AUDIO MODULE

Notes for Mario:

A fairly accurate transcription of the Mario theme tune if I may say so myself! We only need to adjust the speed.

- ⇨ For simplicity purposes regarding the project, my module generates C, E, G, A, F, D. These are the most common notes and make up to about 90% of the transcript I wrote down below. Referenced Nintendo documentation on original Mario.

^E ^E ^E
^C ^E ^G G

^C G E
A B Bb A
G ^E ^G ^A
^F ^G ^E ^C ^D B
^C G E
A B Bb A
G ^E ^G ^A
^F ^G ^E ^C ^D B

^G ^F# ^F ^D ^E
G A ^C
A ^C ^D
^G ^F# ^F ^D ^E
*C *C *C
^G ^F# ^F ^D ^E
G A ^C
A ^C ^D
^D# ^D ^C

^C ^C ^C
^C ^D ^E ^C A G
^C ^C ^C
^C ^D ^E
^C ^C ^C
^C ^D ^E ^C A G
^E ^E ^E
^C ^E ^G
G

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^C G E
A B Bb A
G ^E ^G ^A
^F ^G ^E ^C ^D B
^C G E
A B Bb A
G ^E ^G ^A
^F ^G ^E ^C ^D B

^E-^C G
G A ^F ^F A
B ^A ^A ^A ^G ^F
^E ^C A G
^E-^C G
G A ^F ^F A
B ^F ^F ^F ^E ^D ^C
G E C

^C G E
A B A
G# Bb G#
G-F#-G

- As can be found in the module, the frequencies are as follows:

C (Middle C, C4):	261.63 Hz
D (D4):	293.66 Hz
E (E4):	329.63 Hz
F (F4):	349.23 Hz
G (G4):	392.00 Hz
A (A4):	440.00 Hz

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BREAKDOWN:

The octave is divided into 12 logarithmically equal steps, each step being a semitone. This division means that the frequency ratio between any two adjacent notes (like C and C#, or E and F) is the twelfth root of two (21/1221/12), approximately 1.05946. This system allows for consistent intervals across keys, which is essential for the flexibility in modulation and transposition in modern music composition and performance.

Calculating frequencies:

To calculate the frequencies of the other notes from the reference pitch A4 = 440 Hz, you use the formula: Frequency of Note=440×2(n12)Frequency of Note=440×2(12n) where nn is the number of semitones away from A4. If nn is positive, the note is higher than A4; if nn is negative, the note is lower.

For example:

C4 (Middle C) is 9 semitones below A4. Hence its frequency is: 440×2−(912)≈261.63 Hz440×2−(129)≈261.63 Hz

D4 is 7 semitones below A4, so: 440×2−(712)≈293.66 Hz440×2−(127)≈293.66 Hz

E4 is 5 semitones below A4, so: 440×2−(512)≈329.63 Hz440×2−(125)≈329.63 Hz

F4 is 4 semitones below A4, so: 440×2−(412)≈349.23 Hz440×2−(124)≈349.23 Hz

G4 is 2 semitones below A4, so: 440×2−(212)≈392.00 Hz440×2−(122)≈392.00 Hz

Bo