

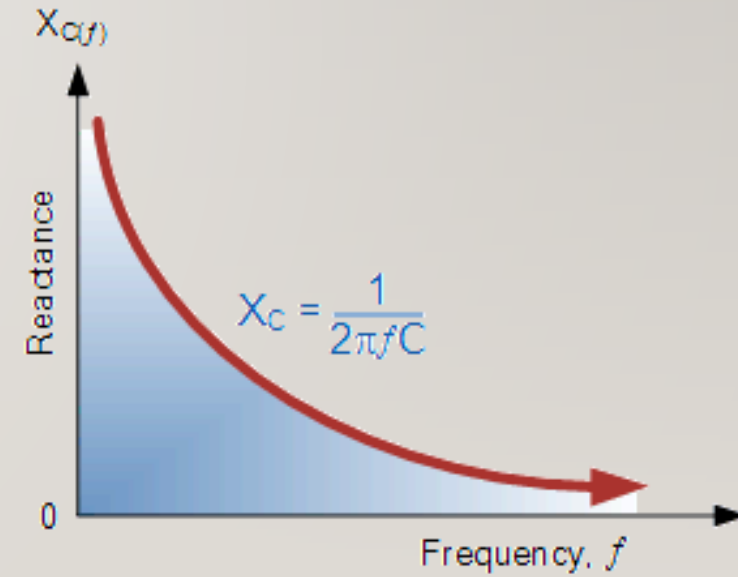
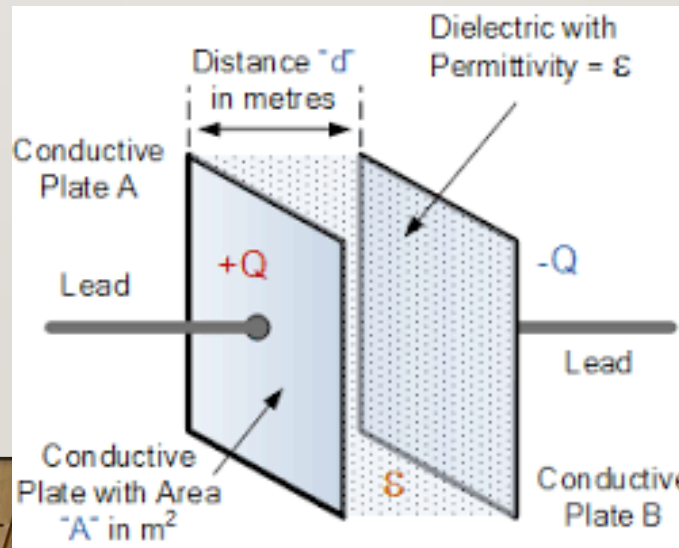
LOW COST THEREMIN: ULTRASOUND DRIVEN MUSICAL INSTRUMENT

PRESENTED BY SUNNY CHEN

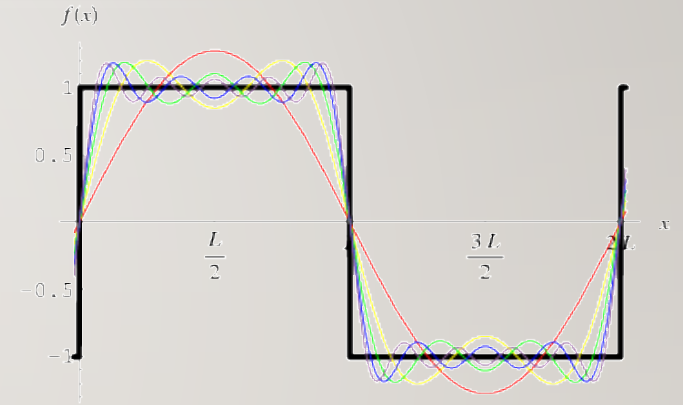


“TRADITIONAL” THEREMIN: DRIVEN BY ELECTROMAGNETIC FIELD

- Two antennas: one controls volume, one controls pitch
- Each of the player’s hand forms a capacitor with the antenna, capacitance is changed by changing the distance between the hand and the antenna.
- Capacitance is related to frequency (time to charge and discharge)



ULTRASONIC THEREMIN:



