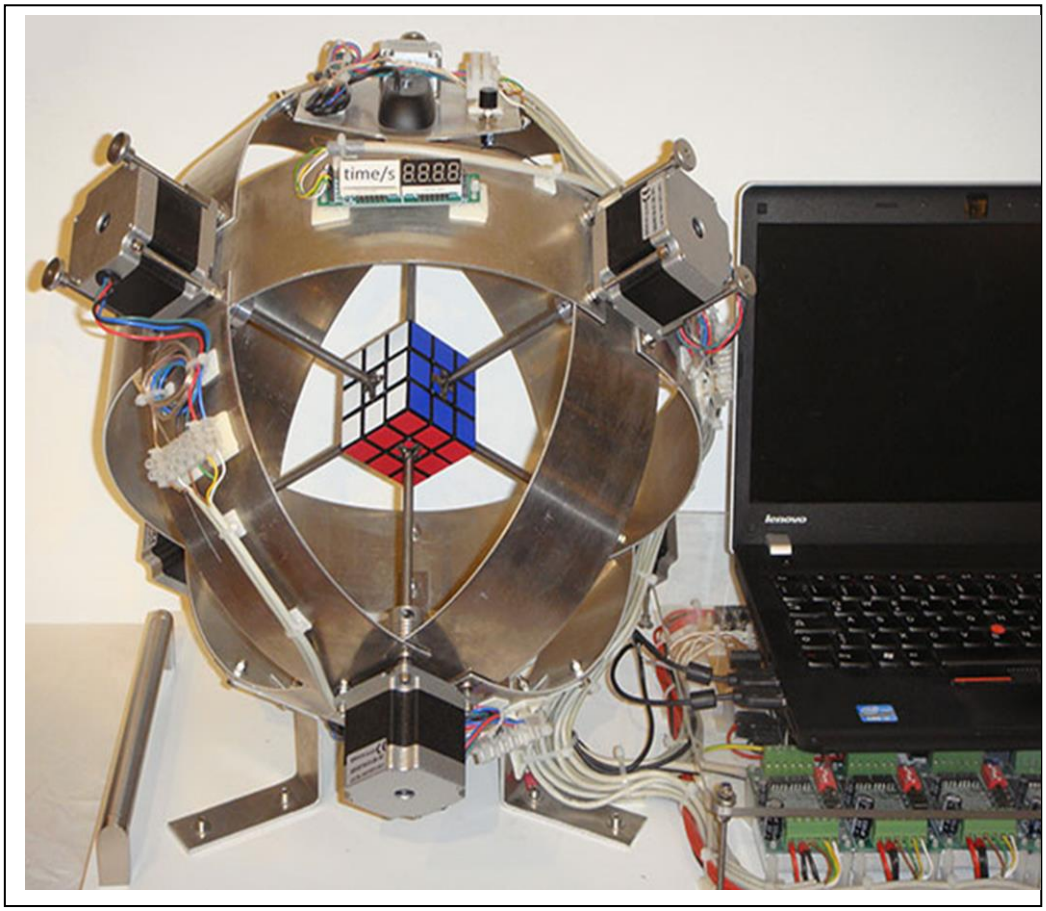
10/14/2019

KNEW PROJECT SYNOPSIS

RUBIK'S CUBE SOLVER



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RUBIKS CUBE SOLVING ROBOT

Aim: To develop an embedded system which can solve a scrambled Rubik's cube automatically.

