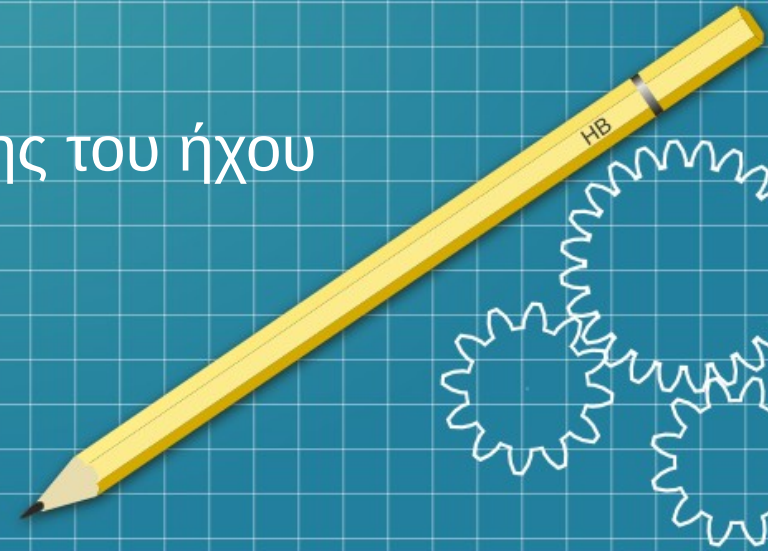


Ταχύτητα του ήχου

Μέτρηση της ταχύτητας διάδοσης του ήχου



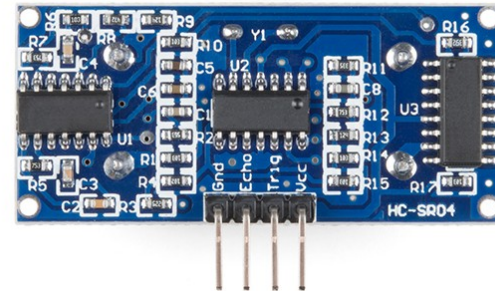
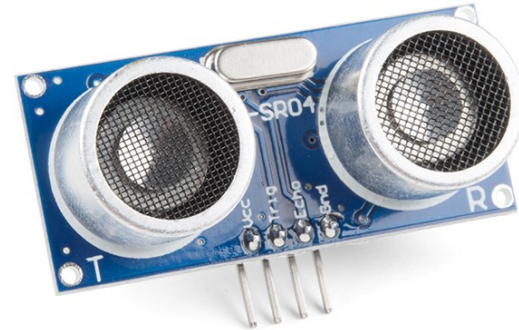
Ο αισθητήρας