Ultrasonic Sensor
determines
distance

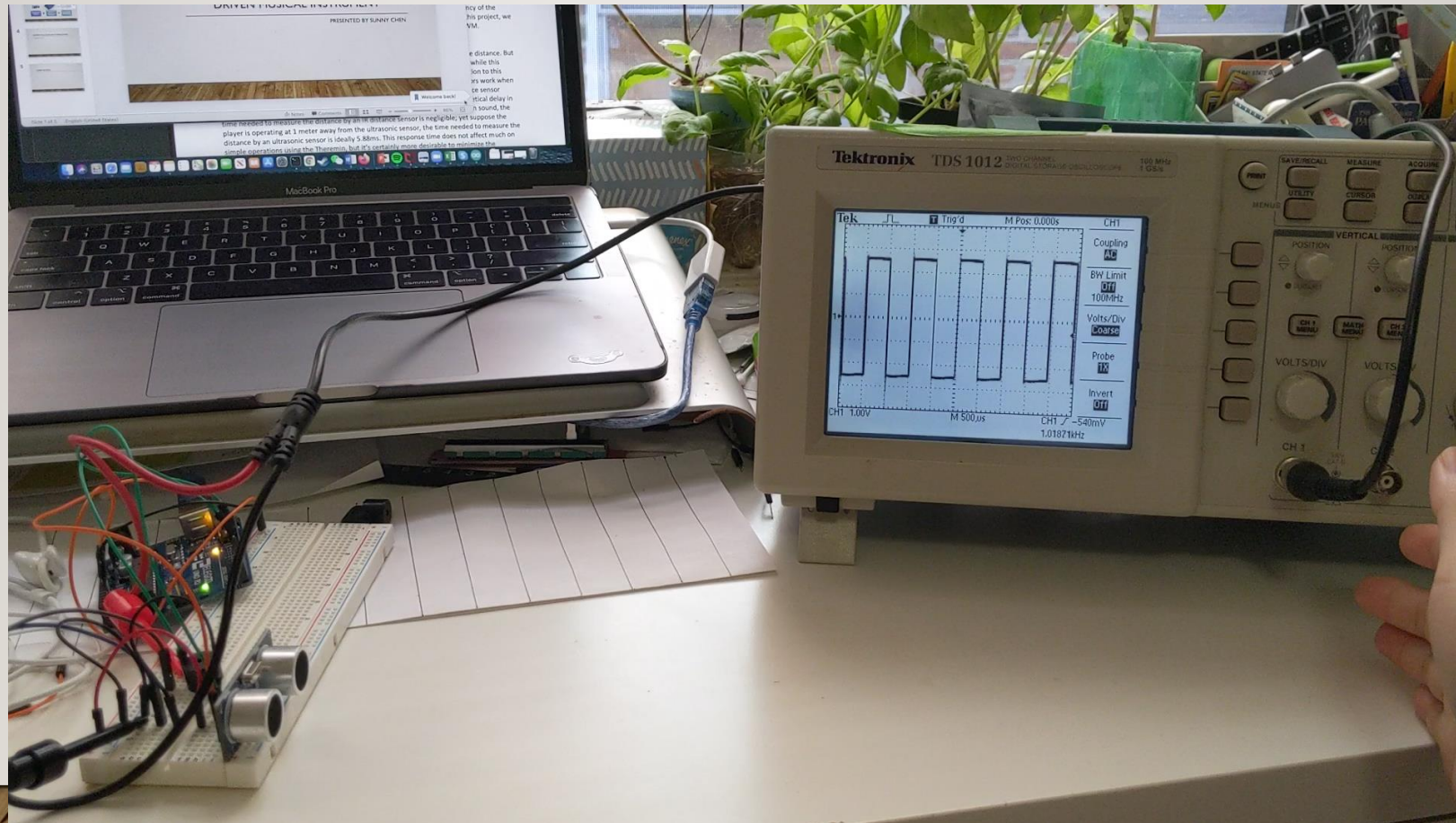


Using Arduino to
determine
frequency based
on distance



Drive the passive
buzzer with square
wave

NOTE/PITCH & DISTANCE CHANGE



GUESS THE SONG



WITH PITCH CORRECTION



WAVEFORM AND SOUND TEXTURE

- Why does the passive buzzer sounds rough?
 - My hand trembling...
 - Ultrasonic sensor fluctuation
 - Waveform (Square vs. Sine)
- How to output sine wave?
 - Sinusoidal Pulse Width Modulation
 - Digital to Analog converter
 - (But all at the cost of limiting the range of frequency of sound that we can output, plus the “sine wave” would not be exact sines anyways.)
 - RC filtering → favors certain frequency



THANK YOU!