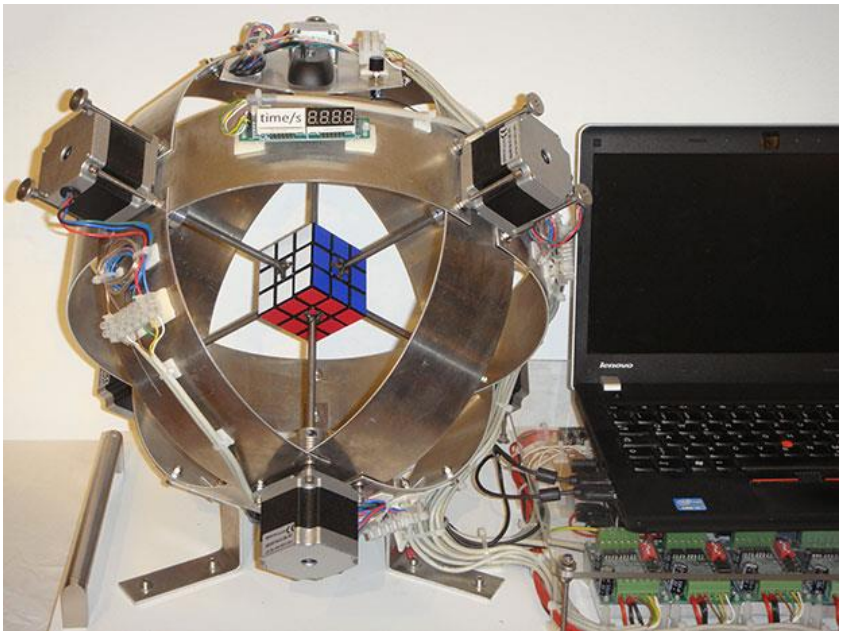

Fig1: A sample model of Rubik's cube solver

Components/ Equipment Required:

- Arduino MEGA development board with AT Mega 2560 microcontroller chip.
- Stepper motors (*6)- Nema 17
- Globe shape frame
- Arm extension rods for stepper motors
- Stepper motor drivers –ULN 2003 driver