- HC-SR04 Ultrasonic sensor

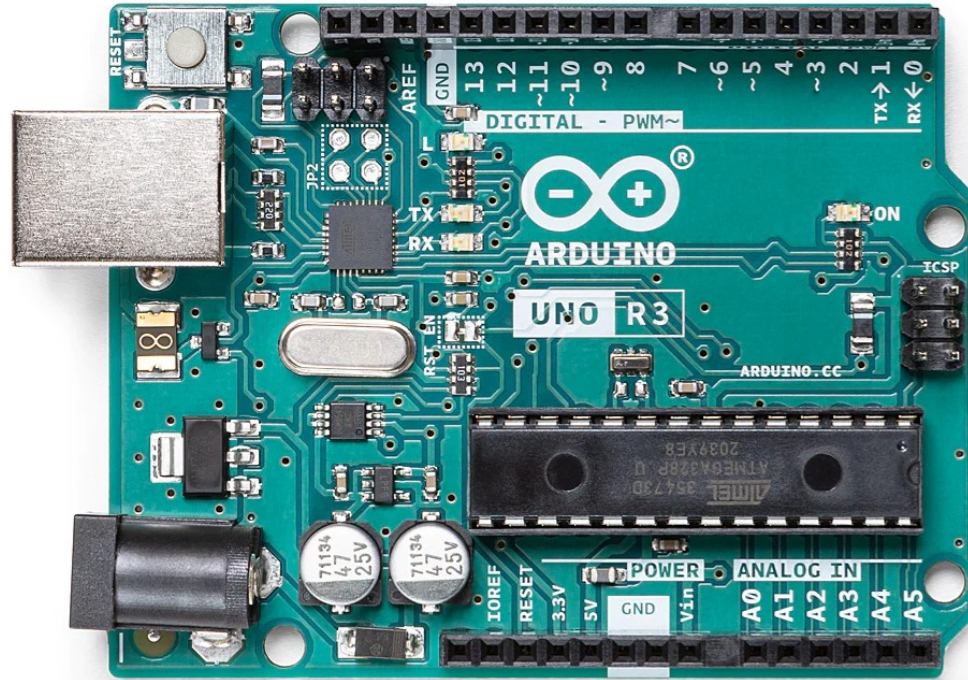


Ο αισθητήρας

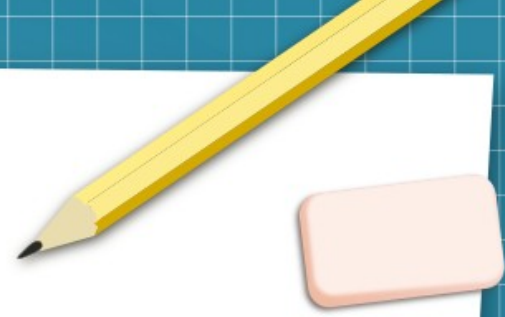
- Στέλνει κάθε φορά υπερήχους συχνότητας 40kHz και ειδοποιεί όταν λάβει την ανάκλασή τους



Πλακέτα Arduino UNO Rev3



Arduino Starter Kit



Sonic | Arduino IDE 2.2.1

File Edit Sketch Tools Help

Arduino Uno

Sonic.ino

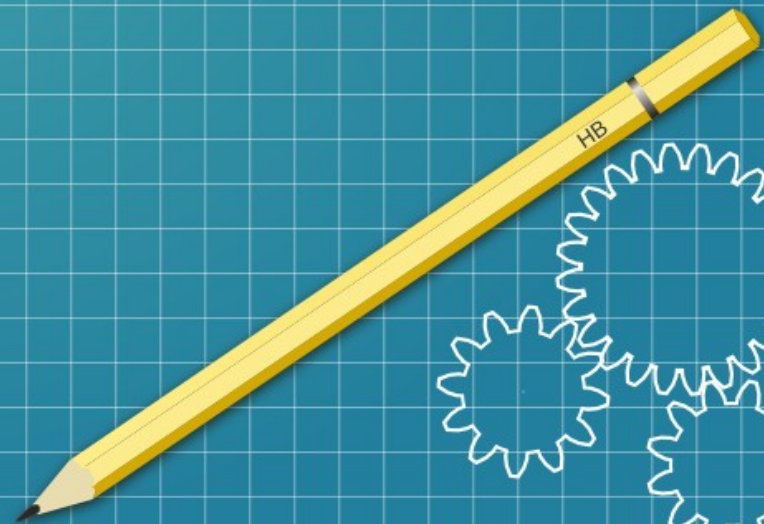
```
1 // Κώδικας για μέτρηση ταχύτητας διάδοσης του ήχου στον αέρα
2 // με τη χρήση του αισθητήρα υπερήχων HC-SR04
3 // Λαμπρινίδης Ευάγγελος 2024
4
5 const int trigPin = 2; // Trig στον αισθητήρα
6 const int echoPin = 3; // Echo στον αισθητήρα
7
8 void setup() {
9   pinMode(trigPin, OUTPUT);
10  pinMode(echoPin, INPUT);
11  Serial.begin(9600);
12  digitalWrite(trigPin, LOW);
13  delayMicroseconds(10);
14 }
15
16 void loop() {
17   float duration;
18   digitalWrite(trigPin, HIGH);
19   delayMicroseconds(10);
20   digitalWrite(trigPin, LOW);
21   // Τώρα στέλνεται ο υπέρηχος
22   duration = pulseIn(echoPin, HIGH);
23   // Τώρα λαμβάνεται ο υπέρηχος
24   Serial.println(duration);
25   delay(2000);
26 }
```

