While there exist more tools than ever to aid computer based performance, the nature of performance itself is rarely approached. How can we, through the development of alternative interfaces address these shortcomings?
Abstract:

Given the sophistication and flexibility of available performance software tools, one could assume that performance would benefit. Yet many computer-based solutions, whilst providing many production and playback options, fail to engage. We believe that this problem is inherent in the peripheral interface devices available to performers. The project aims to develop critical aspects of performance and integrate them into modern practice without sacrificing the benefits of computer-based systems.

Situation:

"The laptop itself does not contribute anything by its own, we do not write a Symphony for Dell, perform a Suite for six Vaios or Two Crashes for Power PC, unless we want to be very ironic. What makes it an instrument is the software running on it. And this is where things start to get complicated. The audience looks at a laptop while listening to music. But what exactly creates the music and how the performer interacts with this tool is completely non-transparent. The laptop is not the instrument, the instrument is invisible. And to obscure things even more we have to realise that most of the time there is not one single instrument and it is not "played" by the performer. What really happens and what remains completely undecodeable for the audience is more described as a huge number of instruments played by an invisible band sitting inside the laptop. The only visible part is the performer conducting the work in a way which looks extremely boring in comparison to the amount of physical work carried out by the guy forcing a full blown orchestra of stubborn professional musicians through a symphony. The minimum difference between pianissimo and a wall of noise? One pixel, 0.03mm."


There is little doubt that the availability of portable studio solutions have enabled performers to present studio work outside of the studio. However, as the laptop becomes the standard tool for electronic live performance it seems that our expectations of what such a performance should be have decreased. The cause of this situation is open to debate, although Robert Henke’s article provides a great deal of insight. The inputout project posits that it has much to do with the laptop itself as an interface as well as the tendency of generic interfaces to focus on convenience rather than vitality and dynamism. Further exacerbating things is the tendency of performance software to translate studio recordings to the stage as accurately as possible. In one sense this trend improves the subjective quality of the performed output yet sacrifices chance in favour of safety and reliability. We ask whether the accuracy of a performance is what makes it a successful performance. Is it not as important (we think more) that a performance speak for a unique creative moment or a unique rendition of one such moment? Shouldn’t the possibility of mistakes and happy accidents also be present? In many cases the inquisitive audience member would not be cynical to ask if indeed a performance is taking place. One solution we propose is to develop tools that can work within the available digital environments whilst giving the performer the opportunity to improvise in a more meaningful way. It is not our contention that artists should drop everything, pick up guitars and start a rock band, we feel that some balance must exist and that it is an important balance to seek.
Concept/Approach:

Although the development of performance through the creation of new interface tools involves a large degree of technical exploration, the series should not be seen as a purely technical endeavour. Rather it should be seen as an examination and development of custom tools from the perspective of the performer.

"With painting, Ilpo says, the work is connected intimately with the smell of the materials....Sound, on the other hand, is not a material in the same way, he says, except for the tools with which you make the sounds."

(Ilpo Vaisanen on sound making materials.)

Given many considerations, not the least of which is a fairly limited understanding of electronics and programming, the technical focus of the project is intended to be fairly simple. In the current climate of DIY enthusiasm, home brew tech and accessible knowledge, this seems a reasonable restriction. Furthermore it allows for user modification of the products, something we would encourage. The development tools used are Max/Msp for software programming; Arduino for electronics-computer interfacing and various MIDI equipped synthesizers for sound generation and performance testing.

The series seeks to operate as a reaction and as an alternative to standardized or generic performance tools. One way to approach the problem is to investigate and address the specific needs of individual performers. Another would be to investigate non-traditional methods to input the same musical data (for our purposes, MIDI). Again, the success of this approach is largely dependent on the individual and his or her particular needs.

"An instrument has presence doesn't it? he says. I've got about five guitars and they're totally different. Their presence is completely different. The character's different. Nobody might notice it but I would play differently on each of them."

(Derek Bailey in conversation with David Toop.)

With many classic electronic instruments the aesthetic and ergonomic qualities seem to invite a desire to touch, to play and to perform. The inputout series is aiming for this balance of aesthetics and functionality as opposed to offering a potentially confusing suite of options. By limiting the scope of the individual instruments to relatively simple yet intuitive functions we hope to limit the learning curve and heighten the immediacy of the instrument.
Research and inspiration:

While the inspiration for the project comes largely from perceived shortcomings in computer-based performance, there is a range of positive influences that also inform the direction of the project. The instruments themselves take design cues from guitars, zithers, early analogue sequencing systems and digital logic systems amongst others. Concerning the nature of performance itself, we are looking specifically at the performance of electronic music as an impetus for development. The reasons for this focus are varied but as project leader I have experience in computer-based performance and have felt a distinct lack of inspiring interface solutions, furthermore it seems to be a field considerably affected by the recent shift to portable studio solutions (i.e. the laptop computer). This is by no means exclusive, and as the project moves forward there appear to be more varied applications including video and graphic performance.