- Rubik’s cube (3*3)
- Colour sensor TCS 3200

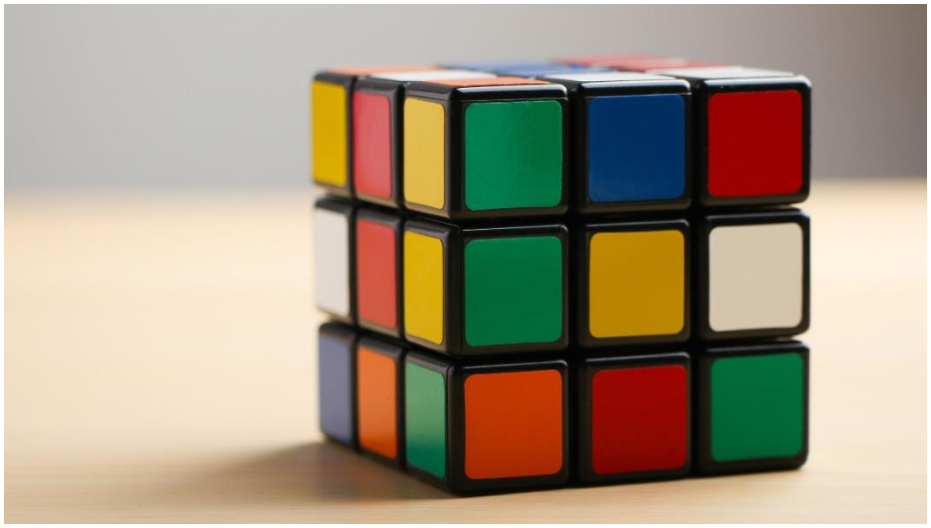

Fig2: A scrambled Rubik’s cube

Fig3: A Stepper motor

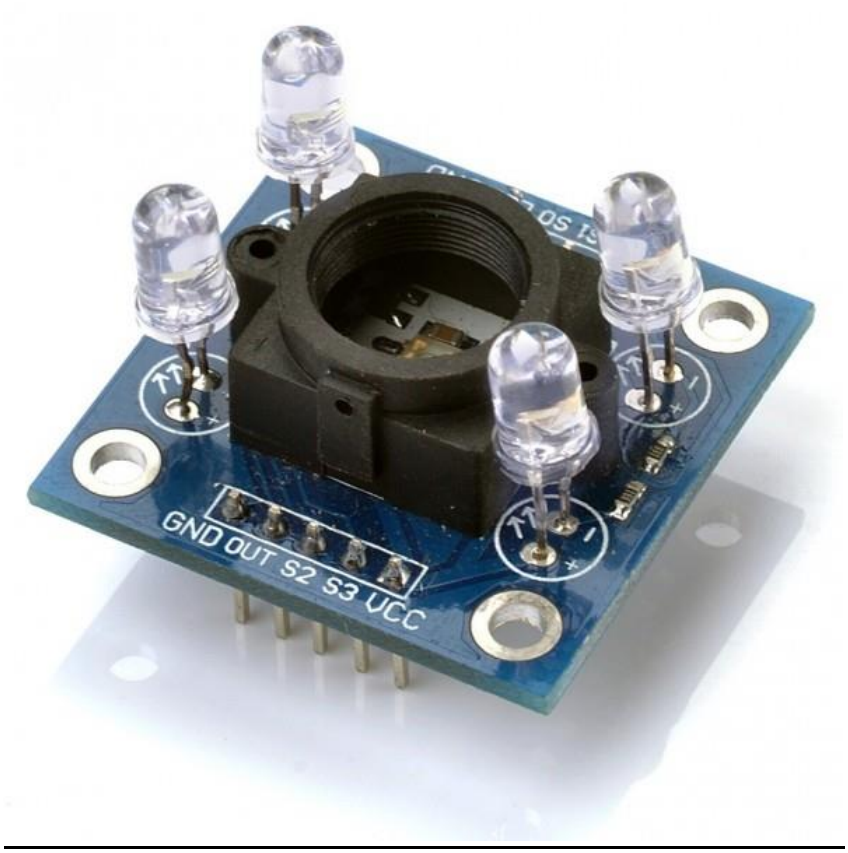

Fig4: A TCS 3200 Colour sensor

TECHNOLOGIES USED:

- Colour detection using **RGB colour sensor**
- Microcontroller-stepper motor interfacing
- **M2/R2 algorithms** for solving Rubik's cube
- Arduino MEGA development board

HOW WILL IT WORK?

- **Step1**: A scrambled Rubik's cube is placed in its position and fitted to the 6 stepper motors through their extended arms.

- **Step2**: When the "Start" button is pressed, two things happen:
  I. Timer starts counting the time.
  II. Colour sensor starts detecting colours of all variables (Edges and corners) using stepper motors

- **Step3**: The Arduino microcontroller then assigns the colour values to all the variables by using the colour sensor (TCS 3200) read values.

- **Step4**: The controller then generates the **solution String** specific for the scramble.

- **Step5**: The string then undergoes processing for getting the **optimal string** code.

- **Step6**: The cube will then be solved by decoding the string characters for different rotations of the six motors, once all the characters of the string code are decoded, the Rubik's cube will get solved.

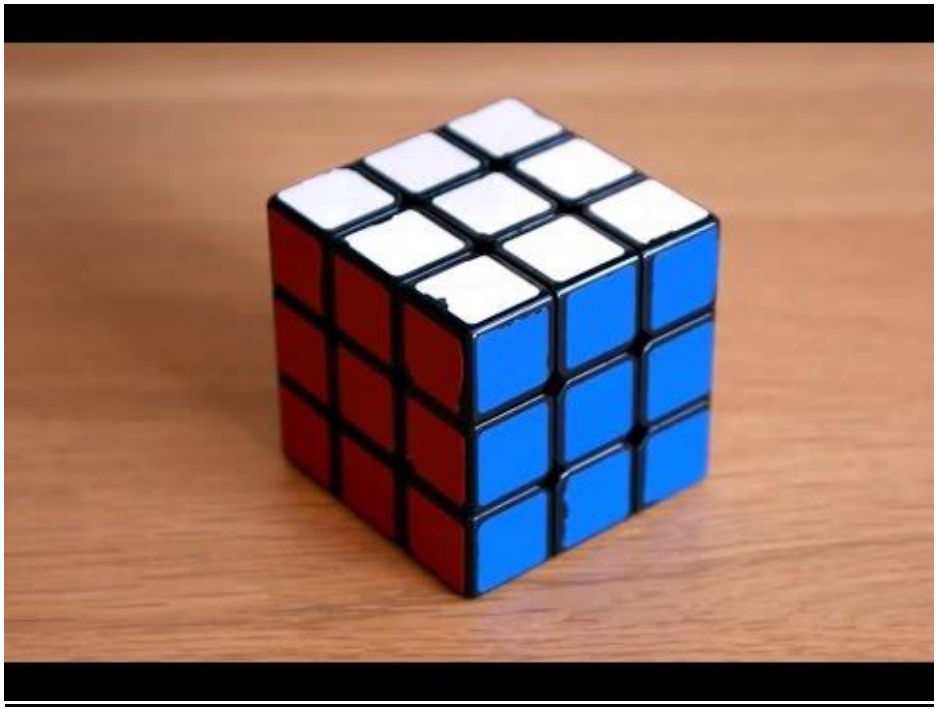

Fig5: A solved Rubik's cube

Result: A randomly scrambled Rubik's cube can thus be solved by using a programmed microcontroller.

References:

The source code:

https://github.com/NikhilAradhya/optimal-logic/blob/master/Rubiksm2r2.ino

Other references:

https://www.worldcubeassociation.org/

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Thank you