Hello, my name is Simon Belshaw and for the next half an hour I am going to talk about and play some of my Music Machines.

Music Machines are computer programmes that generate music within given parameters. They generally explore one idea or process but there may be variations within that process. There are currently 29 machines.

The project has grown out of my interest in generative, process and systems music and began with, naturally enough, Music Machine 1.

Music Machine 1 works by making certain decisions to generate music:

The first decision is How many voices will play? There is a choice from 1 to 10

Then, for each of those voices, the following decisions are made:

Firstly, which sound will play? The choice is from 1 to 128, in other words the computer will pick one voice from the standard midi sound set. The second decision is which note will play? and again the choice is from 1 to 128 with middle C being number 60. The third decision is how loud will the note be played? The choice here is from 20 to 120, with 20 being very quiet and 120 being very loud.

Once all the voices that are going to be played have been set up the next choice is how long those notes are going to be held for. The choices here are for .25 second, .375 second, .5 second, .75 second, 1 second, 1.5 seconds, 2, 3, 4, 6 or 8 seconds. (these values are equivalent to a semiquaver @ 60 bpm, a dotted semiquaver, a quaver and so on, up to and I including a breve).

The final decision the computer makes is how long it waits before the cycle of events is repeated. Here the choices are the same as for the note values but with the addition of zero, so no gap at all.

Here is an excerpt from Music Machine 1

PLAY MUSIC MACHINE 1

Music Machine 1 remains one of my favourites partly because it is so different from the usual type of music that I write but also because it was the start of the project (it showed me that I could achieve what I set out to do). Further into the project it became the start of a whole new direction but I will talk about that in more detail later.

Two other important elements of these early machines are: firstly they run continuously until stopped by the listener and secondly that, although they are different each time they are played, they still have their own distinct identity. There is no way that Music Machine 1 would be confused with Music Machine 2 for example.

In complete opposition to Music Machine 1 where the notes and sounds are free, Music Machine 2 is very tightly controlled. It consists of two parts; one part plays a repeated C major chord whilst the other part plays a melody over it. The notes of the melody are chosen from a C major scale. The full range of a piano keyboard is used but in the extreme high and low octaves only notes from the

major triad are chosen. The process is weighted in favour of the middle octaves playing and there is a 50/50 chance of the melody note being sustained.

PLAY MUSIC MACHINE 2

Whilst the use of midi plays a big part in the machines, I also use pre-recorded sounds. In music machine 5 I use the sounds of coins dropping onto various surfaces. The coins that I use are the current British £2, £1, 50p, 20p, 10p, 5p, 2p and 1p pieces and I drop each one onto wood, metal and stone. The machine then chooses any one of these 24 samples and plays it; there is also the same chance, that is 1 in 25, of playing 3 seconds of silence. Once the computer has chosen which sound recording to play it then decides the volume at which it will play it back. It also decides where to put it in the stereo field. The pulse of the piece, in other words how quickly the computer makes another decision, is set at 150 bpm. The idea of using recordings of coins was inspired by reading The Cheat in Your Change (how to spot fake pound coins) by Ken Peters, in which he writes 'genuine coins, dropped on to a hard surface, make a sound that approximates to F above middle C'.

PLAY MUSIC MACHINE 5

Some of the Music Machines are entirely text based, Music Machine 8 uses the short speech that Neil Armstrong made when he stepped on to the surface of the moon: 'That's one small step for man, one giant leap for mankind'. The music machine takes each word of this sentence, along with both the pause that Armstrong left in the middle of the sentence and the beep that was a feature of communications between the earth and the astronauts, and then plays them back in a random order. This machine has three different performance options; one shot, looped 1 and looped 2. In one shot mode the machine plays each word once only (there is therefore, an extremely small chance that the sentence will be played as it was originally spoken). Looped 1 mode is the same as one shot mode with two variations. Firstly, the program plays indefinitely until stopped by the user and secondly the beep only sounds at the end of each cycle rather than at any point within it. In looped 2 mode the machine plays indefinitely until stopped by the user and has no restrictions on when any word is played, so it can repeat the same word rather than allowing each word to appear once before resounding.

