

## Problem

The theremin is the first electronic musical instrument ever created, but is also one of the least used or well known. It has traditionally been a difficult instrument to learn because it lacks any physical reference for the performers, forcing them to rely heavily on their ears in determining what notes they are playing [1]. Most novice musicians' ears are not very well developed, leading to a frustrating experience for those trying to learn to play the theremin, discouraging casual players who are not sorely determined to learn, from taking it up. Those beginners that do choose to endure these difficulties are hindered by the inherent problems in self-study caused by the aforementioned limitations: that is, with no tactile or visual reference and a less-than-perfect sense of pitch, the students may have difficulty in ascertaining whether their performance is in tune or otherwise acceptable without guidance from a teacher. This is an unfortunate problem, because the fact that the theremin is such a rarely played instrument leads to difficulty in finding teachers, making self-instruction an all but necessary element in learning.

Our group proposes to address these problems by building a display into the theremin that would show what note is being played and to make the theremin MIDI compatible. The display provides visual feedback to the performers, giving them a more reliable reference than their ears as to the accuracy of their performance. The MIDI compatibility will allow thereminists to interface the instrument with a computer, allowing them to study the instrument using software we will write that will be used to evaluate and rate their playing, according to exercises specified in the software. This software is what will set the theremin apart from other MIDI theremin models. The software will be designed such that exercises can be added to it as needed, allowing for greater challenges to be introduced as the user's playing ability grows.

These improvements will make the theremin an easier instrument to play and improve the quality and effectiveness of theremin pedagogy in general, making the theremin more accessible and attractive to a broader group of musicians. In addition to these improvements, the theremin will be designed for a lower cost than currently available models, which can typically range from \$370 to \$3500, further widening the prospective user-base by making it more attractive to casual users. These changes may allow the theremin to finally obtain the popularity and mainstream acceptance that have eluded it for almost the entire eighty years of its existence.

## References

- [1] S. J. Aldrich, "The History and Significance of the Theremin", <http://www.stanford.edu/~aigeanta/theremin/>, Stanford University, 2000.