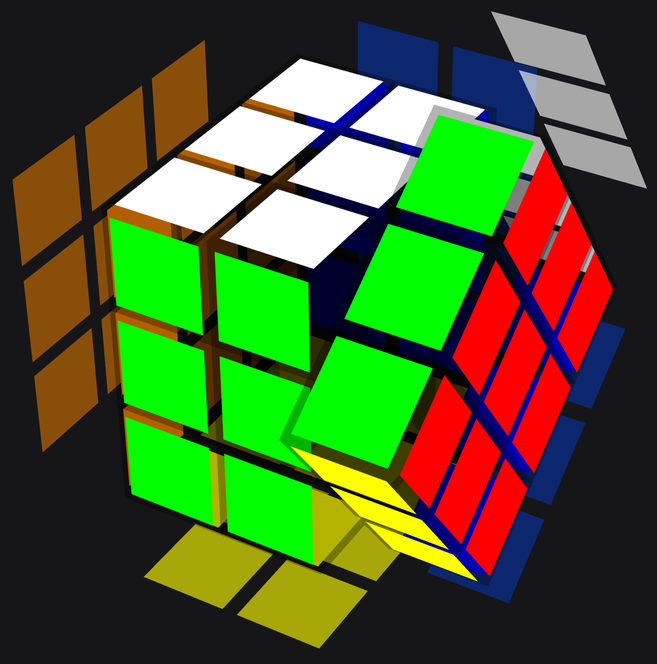
It is possible to build a smart Rubik's Cube by embedding speakers into the centercaps.



The pink bars represent a spectrogram (a type of audio visualization) of the tones played by the cube after each of the labelled face turns.

A computer can scan the audio, recognize the tone changes, and reconstruct the turn sequence.

What is a smartcube?

A smartcube is a special Rubik's Cube that can **record face turns** and **transmit them wirelessly** to another device.

This turn tracking makes it possible to **teach beginners** how to solve the cube and provides **detailed statistics for advanced solvers** who want to get faster.

Why use sound?

A speaker needs **fewer electrical components** than the Bluetooth transmitters used in current smartcubes, yielding a **cheaper** build that fits in **smaller** spaces.

This compact design also makes it possible to **convert a standard Rubik's Cube into a smartcube.**

How does it work?

Each face has a speaker that **plays a tone** to communicate its **current angle of rotation.** Turning a face changes the transmitted tone.

By **recording the tone changes,** an audio analysis algorithm can **reconstruct the turn sequence** applied to the cube.

Learn more!

D.I.Y. Smartcube
Tracking the Face Turns of a Rubik's Cube via Sound

An honors thesis by

Joseph Hale
B.S. Software Engineering
Certificate in Spanish Translation

links.jhale.dev/smartcube