Output Serial Monitor x

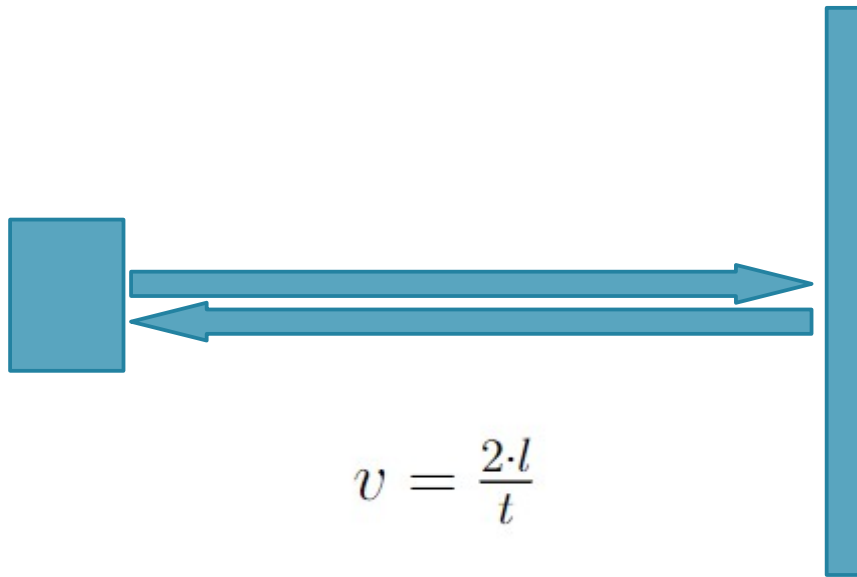
Message (Enter to send message to 'Arduino Uno' on 'COM7') New Line 9600 baud