PLAY MUSIC MACHINE 8

This idea of presenting the listener with a variety of performance options is a feature that has grown and developed. Music Machine 16 is based on Bach's Prelude number 1 from Book 1 of Forty-eight Preludes and Fugues. It has four options for performance. The first option is one shot, this will play all 35 bars of the original work once only but in a random order. The second option is looped, this will play any of the first 32 bars of the original work and will run indefinitely until stopped by the user. The third option is one shot with the original ending, this will play the first 32 bars of the original work once only and finish with bars 33 - 35 from the original piece. The final option is to play the piece as it was originally written. I'm now going to play the one shot version.

PLAY MUSIC MACHINE 16

I mentioned earlier that Music Machine 1 was not only the start of the project but had also been the start of a new direction for the project. Earlier this year I developed a version of Music Machine 1 for live performance. It is intended for performers with or without instruments, anyone who can make a sound. The instructions for performance are very simple: a computer monitor will flash either green or red; green meaning play, red meaning stop. It is up to the individual performers to make the other decisions that in the original would have been made by the computer. So they may

decide that when they see the next green screen that they are not going to play at all. If they decide they are going to play, they have to decide what sound they are going to make and how loud that sound will be.

I have subsequently worked on a number of machines that are intended solely for live performance.

Music Machine 27 is written for Casio digital horn and Raspberry Pi computer. For those of you unfamiliar with either the Casio Digital horn or the raspberry pi I'll give a brief introduction to both. The Casio digital horn was developed in the 1980s, it is shaped like a saxophone and has its own internal sound module but it can also function as a midi wind controller, and that is the purpose I use it for. The Raspberry Pi is a small computer, built in the UK, it runs Linux and has been used for many different purposes. I use it with a usb midi cable to run the Music Machines. So, for Music Machine 27 the Casio Digital Horn's midi out socket is connected to the Raspberry Pi via a usb midi cable which is also connected to a midi sound module. When a note is played on the horn the Raspberry Pi produces a chord which is then sounded by the midi module. The chord will always include the original pitch but it will use it only as part of the chord and not necessarily as the root. It is therefore possible to play a single repeated note and to produce a variety of chords from that. The Raspberry Pi also chooses the instrument sound for each note with all sounds coming from the woodwind section. Here is a brief excerpt from a performance of music machine 27:

PLAY MUSIC MACHINE 27

Music Machine 28 is also for live performance, intended for solo wind instrument and computer. For its first performance it was played by me using the Casio digital horn and Raspberry Pi again. Before a performance of this piece can take place a recording of each note that the instrument can play must be made. This must be a sustained note of around 15 seconds. Each of these recordings are then edited into separate sound files that can be played back by the computer. During live performance the computer runs two programmes simultaneously. The first programme displays to the performer, via the computer monitor, the note to play and how long to play it for, and then how long to wait before playing the next note. The second programme plays the pre-recorded sound files. The computer decides which file to play and for how long to play it. For the first minute of the piece the computer remains silent but as the piece progresses more clips are played at shorter and shorter intervals.

PLAY MUSIC MACHINE 28

The most recent music machine is number 29; this has two versions; one is intended for live performance and the other for computer performance. Both work in the same way. The computer or performer plays a C major scale both ascending and descending as well as the major triad. The computer remembers each note that is played and stores it in a list. It will then choose a note from that list to play back at the same time as the performer plays. Occasionally the programme will delete some of the notes from its memory and then start remembering again. There is also the chance that notes will be sustained allowing chords to build up. I will now play a computer generated version of Music Machine 29.

PLAY MUSIC MACHINE 29

That is the end of the show, I hope you've enjoyed listening to my Music Machines. If you want to learn more about them or download them to listen to on your own computer you can do that at my website simonbelshaw.co.uk - you can follow me on twitter @music_machines and you can also listen to my work on soundcloud (just search for Simon Belshaw or music machines). Thank you for listening. Goodbye.