PROJECT NAME: Arduino controlled Rubik's Cube Solver

TEAM NAME: FANTASTIC 4

- **TEAM MEMBERS:**
  1. Pushkaraj Dhake (140070019)
  2. Tejeshwar Thorawade (140070015)
  3. Roshan Tathed (140040020)
  4. Mahen Kinnur (140040024)

- **PROJECT DESCRIPTION:**

  We have planned to make an Arduino controlled Rubik's cube solver. The initial stage of project will be more involved in preparing mechanical framework. Then, we will write algorithms and do coding of arduino for solving Rubik's cube.

  - **MODULE 1:**

    In module 1, we will make the bot such that it is completely sufficient in terms of mechanical aspects for solving the cube.

    The mechanism would be such that:

    We would be giving rotation to just the bottom face of the cube at once which would be placed on a steel base with a rotational degree of freedom. While it is obvious that any of the 6 faces can be made to be the bottom face of the cube, which allows us to make a change at every face. This things can be achieved with the help of a rod type mechanisms.

    The rotation at the bottom face would be in both the senses i.e. clockwise as well as anti-clockwise. The change of the bottom faces can be achieved with the help of servo motors.

  - **MODULE 2:**

    Module 2 will be started only after the success of module 1. So now it's easy to guess that we would be completing the 'software aspect. We will make the bot self-autonomous to solve the rubik's cube completely'. This will be done using the Arduino coding (which we are in the early phase of learning).

    The only conditions required will be the initial state of the rubik's cube given as an input by the user. This comprises of any five of the faces which will be decided by us.

- ▪ MODULE 3:

  We will do module 3 if module 2 is successful. If so, in module 3, we will include image processing by which bot will automatically scan the positions of blocks with their corresponding colours on each face and solve the cube.

  We would be taking snapshots of all the 6 faces in the image processing. These would be given as input to the code in a particular order decided by us after studying the rubbik's cube algorithm.

  The further execution will be the same as in the the module 2.

- TIMELINE: This is the basic schedule which we would be following:
  1. In the first week we will be trying to complete the base part of the bot which is being used for the change at the bottom face.
  2. In the second week we will be working over the rod mechanisms which will be used for bringing all the faces at the bottom position.
  3. Following one and half week will be reserved for the hardcore Arduino coding for the solver.
  4. The remaining time we will be utilizing for the implementation of the image processing.

- COMPONENTS REQUIRED AND APPROX. ESTIMATION OF COSTS:
  1. Rubik's cube
  2. Servo motors (6)
  3. Camera for image processing(Webcam)
  4. Arduino
  5. Misc. – Base of the bot, connecting wires, supporting rods, screws, pins, etc.

  Estimated Cost for the above components – Rs. 8000-12,000 .

- LEARNING EXPECTATIONS :
  - ▪ Basic programming on Arduino.
  - ▪ Image processing basics.
  - ▪ Making mechanical design efficient and attractive.
  - ▪ Rubbik's cube algorithm.