1662.00
1667.00
1661.00

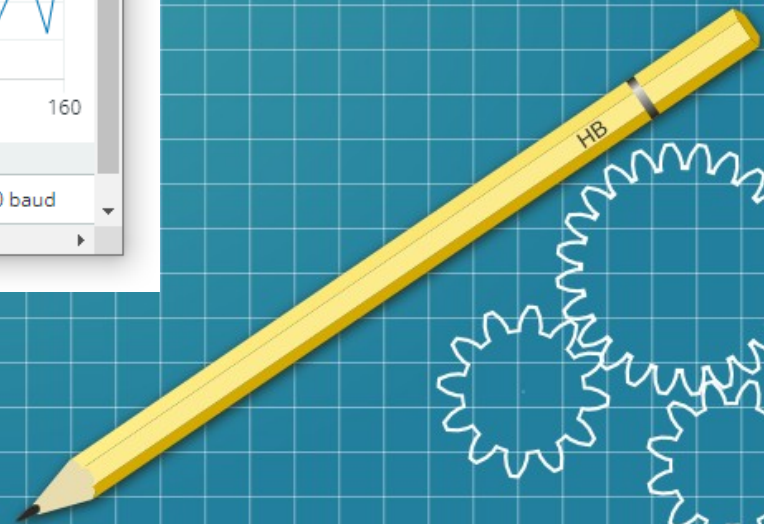
Ln 26, Col 2 Arduino Uno on COM7

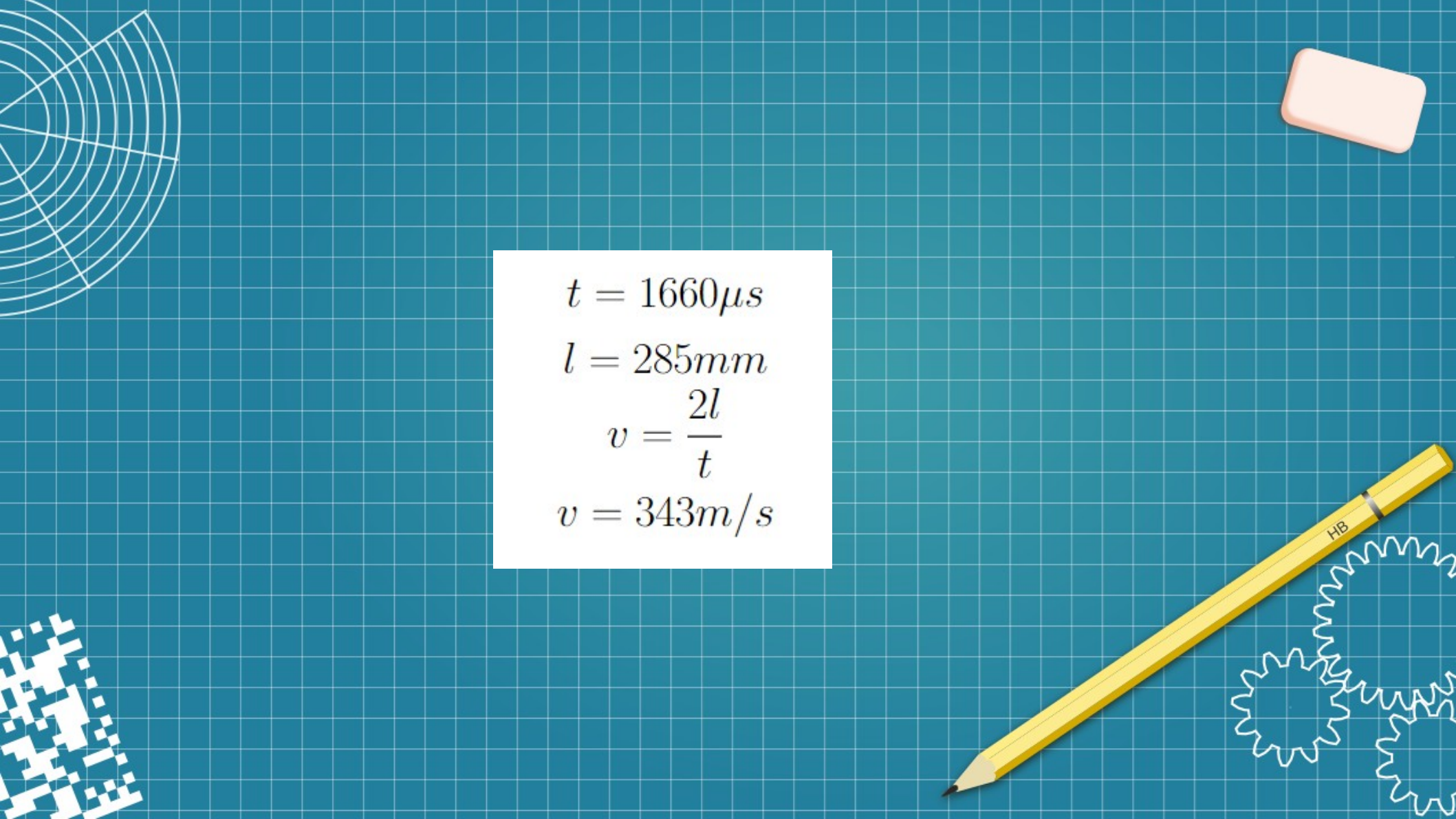


Μέτρηση χρόνου



$$v = \frac{2 \cdot l}{t}$$



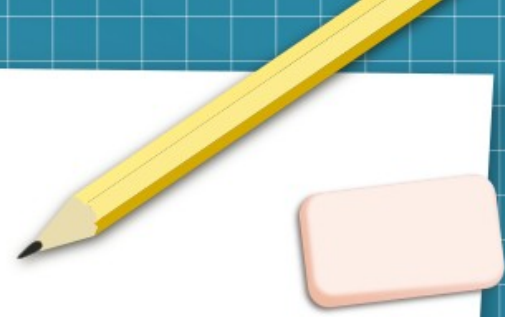

$$t = 1660\mu s$$

$$l = 285mm$$

$$v = \frac{2l}{t}$$

$$v = 343m/s$$

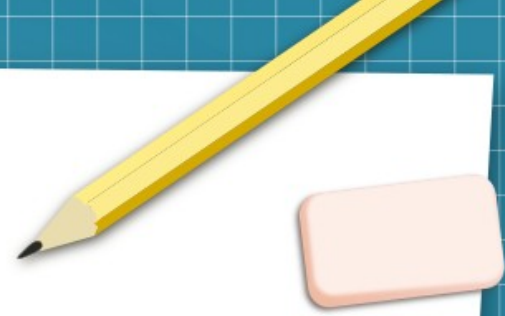
Στάσιμα κύματα



Στάσιμα κύματα



Φλογέρα



Σε έναν σωλήνα ανοιχτό στα δύο άκρα, οι συχνότητες των στάσιμων κυμάτων που δημιουργούνται είναι ακέραια πολλαπλάσια της θεμελιώδους συχνότητας.

$$f_n = n \cdot \frac{v}{2L}$$



Tuner - Pitched!