The research can be seen as a split between finding solutions to (largely) technical problems, finding inspiration for the instrument designs and examining the needs of performers.

Definitions and discussion:

To clarify several key aspects of the project, it seems proper to define and discuss some of the key aspects being dealt with. With regards to the project, performance means real time "live" improvisation or composition. The specific performance issue that is being addressed is the static tendencies of typical laptop performance.

If we take the definition of an interface as "a point where two systems, subjects, organizations, etc., meet and interact ", it seems fair to treat this as a musical, instrumental meeting. The systems we have on offer lean to generic surfaces as ersatz mixers and parameter adjusters. This in itself is not uninteresting, however, these systems tend to favor stability and control over dynamism and chance, elements that we believe are crucial in live performance.

HyperWerk and PlexWerk:

Within the context of the larger PlexWerk project, the inputout series diverges from some of the more obvious themes. Nevertheless, the project can be seen as a continuation of neo-analog themes brought forward in the earlier Acar2 Hyper-project. In a sense a protraction of legacy ideas into the current arena of focus. In particular, the inputout series seeks to push cultural communications through the development of specialised work tools. These work tools should react against the generic standards that are currently available.
Process:

Following the research phase the path from development to construction was a fairly cyclic process of conception, design, prototyping, testing, redesigning and construction. This same procedure repeated itself for each instrument several times until a usable product emerged or until a concept or prototype became impractical or ineffective, in which case the idea would be discarded or abandoned.

The conception and research phase of the project dealt mostly with examining what tools are available, or not, for performers and what ideas and inspiration we can take from traditional instruments and technologies. This left us with three rough design concepts to work with and prototype, taking design and functionality cues from the electric guitar, the auto-harp, music boxes, and primitive video game controllers. These were the Chord Memory, Unsteady State fm Controller and the Fluid Sequence Controller.

After some informal discussions and brainstorming sessions some vague design plans emerged in December 2008. Together with Gabriel Roth I was able to construct a very rough breadboard prototype of both the chord memory and fluid sequence controller instruments. These physical “sketches” were used to make a live performance video demonstrating some of the aims of the inputout series. This was shown at the Hyperwerk open house in mid January 2009.

Having had a glimpse of the performance possibilities, the next step was to implement these concepts into more sturdy and user-friendly packages. With considerable help from Thomas Brunner we were able to create some custom parts to allow for more efficient mechanical operation (particularly for the unsteady state fm controller). This involved the construction of plastic hinging systems and specialized silicon “buffers”. In keeping with the conventions of DIY electronics these early prototypes were still cobbled together informally, however the instruments themselves were much less fragile and were coherent (electronically) enough to begin work on the software development.
Once the prototypes had reached a functional state we were able to focus our attention to the development of the software with which the instruments were going to communicate. Using the Arduino board and Max/Msp as a communications bridge we could translate the raw electronic data into something more universally applicable.

Over time the software has grown more complex, been trimmed and as it slowly makes the transition from beta state become more subtle and reliable. Within Max/Msp many different permutations of the instrument designs can be tried and tested. We hope to offer as many variations as possible for users to use as templates for their own experimentation and build on the design with continued input from our user-base.

The current focus of the project is on refining the physical design and construction of the instrument series. As the diploma year draws to a close the chord memory instrument is in a state closest to a “finished” product. Both the keyboard and guitar based versions are ready to perform and have already been used extensively in the studio environment.

Promotion and Publicity:
To enhance the public profile of the series we have been collaborating with electronic artists and performers to produce a compilation of recordings that showcase the instruments in action. We are planning to release this through our partners Junkbeats recordings in Australia in digital formats. In addition we hope to solidify our relationship with our user base through a series of educational seminars or workshops that involve the participants in the construction and development process. We feel that this is a mutually beneficial situation in which we can share our products and knowledge and gain useful insight and inspiration for new designs and application.
**Products:**

**Chord Memory**

The underlying concept of this instrument is to create a compact input device for playing chord shapes in an accessible manner. That is, for trained and untrained musicians alike. The basic functions of the CM instrument vaguely echo the chord memory capacities introduced to many keyboards in the 1980’s. Mechanically, much of the inspiration comes from the auto-harp or chorded zither, a stringed instrument whose “keys” would mute all strings excepting those required to play a selected chord. Typically this kind of approach has obvious applications in house and dub music, where the reliance on simple chord textures feature prominently. In designing the functionality of the instrument we attempted to minimize the amount of controls available in order to make the instrument as accessible as possible. As far as sensory input is concerned simple button switching is used for note on-off data and potentiometers for basic tonal control. In addition to this there is a ribbon-controller to determine root pitch.

