

Huw Catchpole-Davies

# **Interactive Portfolio and Starfields**

For Human and AI Pilots

## Interactive Portfolio (as a meta-work) Preface

The choice to make the interactive portion of this portfolio a single meta-work was one born from my love of video games. I wanted to create a meta-work that could explore some of the concerns I have about dynamic music in video games and also create an overarching personality to some of the more automatic works included in my whole portfolio (including the notated works). The overarching theme—one which I have always been fond of—is that of the combination of humans and technology or nature and humanity. Being the creators of technology and, at the same time, a creation of nature (in only my personal belief), humanity is impossible to separate from these distinctions and the exact place humanity sits with respect to either is uncertain. This makes the contrast, or juxtaposition, between humanity, and its interaction with either (nature or technology) an extremely interesting concept for me. These concepts are found in every work of this portfolio.

In considering the interactive portfolio itself a work, I would draw focus to the fictional ship's artificial mind liaison (PAMiLa). The synthesized voice of PAMiLa guides you through the portfolio, in the tutorial; generates music for you, in the generative triptych of percussive music; creates a narrative and accompanies it with music, in *Deus Est Machina*; and ultimately decides your fate, or at the very least your entertainment, throughout all of these works.

However, PAMiLa is not without its human flaws. As the listener will gather from the opening sentences of the tutorial, PAMiLa has an irksome relationship with 'bios' which leads it to try to wrest control of the ships flight systems during *Starfields* (FLIGHT MODE) and decides your character's fate throughout *Deus Est Machina* (NARRATIVE MODE). The listener will also quickly notice PAMiLa's god complex when describing its 'own' works as "gifted" and suggesting the creation of sonatas as a trivial task. The listener will also notice that the writing style is very factual and sometimes cold, suggesting that PAMiLa's own view of its writing is not necessarily correct and perhaps doesn't display the human warmth we may expect from a human writer. I am suggesting that even an Artificial Intelligence can display something that we often attribute only to humanity.

## Starfields (FLIGHT SYSTEMS) Preface

*A video programme note/demonstration for this work can be found on the accompanying DVD. The video discusses all the detail that can be found here and should be viewed in parallel with this text note.*

*Starfields* began as a musical project designed to fill the often large temporal space between individual pieces within a concert of *The Oxford Laptop Orchestra* of which I was a directing member in 2012-2013. The original version had a single section of reactive intensity. Within this section the user was able to adjust the degree of intensity of the texture by sliding up and down a software fader interface (in MaxMSP is known as a slider). This was useful for creating music of a dynamic length to fit in between points where unexpected technical issues occurred in the set-up of new pieces. It also had the added bonus of enabling a musically sensitive operator to react to their perceived ‘needs of the moment’ and increase or decrease the textural complexity of the music.

This version of *Starfields* (*Starfields 2.0*) is a fifteen to twenty-minute work incorporating this same design in its opening sections. The piece also goes on to explore many alternative ways in which musical intensity can be changed with this same control mechanism and eventually explores the notion of player-control itself.

The role of MaxMSP within this work is twofold. First, MaxMSP has been used to provide an appropriately simple user interface that can be run on any reasonably powerful OSX machine. Second, MaxMSP runs all of the under-the-hood processes involved in the transference of user action to audio. This involves selecting sound files, choosing whether or not to play them, running any random chance decisions, running the artificial intelligence, moving through sections, timing sub sections, filtering audio, and even performing as an electronic oscillator soloist in the later stages of the work. All sound files (900+) were composed outside of MaxMSP. To this end, MaxMSP is a tool for maintaining and enforcing the structural architecture of the work while providing the user interface and user control.

The piece comprises twelve discreet sections, which explore the interplay between these different levels and modes of control. The majority of control in this work is done by a single slider controlled by the user on the right of the screen. The slider enables the user to move vertically through the piece. There is also a behind-the-scenes counter that moves the piece horizontally through the sections. The counter counts in seconds and, at certain trigger points, engages a transition to a new section or a modified version of a section already heard. The majority of these sections were composed to last for an indefinite amount of time. However some have defined ranges of time-space. Compositionally this amounts to the more defined sections having more time-sensitive triggers.