Stonekick

Contains ads - In-app purchases

4.7★
21K reviews

1M+
Downloads

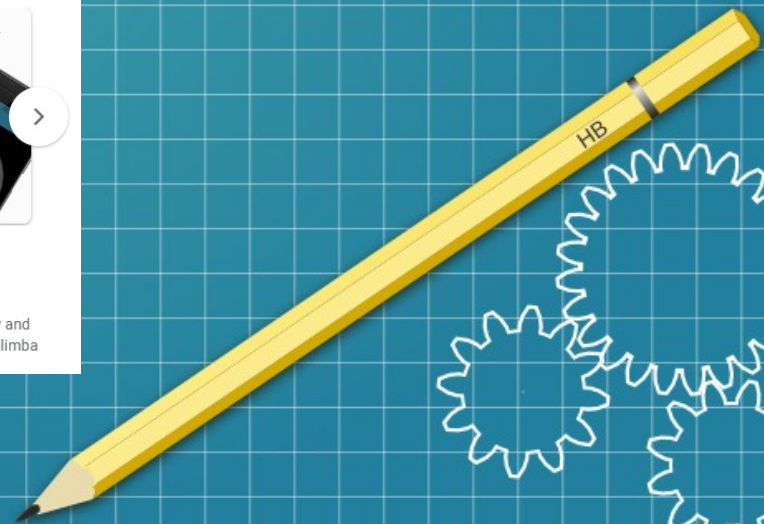
3
PEGI 3

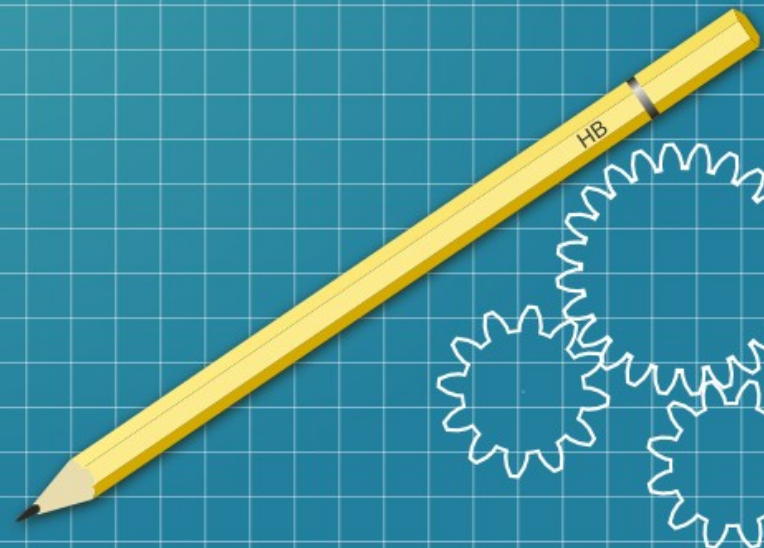
Install



About this app →

Pitched Instrument Tuner and Pitch Pipe has been designed by musicians to help you quickly and easily tune a wide range of instruments - use it as a ukulele tuner, violin tuner, guitar tuner, kalimba tuner, voice tuner, and more. Even very low bass strings can be tuned.







Audacity is the world's most popular audio editing and recording app

[Download Audacity 3.4.2](#)
Installs with no extras

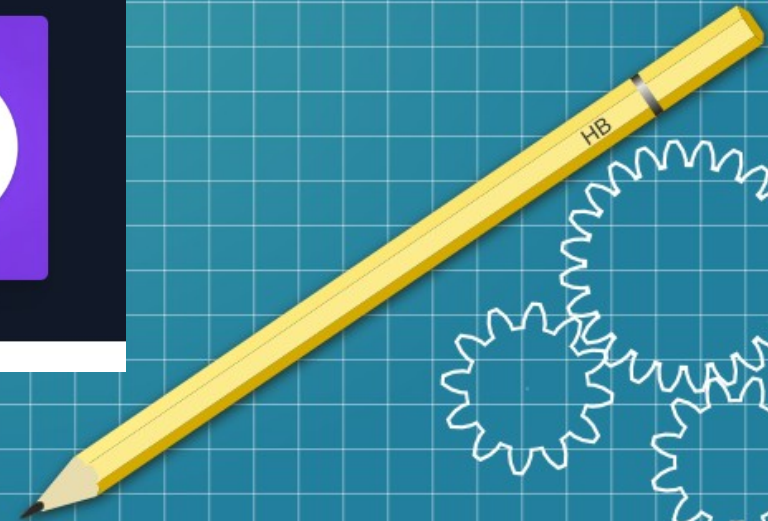
Audacity + free effects & samples
Requires the Muse Hub installer

