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theremin



Ancient life was all silence. In the nineteenth century, with the invention of the machine. Noise was born. Today, Noise triumphs and reigns supreme over the sensibility of men. One of the biggest and most influential of these machine inventions was the theremin (or thereminvox). The theremin was one of the biggest cornerstones for electronic music and pioneered future generations of electronic and electrically amplified music.

It is named after its Russian inventor, Professor Leon Theremin, who patented the device in 1928; to fully understand the theremin we have to go back earlier in Theremin's life as to how he came about inventing the machine. Physics and the invention of musical devices go hand in hand, and the theremin is no exception to this. Theremin was born in 1896 and at the age of 17 Theremin was experimenting with high frequency circuits, optics and magnetic fields. On May 9th Theremin attended Abram Fedorovich Loffe's dissertation on the magnetic field of cathode rays, the elementary photoelectric effect and similar studies.

During his research at a Military Engineering School he was called by Loffe to attend his Physical Technical Institute. It was here he built a high frequency oscillator to measure the dielectric constant of gases with high precision; upon investigating further uses for this research, he invented the first motion detector, which would be used as a "radio watchman" (commonly used as security devices today). While adapting the device with circuitry to produce an audio tone Theremin noticed the changes in pitch when he moved his hands around.

He first demonstrated the findings in October 1920 and went to try out musical pieces he learnt on his cello growing up; on November 1920 he

performed his first public concert with the instrument. The theremin produces a very eerie sound; because of this it was associated with the realms of the bizarre and the creepy. It was featured in films such as 'The Spiral Staircase' (1946), 'The Thing' (1951) and 'The Day the Earth Stood Still' (1951)[1]. It was also used by Composer Garry Schyman for the musical score of the 2005 videogame Destroy All Humans!

The theremin is almost unique in the fact that it requires no physical contact to play. The controlling section usually consists of two metal antennas, which sense the position of the player's hands and control radio-frequency oscillators for pitch with one hand, and amplitude with the other, so it can be played without being touched. The electric signals from the theremin are amplified and sent to a loudspeaker. Works by changing the magnetic field when beings of electrical properties pass through it's plane of register, picking up the changes in signal and changing the sound.

When it comes to performing with the theremin, it is fundamentally easy to learn but difficult to master. The challenges of the instrument are attaining reliable control of the instrument's pitch with no guidance (no keys or frets etc), and trying to eliminate undesired portamento that is commonplace because of the instrument's continuously-variable-pitch design. Pitch control is challenging because a theremin can generate tones of any pitch throughout its entire range, including those that lie between the conventional notes.

Another challenging aspect is the fact that the theremin has no physical feedback like string tension or the tactile fingerboard for strings, or air column resistance in wind instruments; the player has to rely solely on what

is heard, and can only correct a pitch when it can be audibly heard. When performing with the theremin the presence of some portamento is inevitable and only the most experienced performers could reduce it to a discreet level. Most performers would play compositions that were written to be played in legato as it is acceptable or even traditional to include some portamento and glissando.

Highly skilled players, however, can use rapid and exact hand movements to reduce undesired portamento and glissando to a level enabling them to play individual notes and even achieve staccato effects. Moving your hands in small and rapid movements can also create tremolo or vibrato effects. Although pitch is usually generated by the distance of the performer's hand to the pitch antenna, most precision thereminists enhance their playing techniques with a system called "aerial fingering"; this technique was largely devised by Clara Rockmore and subsequently adapted by Leon Theremin himself and his protegee, Lydia Kavina.

It employs specific hand and finger positions to slightly alter the amount of capacitance relative to the pitch antenna to produce small changes in tone rapidly and in a manner that can be reliably and quickly reproduced. There is also a controversial technique called "angling"; in this method the pitch control hand rests on the top of the theremin (in opposition to the 'no touch' creed of traditionalists). When angling the performer changes the angle of the hand and fingers to alter the pitch, repositioning the hand if the pitch interval is too large.

Touching the theremin dampens the effect of superfluous movement on pitch; this allows the performer to achieve steady pitches without vibrato

and without the performer's remaining perfectly still. An alternate to touching the instrument is to rest the elbow of the pitch arm on a tripod while standing or such as an arm of a chair or a performer's own knee; this gives a steady reference point and pivot for the arm allowing for steady pitch play over the entire pitch range. The volume control antenna is also plays an important part in theremin articulation.

Unlike touched instruments, where simply halting play or damping a resonator silences the instrument, Clara Rockmore stated that the thereminist must "play the rests, as well as the notes." [2]. Skilled players who could overcome these challenges by a precisely controlled combination of movements can achieve complex and expressive performances, and subsequently can realize a theremin's potential. The theremin was also tried with dancers as the 'musicians' but performing precise music with dance moves was difficult as even having a finger or limb slightly out of place could change the sound.

The Theremin also went on to produce some similar inventions in the future, one of them being the Electro-Theremin. The Electro-Theremin, often called a Tannerin after the developer Paul Tanner, was made in the late 1950s to mimic the sound produced by the Theremin. The instrument features a tone and portamento similar to that of the Theremin but it has a different control mechanism. The mechanism consisted of a sine wave generator with a knob that controlled the pitch, placed inside a wooden box.

The pitch knob would be attached to a slider on the outside of the box with some string (the 'stringer'). The player would move the slider, and whilst doing so, turning the knob to the desired frequency; this would be aided by

markings drawn on the box. The theremin however doesn't sound much like the original theremins of the previous era, and people who have heard both instruments can easily tell them apart. Tanner had the instrument built because he appreciated the theremin's sound, but wanted greater control of pitch and velocity.

Mechanical controls, a long side bar for pitch and a knob to adjust volume, make up the electro-theremin. The Electro-Theremin also produces a slightly less complex timbre than the original due to not having intentional harmonic generation, which is in the output of the original Theremin. Tanner played the electro-theremin on the 1958 LP 'Music for Heavenly Bodies' and subsequently on several television and movie soundtracks. Most famously Tanner played the instrument on 3 tracks by the Beach Boys: 'I Just Wasn't Made for These Times', 'Good Vibrations', and 'Wild Honey'. Going back to how hard the theremin is to play, the Beach Boys wanted to buy one but, upon trying to play one said "No, no, this is impossible", "We're guitarists, can you do anything like a fret board?" [3] and Tanner came up with the 'stringer'. Tanner's prototype of the instrument appears to have been the only one made; he sold the instrument in the 1960s as he believed the invention of newer synthesizers made it obsolete.

The theremin is still in circulation today, although not widely used, and was the forerunner for many modern synthesizers. The company Moog Music was, and still is, one of the biggest theremin makers around and has progressed to producing many synthesizers and plug-ins for industry standard programs such as Pro Tools. The theremin was undoubtedly one of the biggest turning points in the history of electronic music, and ultimately

led to some of the high quality synthesizers and software plug-ins we see today.

Bibliography

<http://en.wikipedia.org/wiki/Theremin>