Each sections linear movement is built around a looping subcounter which is detached from the main counter propelling section changes. This subcounter will count sixteen beats and then recount them ad infinitum. Most sound files are initiated on one or more of these beats with each sound file being given its own initiation parameters. On top of these initiation parameters are chance-to-hit parameters that give certain sound files degrees of likelihood above zero to be played. Therefore the average file will have two parameters. First, the beats it can possibly initiate on and second, the chance that on these beats it will initiate. For example: snd\_01.wav; can activate on: beat 1, beat 5, beat 9, and beat 13; with a chance of 75%.

Some sound files are governed separately to this and trigger at specific points after the start of the section. These points are either defined exactly or given a range of potential starting points after the triggering of a new section.

In the most recent version of the work I have added in three minigames. The term mini game comes from the gaming community to mean a game within a game. These are often easy-to-solve tasks taking place within the narrative fiction of the game, or in this case, the work Starfields. The three minigames add to the ‘control’ and ‘interaction’ texture of this work by allowing the user to have ostensible control over the narrative of the work. The control mechanisms of the mini games and the narrative context of their temporal positions in this work are explained towards the end of this video. Help documentation can also be found within the main interactive portfolio.

---

#### Notes on the Graphical Score

The score for this work can be read as any other score, from left to right.

Your slider position represents a location upwards or downwards on the hull and so a path could be traced for any single hearing of Starfields.

There are two competing musics juxtaposed within the work. That of the human, scored in western notation and are sonically made from more complex acoustic sounds; and that of the computer, scored with 1s and 0s and are sonically produced from much simpler mathematical synthesis.

The piece also incorporates *one-time* events which trigger once only during the work. One-time events are composed analogously to a linear work and provide moments of definability amidst the chance-like subtleties making up much of the rest of the work.

The piece comprises twelve discreet sections, which explore the interplay between these different levels and modes of control.

---

#### More details on the Sections

##### Section 1, 2, 3 and 11

Section 1, 2, 3 and 11 comprise independently layered musical textures, which the user can move through with the slider. Each sound file acts as a stem of the full texture. Moving the slider above or below certain thresholds activates or deactivates the stem from the texture. Each stem is made up of a pool of similar sound files, which are randomly selected by the computer. The three sections are contrasting in overall density and occupy different harmonic-clouds (a concept discussed in Chapter Two of the accompanying critical writing).

Section 3 also incorporates a one-time event which has different parameters based on both the location of the slider at the trigger point and an element of chance (this is known as *salt* in cryptographic computing). Some permutations of this section are shown in the excerpts folder within the portfolio file.

-----

##### Section 4 and 6

Section 4 and 6's music are no longer stems of individual instruments but stems of a single superchord with many partials. Each partial is given its own stem and the user can sweep up and down to explore the timbre. The control reacts much quicker to the user's inputs than the previous three sections. Section 4 is the first section to directly disable the user's control of the slider thus introducing the AI character (PAMiLa, discussed above) to the narrative. These superchords are labeled on the graphical score provided. At brief moments the artificial intelligence controls the slider. The AI displays a number of different personalities which manifest in different slider movement styles. Some of the personalities include: slow movement, quick movement, large ranges, small ranges, specific ranges, non-specific ranges, etc. Coupled with the interjections of the artificial intelligence are new textures of sound that represent the artificial intelligences sound world. These sounds are overtly electronic in nature often incorporating much distortion, noise or regular mathematical fragmentation of the sound wave.

-----

#### Section 5

This section is entirely composed with a single one-time event which expands on the material introduced in section 4. At this time the user has no control over any of the sound. While movement of the slider is possible, no sonic effect is made. Further, the AI takes control of the slider for much of the portion of this section. This is intended to make the user feel like they are battling over the control of the slider.

-----

#### Section 7 and 8

The music of the AI has taken over during this section. However, the user has complete control over the density. Density is achieved in a different way from the previous stem activation method. In this section there are many primed play objects ready to send a file to the DAC. Increasing the sliders value will cause more of the primed play objects to fire. The sound files used in this section are quite short and their erratic nature blends well with the erratic control method this section allows.

In Section 8, the user has control over the same files that played in section 7 but no longer is there many different primed play objects. Now there are just two looping play objects which continually fire immediately after they have finished the previous files. One of these play objects is playing electronic files from the previous section and the other is playing harsh yet regular drum patterns. The user has control over what speed these files are played back. Therefore difference in texture is here controlled by slower or faster rate of sound file playback that I intended to produce the illusion of density changes.

These sections are the first example of temporal transformation of the sound through time as opposed to looping.