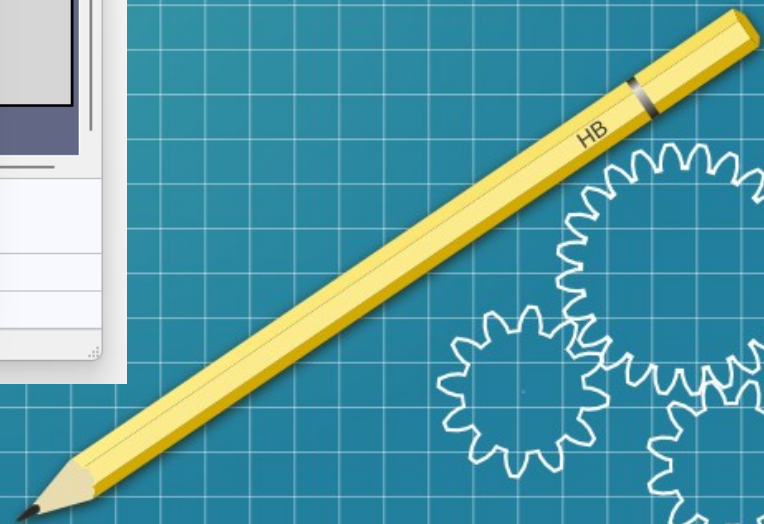
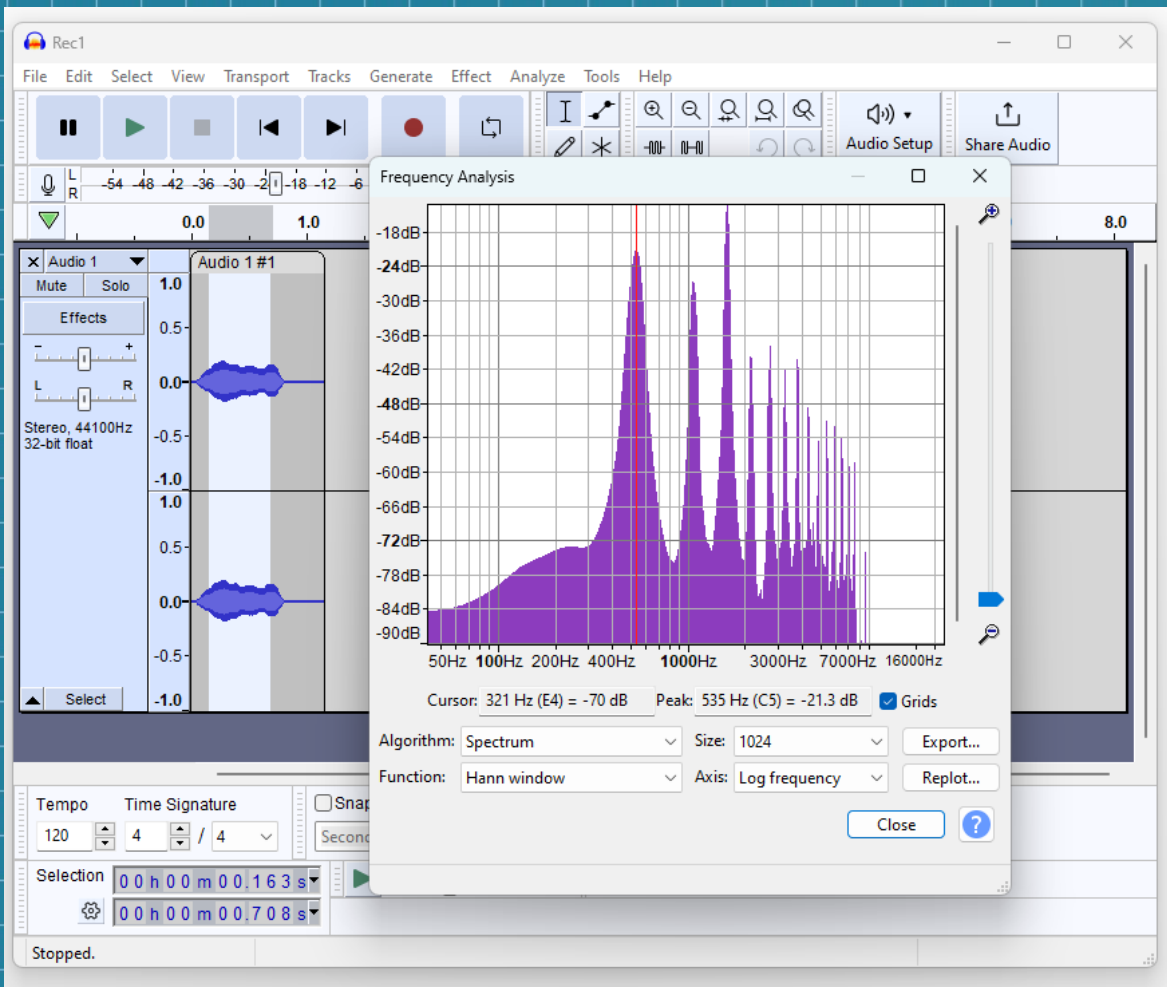
Produce music. Produce podcasts. Take total control of your sound.