There are currently two versions, a keyboard module and a guitar module. They operate according to the same principles with a few tactile variations. In both a ribbon controller controls the basic pitch while the keys (or strings on the guitar) correspond to notes (or chords) within the scale set by the ribbon. In use the keyed module lends itself to chord based work while the guitar to soloing.
Unsteady state fm controller:

The unsteady state fm controller is an interface whose approach to sound-design is to create a delicate and unstable moment in time. Rather than focusing on inputting note data we will be assuming that the “played” data will be handled elsewhere, a sequencer most likely. At this point the interface should control various aspects of an fm synthesizer (e.g., frequency modulation, feedback amount, pitch envelope parameters and so on...). A key consideration in the project is that a “neutral”, “steady” or tonally consistent state should be the state of maximum gestural input, therefore allowing constant sonic variation as the gestures relax. FM synthesis has been chosen because of the relatively large sonic change that can occur given little input. The design concept is to make the maximum use of minimum gestural input, a kind of micro-gestural interface. Our focus at this point is to use a set of tension sensors attached to flexible strings. A vague influence here is the harp, although instead of plucking the strings the user applies pressure to the set of strings and changes the timbre by relaxing the pressure. The technical consideration is in constructing an adequate tension interface and then applying multiples of these interfaces into one coherent device. We are investigating a complicated yet primitive system of strings, blocks and springs to create a consistent tension controller. Currently the instrument is housed in a rectangular box inspired by an early video game system.

The Unsteady State fm Controller, seen here without casing.
Fluid sequence control:

In response to the ubiquitous constant clock driving electronic music performance we are designing a simple interface that can be used to fluidly and gesturally control the tempo of sequenced data. The design inspiration comes from two separate technologies. The first influence is the music box, whose simple mechanical interface allows the player to step through a given sequence of notes at a fluid rate. Secondly the Roland SH-101 synthesizer which uses a simple digital sequencer to reproduce sequences, what is special here is that the user triggers each step thus allowing patterned variations on the same set of notes. The FSC aims to marry both of these technologies and expand the possibilities by adding multichannel sequencing, sample triggering and variable sequence offset controls. Initially we had been experimenting with a fairly literal translation of the mechanics of a music box. While we did achieve some success it made more sense, and was electronically simpler to build the concept in the direction of a percussion instrument. This instrument is still in an early stage of development.
Results and reflection:

The inputout series is intended to be an ongoing project. It is a cyclic and recurring process of conception-design-prototyping-testing. It is difficult to evaluate the instruments in a conventional manner, as most of them will always be in a state of mid-development. The criteria used to determine whether any of the series is successful are quite vague and somewhat specific to individual users and the ways in which they use them. What seems to be most important in use is that the instrument be intuitive and offer familiar parameters in an alternative manner to that which is available. Perhaps unsurprisingly, the best results so far have been from the least complicated prototype instruments.

Performance tests have been mostly confined to the studio due to the relatively fragile nature of the prototypes, however the results have been encouraging. Given the focus on alternate usage and improvisation the instruments seem well suited to a more experimental performance approach that favours gestural dynamic and tonal modulation. Although many of the gestures needed to play these instruments are familiar the results often counter expectations. As a response to the initial concept this is not a bad thing. However it does mean that a certain degree of patience or practice is required to make good use of the series, as is certainly the case with any instrument.

Through the development of the software what soon becomes apparent is that each instrument has potential to be used in many different ways depending on specific needs or desires. For example the «unsteady state fm controller» becomes a subtle image modulator when used in conjunction with graphics software. At the time of writing some of the products are definitely still in a beta state and have much room for improvement and refinement. A large part of the process has been a learning experience, particularly with the electronic development. It has been a long period of trial and error, however the experience has been extremely valuable. With a wealth of new knowledge and experience the inputout series has great potential to grow into something useful for performers of varying disciplines.

The future:

The post-diploma plans for the inputout series are to continue development of the current series and explore new designs and concepts. The possibilities for further development of each individual part of the series are quite exciting. As the project continues the series should likewise expand. There are already several design concepts that are planned for post-diploma development, some of which follow from ideas already explored in the project and some charting new territories. In addition to this we will be trying to promote awareness of the project through the organisation of workshops or seminars in which the series can be used as a catalyst for the discussion and further development of performance tools. The first of which will occur in Australia early 2010 in conjunction with the Northern Rivers Conservatorium of Music.

These workshops will involve the construction of kits based on the series or variants (depending on individual needs) followed by a process of finding practical software and performance application of the instruments built.
Team/Organisation:

As project leader I have been active in all aspects of the project. I have experience in audio production and performance, sound design and, limited, experience in programming and electronics construction. As the project touches to varying extents on all of these disciplines I have been able to work with a relatively small internal group, consisting of myself, Thomas Brunner, Konrad Siegl and Gabriel Roth. Thomas has been assisting in the physical design and development process, specifically with plastic molding and aesthetic considerations. Konrad and Gabriel have helped with public relations, web design and prototype conception and testing.

External Partners:

The bulk of the work on the project has been internal with much informal input from blogs, discussions with artists etc. Into the next year the inputout project will become more active with our external partners with the first phase of workshops commencing early 2010 and the first audio releases slated for October 2009.

Thanks:

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Reference:

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