Towards the end of these sections the spaceharp is introduced. The spaceharp is a digital instrument of my own design for this interface. The spaceharps pitches trigger from the crossing of thresholds in both directions giving it an analogous impetus to the acoustic harp. The sound of the spaceharp is a modified pluck sound source giving it further analogy to the acoustic harp. Added to the decay and sustain portion of the waveform is a bending generator which will bend the pitch of the note up or down over a specific range. This bending generator is pushed to its most notable limits in the second hearings of both section 9 and section 10. In this section the spaceharp is played behind-the-scenes by the AI and uses the hybrid melodic generation process that is discussed in Chapter Two of the critical writing accompanying this portfolio.

-----

## Section 9 and Section 10

Section 9 and section 10 are best considered complementing counterparts. Each use the same timbres (the bellchords and spaceharp) but have vastly different compositional structure. Section 9 is governed by chance and Section 10 is hard composed. These sections are repeated afterwards with a generated melodic accompaniment from the AI which attempts to find its footing, through complementary music, and does so towards the end of the section.

-----

## Section 12

Section 12 is the finale of the piece and conceptually returns the intensity control back to the domain of time. Though the operator is completely human throughout this section they are in control of very little of what makes the final minutes of the work complete. The entire section takes the form of a giant swell. Much like the user has been able to increase intensity by moving the slider up the screen the intensity is now temporarily achieved.

Throughout this section, material from the one-time events in section 3 are revisited and given new timbres, related to the mathematical timbres of the previous section. The computer now selects larger fragments of precomposed melody and has control over the order in which they are played. Much like the bellchords of section 8-10 the computer is given the opportunity to play multiple lines of these fragments simultaneously. As these are chosen at random and delayed by a random number of beats this allows the opportunity for many different combinations and interplays.

During the evolution of this section there are background swelling chords that are also derived from earlier swelling material such as the bellchords of section 8-10 or the transitional swells between the opening sections 1-3. These swelling motifs move more and more into the foreground and become more and more computationally corrupted. However, here this corruption is complementary to the texture. This completes the combination of the juxtaposing materials representing both human and AI.

---

## New Additions to this Version of Starfields

### Interface

The score for this work is accessible within the main interface by selecting the NAVIGATION DISPLAY. When the engines are engaged a small sprite represents the players location through the work. Further to this, on mouse-over the descriptive labels for the score can provide further detail on any labeled score element. The descriptions for these labels are written from a perspective outside of the fiction of the portfolio to aid the player more readily.

---

### MiniGame 1

During the first MiniGame the AI is attempting to take control of the audio system and is in the process of transferring access of this system to itself. The MiniGame takes the form of a ‘button battle’ with the AI where the player must press SPACEBAR faster than the AI can. When the player presses SPACEBAR the cursor in the centre of the screen moves towards the left. When the AI presses its virtual SPACEBAR the cursor in the centre of the screen moves towards the right. The music for this MiniGame actively adjusts levels of stems of two competing musical minicompositions. These compositions both complement each other, for example, in terms of texture, rhythm and harmony; and contrast each other, in terms of timbre and intensity for example. The two musics of this section also sit within the superchord texture being produced by the section (Section 6) this MiniGame inhabits.

---

### MiniGame 2

During the second MiniGame the starship is adrift without functioning engines; the player here is attempting to reboot and calibrate the engines in order to continue the onward journey. The MiniGame takes the form of a ‘call and response’. The computer generates combination of pitches connected to a coloured button and the player must repeat this pattern back accurately. 5 stages must be completed without mistake. The game starts with a 3-part combination stage and ends with a 7-part combination stage. Should the player not be able to pass this MiniGame successfully in the allotted time then the game switches to an easy-mode. In easy-mode the game switches to a 2-part combination with only a single stage to completion. The musical sound effects within this section complement the surrounding texture.

---

### MiniGame 3

During the third MiniGame the starship has triggered a synergic Co-Pilot testing procedure as it has identified the player and the AI as cooperating pilots of the audio and propulsion systems. This is intended to reinforce the idea that the once corrupted AI is now working with the player in its output of musical material. This is the cue that the final section of the work will be wrought through the jolly cooperation of both computer and human materials. The MiniGame takes the form of a ‘hitbox reaction’ test. The black bar swings back and forth and the player must hit SPACEBAR when the black line falls within the green area. The AI pilot also performs a similar task on the right hand side of the screen. 6 stages must be completed before the final section of the work will play.