



The first part starts with an overview on the different aspects that are needed to hack<sup>1</sup> several game and related controllers. After an introduction into the background and the general principles of hacking we give a crash course into the basic principles of classical sound synthesis and sound design. According to the length of the workshop we will first focus on the techniques of subtractive, FM and modular synthesis. Optionally this can be followed by an elaboration in more advanced sound synthesis techniques such as additive synthesis, granular synthesis and physical modeling. As to the practical implementation and experimentation with these synthesis techniques the students will be taught to work with the open source platform Pure Data. This section on sound synthesis is followed by an overview on the different techniques to hack several controllers and related devices. Hereby we go more in to detail into the required software tools that are needed in different situations. This ends the first part of the workshop.



In the second part of the workshop the students are invited to invent and create their own musical instrument using the techniques which were explained in the first part. To this end the attendants can bring their own controllers and devices that will be hacked and can then be transformed into musical devices. For the practical realization of this second part use will be made of software packages Osculator, TouchOSC, Pure Data. Pure Data is hereby an open source multimedia platform that focused on both sound and image. In this workshop we will focus on the sound engine of Pure Data. As such this will enable the development of synthesizers using various synthesis techniques in a very straightforward way. Touch OSC and Osculator are software programs that are used for hacking Wii controllers, iPhones and Android phones. The data streams that are being read and send to a computer in this way will then be used to control various sound generators and/or synthesizers.

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<sup>1</sup> With hacking we mean the technique by which data originating from any controller such as a game controller or smartphone is being read and send to a central computer unit. The computer unit can hereby be a laptop, desktop or tablet computer.

## References:

- Pure Data:
  - <http://puredata.info/>
  - <http://www.youtube.com/user/cheetomoskeeto>
  - <http://en.flossmanuals.net/pure-data/>
- Osculator:
  - <http://www.osculator.net/>
- Touch OSC:
  - <http://hexler.net/software/touchosc>
- Sound synthesis
  - “The Theory and Technique of Electronic Music”, Miller Puckette (download via <http://hexler.net/software/touchosc>)

## Technical requirements:

- Working space
- Beamer
- The attendants bring their own computer, laptop, headphones and optionally their own game controllers or related devices
- Sound system so that the students can demonstrate their own instruments at the end of the workshop

### About the teacher:



Dr. Valery Vermeulen is electronic musician, music producer, mathematician, new media artist, author and visiting professor at Erasmus University College in Brussels where he teaches on multimedia art and technology. In 2001 he obtained a Phd in pure mathematics at the Ghent University (Belgium) conducting ground breaking research in the field of algebraic group theory. Between 2001 and 2005 Vermeulen worked at the Institute for Psychoacoustics and Electronic Music (IPEM, Ghent University) on a research project focusing on the link between music and emotions. Meanwhile he started writing and recording music in my his own production studio. Since 2003 Vermeulen has been working on various interactive multimedia projects where the man machine interaction plays a central role. Topics in his work cover a broad range of disciplines including creative evolutionary systems, generative art, algorithmic sound and image generation, affective computing, artificial intelligence, econometrics, sound design, data sonification and music production. As examples of his recent projects we can mention *EMO-Synth*, *Krystal Ball* and *Mikromedas*. With the *EMO-Synth* project Vermeulen's work is situated in the area of interactive multimedia systems where automatically generated sound and music systems are directed by the emotional responses of the user (more info at: <http://www.emo-synth.com>). In the *Krystal Ball* project, an interactive multimedia system where the mechanisms that caused the financial credit crisis, stochastic and algorithmic music generation and the work of pioneer I. Xenakis play a central role. With his most recent project entitled *Mikromedas* (more info at <http://www.mikromedas.net>) focus is set on the innovative uses of data from space and deep space as new tools form music composition and performance. Vermeulen's installations and performances have been widely shown in Belgium as well as abroad. Locations and venues of where his work was shown include Slingshot Festival (Atlanta, US), TES (Wychwood Theatre, Toronto, CA), IMT (Institute for Advanced Studies, Lucca, IT), Technical Museum Zagreb (Zagreb, HR), BEAF (BOZAR Electronic Arts

Festival, Brussels, BE), DEAF Festival (Dutch Electronic Art Festival, Rotterdam, NL), GOGBOT Festival (Enschede, NL), W139 (Amsterdam, NL), TEDxFlanders (TEDx, Antwerp, BE), Agora Collective (Berlin, DE), Liebig 12 Gallery (Berlijn, DE), Korrekt Gelände (Frankfurt, DE), GRETA Gallery (Zagreb, HR), MHKA (Museum of Contemporary Art Antwerp, BE), MHKA Media (Museum of Contemporary Art Antwerp, BE), Musical Instruments Museum (MIM, Brussels, BE), Atomium (Brussels, BE), Beursschouwburg (Brussels, BE), Z33 (Hasselt, BE), STUK (Leuven, BE), Vooruit (Ghent, BE), Tour & Taxis (Brussel, BE), Happy New Ears Festival (Coutray, BE), artcinema OFFoff (Ghent, BE), Art Gent (Ghent, BE), Pecha Kucha (Ghent & Brussels, BE), DORKBOT (Ghent, BE), Royal Conservatory of Ghent (Ghent, BE), KASK Cinema (Ghent, BE), Gallery Tatjana Pieters (Gent, BE), on national radio channels KLARA, Radio1, Radio2 and Studio Brussels and national television channels Ketnet and TV Brussels. Besides his artistic and educational activities Vermeulen currently also works as a statistical expert and consultant and recently finished his studies as music producer at the Royal Conservatory of Ghent.

More info at <http://www.valeryvermeulen.net/>

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