



**CALIFORNIA STATE SCIENCE FAIR
2015 PROJECT SUMMARY**

Name(s) Gustavo Padilla	Project Number S0920
Project Title RFID Theremin: Music with No Limits	
Objectives/Goals The goal for my project was to create a device/musical instrument that is able to play any instrumental sound and can be played without any physical contact through the use of electronic tone generation coming from a theremin and the use of RFID technology in order to play instrumental sounds.	
Abstract	
Methods/Materials RFID Transponders RFID Reader Theremin Speaker Computer USB to Micro USB Cable	
Results As far as my results go my theremin prototype can reach frequencies as low as 130 Hz to as high as 1,661 Hz. When calibrated at 6 inches away from the antenna, the low C of 130.8Hz should be audible. Each note after that will increment in periods of 0.5 inches. For example, the note D of 146.8Hz will be found 5.5 inches away from the antenna. After this octave and the high C of 261.6, the increments for each note will become smaller as the distance from the antenna shortens, coming down to increments of a quarter of an inch for the next octave and approximately an eighth of an inch for the octave after that. As for the RFID tags, I have them coded for a full chromatic octave from a low C to a high C with varying hertz depending on the instrumental sounds that they are programmed to play. They make a total of 13 chromatic notes for each instrument. The RFID tags are able to play any sound as long as I have the sound files in the same directory as the program itself. I currently have sound files of a violin, piano, cello, guitar, and bells. I also have piano accompaniment sound files that I can play automatically with the swipe of a tag.	
Conclusions/Discussion My device is in fact able to play any instrumental sound or sound in general using RFID technology as long as the sound files are in the computer directory. The same program that is used to call the sounds with the swipe of a RFID tag can be recycled and the new sounds can simply be substituted into the program. Both the theremin and RFID technology can be used simultaneously to play a song. For anyone with no musical background, that cannot read music, or a person with a physical or mental disability; they will be able to play any instrumental sound with a simple swipe of your hand through mid air.	
Summary Statement I designed a musical instrument that is able to play any instrumental sound that I want as well as be able to omit a wide range of electronic tone generation with a simple wave of your hand through mid air; an instrument for the disabled.	
Help Received Tech guy at school helped me wire board for the theremin. Emailed a science buddies expert that helped me with my program.	