

# The Mutantrumpet

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## ABSTRACT

Ben Neill will demonstrate the *mutantrumpet*, a hybrid electro-acoustic instrument. The capabilities of the *mutantrumpet* are designed to erase the boundaries between acoustic and electronic musical creation and performance. It is both an expanded acoustic instrument and an electronic controller capable of interacting with audio and video simultaneously. The demonstration will explore the multi-faceted possibilities that are offered by the *mutantrumpet* in several brief, wide ranging musical examples composed and improvised by Neill. Interactive video performance techniques and collaborations will be integrated into the excerpts. The aesthetics of live intermedia performance will be discussed along with a technical overview of the interface and associated software applications Junxion and RoSa from STEIM, Amsterdam. Reflections on the development of a virtuosic performance technique with a hybrid instrument and influences from collaborators Robert Moog, David Behrman, Ralph Abraham, DJ Spooky and others will be included in the presentation.

## Author Keywords

NIME, mutantrumpet, augmented instrument, hyper-instrument

## ACM Classification

H.5.2 [User Interfaces] Ergonomics, interaction styles, theory and methods, H.5.5 [Information Interfaces and Presentation] Sound and Music Computing.

## 1. INTRODUCTION AND HISTORY

The mutantrumpet is a hybrid electro-acoustic instrument that has seen 30 years of development and a wide range of musical applications. It was originally designed as an expanded acoustic instrument combining three trumpets and a trombone with analog electronics built for Neill by Robert Moog. In 1992, while in residency at STEIM (Studio for Electro-Instrumental Music) in Amsterdam, Neill made the mutantrumpet fully computer interactive. In 2008 he created a new version of his instrument during another residency at STEIM, and has continued its development there during residencies in 2014 and 2016.

## 2. CURRENT TECHNOLOGIES

The current mutantrumpet has two normal B flat trumpet bells, two sets of valves, and one piccolo trumpet bell that is attached to a trombone slide, making glissandi possible. The extra set of valves controls switching between the three bells, and different mutes are used to give each bell a distinctive timbral quality. Half valving makes timbral shifts reminiscent of electronic filtering possible, and a quartertone valve enables microtonal performance. The acoustic trumpet sound is converted to MIDI

data via a pickup in the mouthpiece connected to a pitch to MIDI converter that generates note, controllers in the form of potentiometers and a fader. On top of the instrument, right next to the second set of valves, are two joysticks with X/Y axis controls. Another potentiometer is mounted on the first valve slide, located on the other side of the velocity, volume and aftertouch information. The current mutantrumpet incorporates a STEIM Junxion board, mounted under a plate of clear Lexan plastic. There are eight momentary switches on the Lexan panel, as well as four continuous MIDI instrument body. STEIM's Junxion software maps the controllers on the board to a variety of routings. Many different configurations can be created in Junxion, including tables which shape the response curves of the controllers. A clip-on microphone is attached to the bottom bell, making the acoustic sounds of the instrument available for processing. All MIDI notes are generated by the mouthpiece pickup, which helps to minimize feedback or glitching of the Pitch to MIDI device. Software applications frequently used include Junxion, LiSaXC (the STEIM live sampling program), Ableton Live, Jack Router, and numerous audio plugins. Resolume is used for the live video interaction.

As Neill performs, the acoustic sounds of the mutantrumpet are sampled in real time using LiSa XC or RoSa. The sampling process is triggered by switches on the instrument. One switch initiates replacing the sample buffer, another overdubs the sound to the existing recorded audio. The samples are then played back either through Neill's played MIDI notes or by Ableton Live, whose MIDI sequences can control the playback of LiSa XC and RoSa. Neill modifies the samples in real time as they are played back using the instrument's continuous MIDI/OSC controllers. Parameters that are modulated include filtering, length and start points of the samples, granular synthesis, duration, pitch, and dynamics. The output of LiSa XC or Rosa is connected to an audio track in Ableton Live through Jack Router, making the live sampled sounds available for further processing using plugins in Live. The live sampled sounds are directly connected with the acoustic performance and make up the primary melodic and harmonic structure in the music. The emphasis is on real time transformation of the acoustic sounds into complex sonorities and textures.

The mutantrumpet's controllers are also mapped to video parameters using Resolume, a video performance software application. The choices of mapping create a true synthesis of the two media in performance. For instance, filter frequency is often mapped to the same controller as image brightness or color, creating a perceptible connection between the audio and visual dimensions. The joysticks, which are frequently used for pitch control of live sampling, are mapped to tables that outline the harmonic series; this overtone mapping is also applied to the visual parameters, resulting in audio/visual harmonics and scales similar to those described by John Whitney.[1] The audio of the mutantrumpet, its directly played synthesizers in Live, and its live sampled sounds are all used to animate the visual material. The visual feedback can help the audience to



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perceive the interactivity of the performance. [2] Still images are often used as the basis for the visual presentation; their processing and animation is controlled in real time to maximize the perceptibility of the interactivity and the relationship between sound and image.



Figure 1. The current version of the mutantrumpet

### 3. COMPOSITION, IMPROVISATION AND VIRTUOSITY IN PERFORMANCE WITH NEW INSTRUMENTS

Neill has always conceived the mutantrumpet as a vehicle for his compositional ideas and approaches as opposed to being primarily a design project; the instrument is inseparable from its musical applications. As discussed in a recent *Leonardo* article by Johnston and Ferguson, “We need to consider fully the reciprocal relationship between the new instrument and creative practice, not just how well it supports existing practices, which are implicitly assumed to be static.” [3] Since “real-time operation is in fact better suited to performance and improvisation than to genuine composition,” [4] over time Neill has incorporated more improvisation into his performances. By populating pre-composed rhythmic and harmonic structures with spontaneous musical material played acoustically, a dialogue is created between the acoustic and electronic elements of each piece. The multi-timbral quality of the mutantrumpet’s acoustic sound adds to the complexity of the sonic exchange. The emergent melodic and harmonic patterns that unfold from the improvisational process often become primary material in the compositions. Jordà [5] and Keith [6] have both discussed the importance of improvisational approaches in performance with new instruments. In his book

*Media Ecologies* Fuller and Melina describe the process of interactive performance with media systems:

“The only way to find things out about what happens when complex objects such as media systems interact is to carry out such interactions – it has to be done live, with no control sample.” [7]

“Multiplicity is induced by two processes: the instantiation of particular compositional elements and the establishment of transversal relations between them. The media ecology is synthesized by the broke-up combination of parts.” [8]

The demonstration will embody these principles and will also include a discussion of virtuosity on a hybrid instrument and issues that arise with new design and implementation.

### References

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Figure 2. Ben Neill performing on the mutantrumpet.