[More about our new release](#)

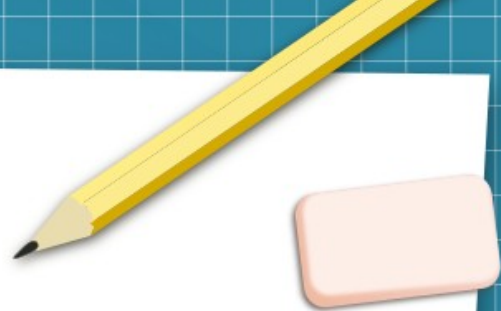
Audacity 3.4

New Mus 
Features





Ταχύτητα διάδοσης

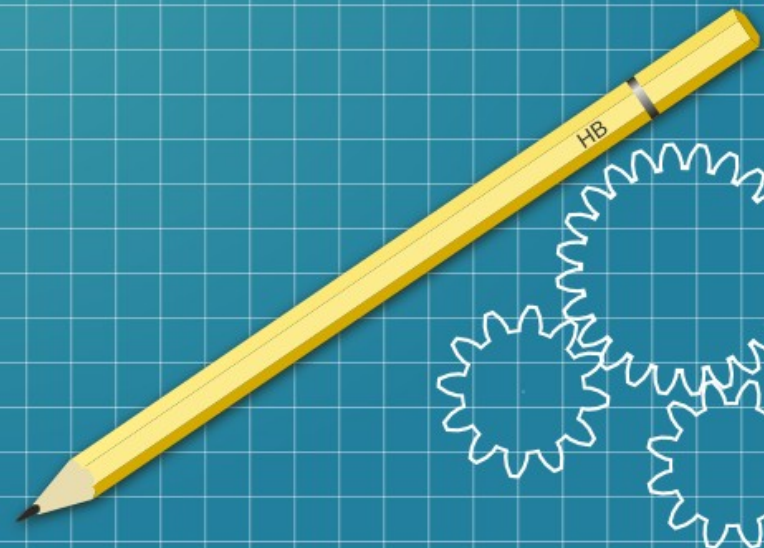
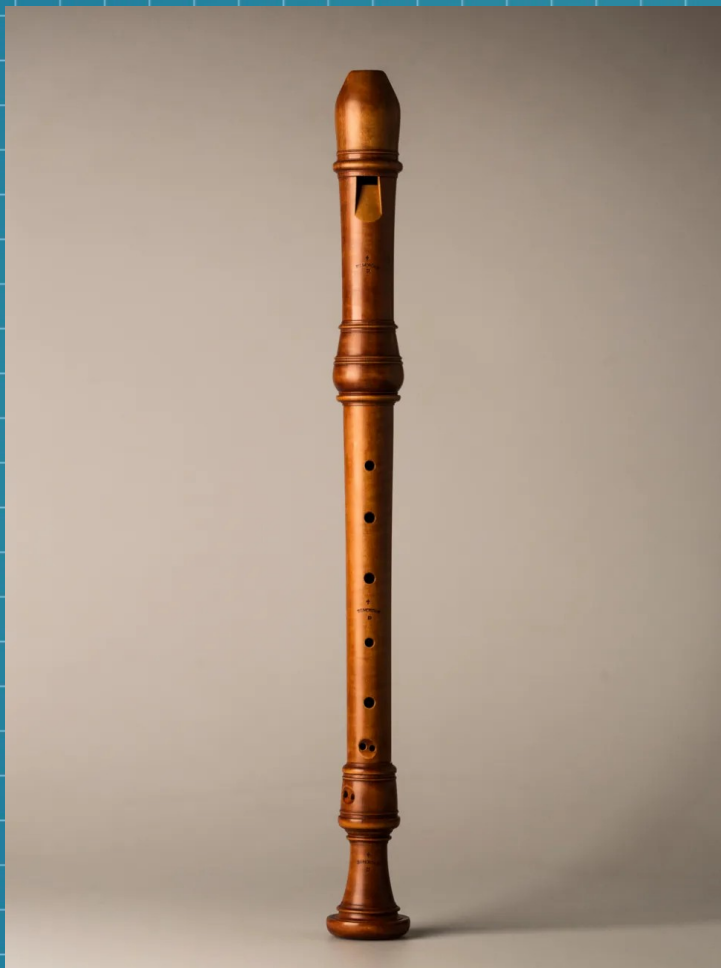


$$f = \frac{v}{2L}$$

$$v = 2L \cdot f$$

$$v = 2 \cdot 325\text{mm} \cdot 535\text{Hz}$$

$$v = 348\text{m/s}$$



Πηγές για τις φωτογραφίες ανά [διαφάνεια]

