Supervisor:
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Project #35

Self-solving Rubik's Cube

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Abstract

An internally powered, Wi-Fi connected, Internet-based, self-solving Rubik's Cube.

Challenges

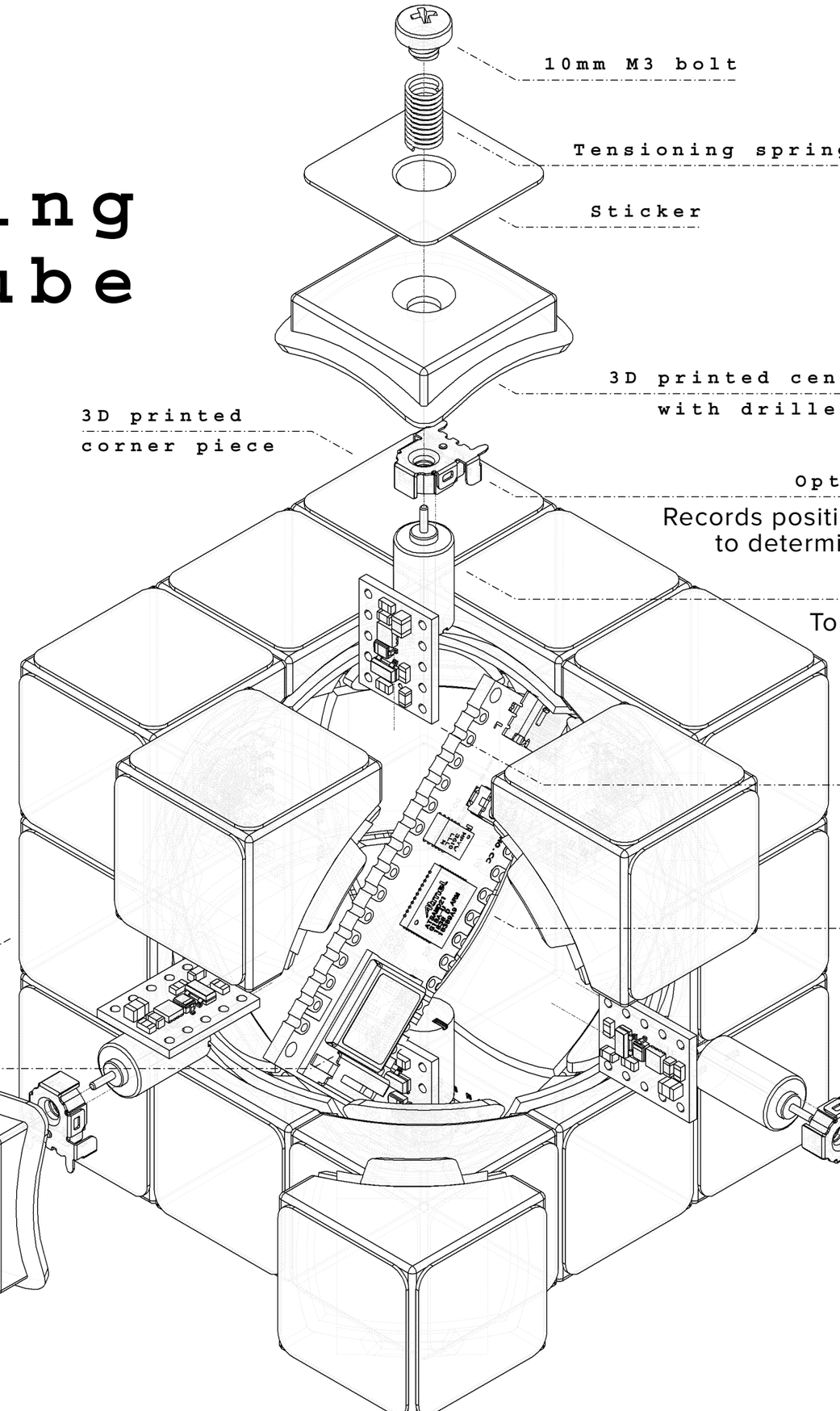
Designing a custom hollow Rubik's cube.

Miniaturising electronics to ensure they fit.

Minimizing the # of solving moves used due to limited battery capacity.

Selecting a solving algorithm that is both fast and calculates an optimal solution.

Choosing small motors that have enough torque to overcome friction between pieces.



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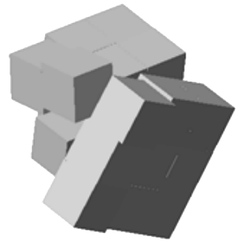
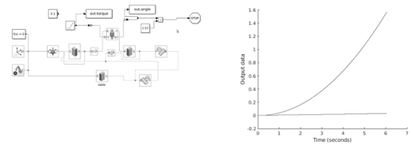
Holds cube in elastic tension, allowing some give between pieces. Stiffness value chosen based on that least likely to fall apart, using Simscape simulation.



Records position of each face, to determine cube's state.

Torque requirement calculated using Simscape.



Uses PWM to drive motors.

Records state of the Rubik's cube and stores it in a JSON object, which is passed on to the cloud solver's API.

Communicates with cloud-solving website to calculate a solution to solve the cube using DeepCubeA algorithm.

Solver algorithm chosen by MATLAB simulation, comparing performance.