started in the hallway at the front door with the assignment to find a specific object downstairs. After finding the object and picking it up the participant was told to go to the master bedroom and drop the object there. When entering the master bedroom the scene was not what you would expect. All the furniture was placed on the ceiling as if the entire room was flipped upside-down. To make matters even less realistic the furniture moved down-and-up slowly.

The reason for having the furniture move was that due to the somewhat limited field-of-view of the head mounted display and the limited resolution, a participant entering a bedroom that was only flipped would be much harder to see and interpret, missing crucial visual information that would be present in real life. Adding motion to the scene drew attention and amplified the unrealistic features of the room.

Each trial was recorded and played back to the participant during which he had to indicate, using special software, his level of presence. For a more objective measure the participant's heartrate was also recorded using the BioSignalsPLUX system available in the Tech Labs.

Reseachers: Paula den Ouden, Allison Eden



Virtual violence against avatars

In this study the hypothesis is that it will take people longer, have more guilt and distress when committing a violent act against women or children than against men. By using a virtual environment with one or several variations of avatars and measuring presence, the realism of the avatar (human essence), guilt, distress and empathy together with time to hit and possibly leaving the scene the project will be able to test this hypothesis.

The Tech Labs is currently creating a virtual environment in Unity Pro (v5) that will consist of a small neighbourhood with a café. Inside the café several patrons will be present "doing they thing", at the bar there will be one female avatar with whom the participant will be able to interact. The avatar

will express full body animations both ready-made and custom-made ones and the avatar will have facial expressions and lip sync. The facial expressions will be generated using facial motion capture software (FaceShift) so the avatar will have optimal realistic expressions. The avatar will talk to the participant after which the participant will have to react by choosing from several options in a menu, including hitting the avatar. This interaction can consist of several steps before the scenario ends.

Researchers: Tilo Hartmann



Virtual Burglary – an update

The virtual reality burglary project has been running for well over a year now. Already two experiments were run with the environment and more are to come. The virtual environment itself is constantly being upgraded. At the moment five houses are accessible to burgle, the neighborhood is finished and many changes have been made to details and the scripts that run the entire simulation. To gain a jump in realism the Tech Labs called in the help of Bruno de Vos (designer) to help with advanced lighting (lightmaps) and adding more scenery objects.

During this summer Claire Nee (University of Portsmouth) will be running the simulation in several British prisons using convicted burglars and non-burglars to gather data about how professionals would select and gain access to a house and how they would proceed with the burglary. She not be using the Oculus Rift due to practical reasons, although the simulation is easily converted to a Rift enabled version.

Already the press are interested in the study, as Claire Nee was interviewed by the BBC (<http://www.bbc.com/future/story/20150618-the-strange-expertise-of-burglars>).

Researchers: Jean-Louis van Gelder (NSCR), Claire Nee (Uni Portsmouth), Marco Otte



Quick News

Update: News Tracker

The News Tracker project tries to gain insight in the on-line news reading behavior of people by tracking their Internet activity from any location they use. Data is gathered only for a specified large list of websites that feature some form of news. For the past several months the News Tracker setup has been used for its first large data gathering sessions, using dozens of users. This has generated over 3GB of raw data coming from the proxy server that is running in the Tech Labs and used to register the users on-line actions. The software created by the Tech Labs to clean up these files and retrieve the actual content of the news pages visited, reduced this total to only 13MB plus images belonging to the news items. This condensed version of the logs files will enable the researchers to gain the insight they want.

In a next News Letter we will report some of the first findings using the News Tracker software.

Researchers: Irene Costera Meijer, Martijn Kleppe, Tim Groot-Kormelink

Update: Selecma – Meet Alice the social healthcare robot

The Alice social robot, part of the Selemca project, has had quite some attention in the media over the past months. About a year-and-a-half ago Sander Burger (director of documentaries) wanted to do a documentary about Alice. Showing how the elderly interact with a social robot. After many hours of shooting the documentary “I am Alice” was made. It premiered at the Rotterdam International Film Festival and won the Eureka prize from NWO and KNAW for best scientific outreach effort. The documentary was aired on national TV on July 6, 2015 (NPO2).

Researchers: Johan Hoorn, Elly Konijn, Marloes Spekman, Margo van Kemenade, Wang Long Li, Robert Pauwe

New: Green Lab – Making servers eco-friendly

Nowadays, IT is responsible for roughly 4-5% of the total CO₂ emissions worldwide, which is comparable to the environmental impact of civil aviation. Most of these emissions are caused by datacenters, large-scale computing facilities which demand an impressive amount of power. Although hardware technologies have significantly improved their energy efficiency, this improvement is neglected by the inefficiency of software applications.

For this reason, we launched the Green Lab initiative as part of the master program of Software Engineering and Green IT of the VU University Amsterdam. The Green Lab is a master course, but also a physical lab located in the Medialab of the Network Institute, where students and researchers perform experiments on the impact of software applications on energy consumption. The lab is equipped with servers instrumented with state-of-the-Art power monitoring devices. By collecting and analysing data on energy consumption and software behaviour, we discover patterns and relationships on software and energy. Such knowledge is then translated into best practices and guidelines to design and develop energy-efficient software. The case studies we conduct in the lab are based on real-world software applications provided by our industrial partners.

Researchers: Giuseppe Procaccianti, Patricia Lago

New equipment in the Tech Labs

Although some Kickstarter projects have not yet delivered, the Tech Labs have purchased some new equipment over the past several months. The list below will give you an idea of what's hot and new!

EPOC+ - Reading the brain

The EPOC+ is a brain computer interface that offers 14 EEG channels in a easy to wear headset. Data transmission is wireless for optimal freedom of movement. The SDK offers researchers many different ways of accessing the data for their research.



Pupil – Wearable eye tracker

The Pupil headset offers single eye, eye tracking super imposed on a live video feed. This way recorded video, and gaze direction data, can show where a user is watching. This means eye tracking studies can be done without the need of a computer screen and participants can walk around freely and perform tasks while the system records what they see and where they're looking at.



Eye Tribe – Wearable eye tracker

Eye Tribe is a small eye tracking device that is usable to study gaze direction. The sensor is small enough to use with laptops, but also with non-computing devices such as printed images or books.



Felix 3.0 – 3D printing that works

The Felix 3.0 dual extruder 3D printer look small and simple but delivers amazing quality without most of the setup and maintenance issues if many other mid-range priced 3D printers.

