Rubik's Cube Solver

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Since its invention in 1974, the Rubik's Cube has challenged users to solve a colorful puzzle in record time. While humans have managed to solve the puzzle in as little as 4.69 seconds, robots are able to do so in under a second. This seemingly impossible puzzle can be solved amazingly quickly through the use of algorithms - sequences of moves that move specific pieces of the puzzle from one location to another.

We propose a Rubik's Cube solving robot that implements such algorithms on an FPGA. The FPGA will interface with a web camera to sequentially observe each face of the Rubik's Cube in a scrambled state. We will implement a method for taking this raw photographic data and translating it into a representation of the scrambled state of the puzzle. We will then select an algorithm that takes as input the scrambled state of the Rubik's Cube and outputs a sequence of moves that solve the Rubik's Cube. This output will be translated into a series of instructions for six stepper motors that interact with the Rubik's Cube. Each stepper motor, controlled by stepper motor drivers connected to the FPGA, will turn a face of the puzzle.