

SPO - Super Prime One

Augmented Reality

electronic string instrument to play with hand gestures

About the name of the instrument: SPO.

The Pure Prime is a central sound location in a game that is to result in live composition. This tone location is indistinguishable in the game to the extent that both or more players meeting on this tone location may not be able to identify which of the identical tones is the tone that the respective person is playing. Therefore, this tone location may be a starting point or formal agreement for further play.

The 1.0 version of the instrument was presented to the public several times. For the first time on July 14, 2019 at the "night of science" at the University of Frankfurt, and in 2019 at the SKOP festival "Computer-Music V" in Frankfurt. Due to the corona pandemic, the other concerts with the instrument could only take place via the Internet, on March 29, 2020 and October 21, 2020. A composition by Phill Niblock, New York was realized with the instrument and came in December 2020 in New York, at Roulette, premiered.

The development of the instrument began 3 1/2 years ago and at the beginning it was not foreseeable that it would develop in this way.

Some developments have been made since version 1.0. They include extensions on the software and hardware side.

The tuning systems play a decisive role in the programming / compositions. The differences between individual tones, as they appear acoustically, can be clearly perceived. Since they are related to the position values and the LEDs, the positions can be reproduced at any time and can be perceived visually / acoustically. The position values are summarized in large array lists and related to each other in terms of programming. In order to get into very small pitch differences, the position values for 106th root of 2 were determined. They make it possible to shape the given tone space to the limit of perception. This made it possible to bring the tuning systems together as a unit, to represent small and very small intervals. Individual tuning systems are optically indicated by the different colors of the LEDs, see picture. This is an essential requirement for playing the instrument via gesture control. A player perceives this through the colored LEDs, is stimulated by these optical impressions to determine - undefined position trips. He doesn't have to know anything about the musical-technical requirements for his playing.

Gesture control offers new possibilities for playing with the instrument. With conventional programming, the string divider can move exactly one position with a tenth of a millimeter. A difference in tones could already be perceived at 2 millimeters. This accuracy made the pure intervals appear in strong resonance, a deviation of 2 millimeters led to a significant weakening of this hearing impression. As a result, the pure intervals could be determined very well in connection with programming-technical processes. The software enables a fast and precise achievement of main intervals such as: Pure consonances, Pythagorean intervals,

106th-root-of-2 intervals, etc. When the player enters a range of values for one of these intervals, the software controls the motors to the exact position and a game action is triggered. Also, a player can independently steer to any position and trigger actions.

Since both parts of the string always emit a tone when playing with the pick, the small pitch differences could be clearly perceived. Especially when there was no vibrato in the composition. The play of overtones was also specifically programmed. The pick is placed very softly and the string is released from the damper at the right moment.

The camera-Teensy interface was programmed by Thomas Perizonius, who was also involved in the development of the pickups.

Tunings Systems

Pure tuning, Pythagorean tuning, 6th-root-of-2, 53th-root-of-2 and 106th-root-of-2. These tunings found their previous applications in different programming / compositions. The tuning systems are combined as a unit to display small and smallest intervals. Individual tuning systems are visually indicated by different colors of the LEDs, see picture. When certain positions are reached, the corresponding LEDs flash.

Light-Case

Extension of the instrument by a light case with 189 LEDs. Here the different tunings are marked by different colors, see picture.

Gesture Control Camera

Augmented Reality, the instrument can be classified under this heading. The instrument becomes augmented reality essentially through the Kinect V2 camera, because it makes the instrument playable for "all people" via gesture control and light signals.

Microcontroller: in meantime teensy 3.6

www.wiessenthaner.de/Images/SPO/2021_03_29_Test_3_Handgesten.mov

www.wiessenthaner.de

<https://hackaday.io/project/179460/gallery#8d32862792b7a00f671a2826dcb299d2>