[2] <https://grobotronics.com/> <https://www.sparkfun.com/>

[3] <https://www.sparkfun.com/>

[4] <https://www.arduino.cc/>

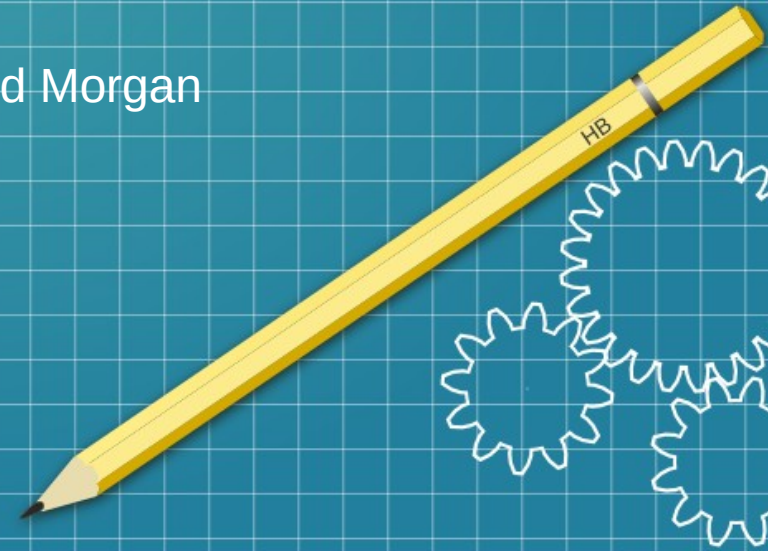
[5] <https://grobotronics.com/>

[10] , [11] <https://www.nakas.gr/el/> , <https://www.thomann.de/>

[13] <https://play.google.com/store/apps/details?id=com.stonekick.tuner>

[15] <https://www.audacityteam.org/>

[18] Baroque Alto Recorder After Bressan by Fred Morgan
<https://beautifulrecorders.com/>



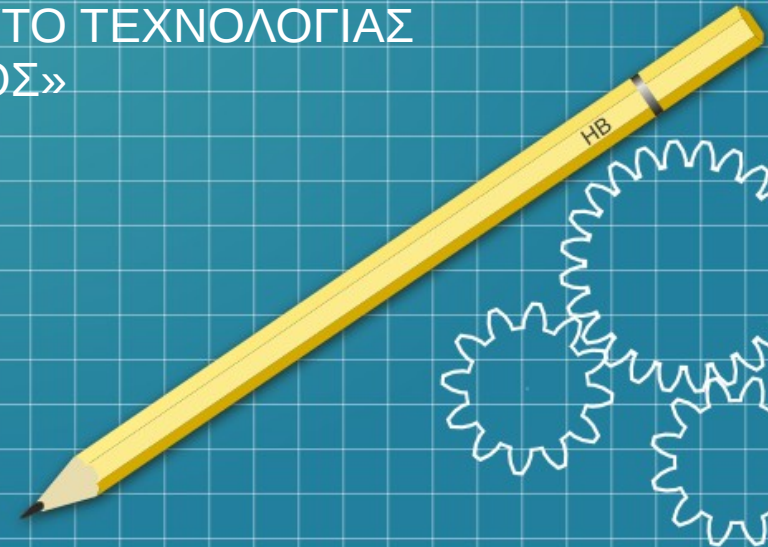
Βιβλιογραφία

Physics Bootcamp - Samuel J. Ling

<http://www.physicsbootcamp.org/planar-sound-wave.html>

Physics for Scientists and Engineers with Modern Physics - Raymond Serway - John Jewett

Φυσική Ομάδας Προσανατολισμού Θετικών Σπουδών & Σπουδών Υγείας
ΤΕΥΧΟΣ Γ' Γ' τάξη Γενικού Λυκείου ΙΝΣΤΙΤΟΥΤΟ ΤΕΧΝΟΛΟΓΙΑΣ
ΥΠΟΛΟΓΙΣΤΩΝ ΚΑΙ ΕΚΔΟΣΕΩΝ «ΔΙΟΦΑΝΤΟΣ»





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