

## **The future of AI = the now of cubing**

Cubing is often associated with a set of algorithms and an intellectual mind while being called a “Brain puzzle”. Now, I won’t argue with that because it makes perfect sense, right?. But are humans the only group of minds that can solve a cube? Considering the fact that AI (Artificial intelligence) has already surpassed various human weaknesses, the answer isn’t too tricky. In fact, it’s rather obvious : Robotic cube solvers.

But one major question that we still need to answer is *How does a robot solve a Rubik’s cube?*

Well, there are various ways in which this can be achieved, some of which are as follows-

1. Using the Shadow Dexterous hand with a cage
2. Open AI’s all purpose “hand bot”

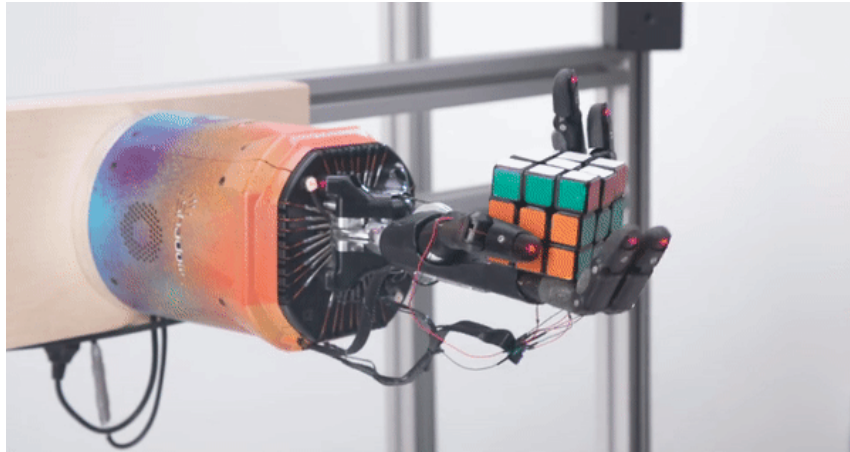
OpenAI’s cube solving robot has a success rate of 20% for maximally difficult scrambles and a success rate of 60% for easier scrambles within a specific time limit, although it can solve any scramble if given more time.

## **Fusing robots with cubing**

Solving a cube in this generation especially, is no longer a big deal for us. With a world record of 3.13 seconds, it is common to find teens obsessing over cubing competitions. But seeing the simultaneous exponential growth in technology, it seems only fair to bring computers and wires into picture, right? The use of robots is becoming more and more common by the day and although this hasn’t publicly been implemented (just yet :-D). From self-driving cars, to ChatGPT, our technology is expanding faster than our universe and an AI driven bot that solves Rubik’s cubes seems almost trivial. Actually, solving a cube is no big deal for any bot - just like playing chess is no big deal for them. The problem lies in the target time that we know robots can reach, but have not done so, yet.

## **What’s so Different?**

But then, why am I blabbering so much for something that is so commonly implemented already? Take a look at the GIF below:



The hand above is a part of a big bot which is supposed to simulate the actions of a human being. In today's world, it's common to see robots do various weird things but the main difference between those bots and this one is that all of those other bots do very specific tasks and if someone wants to live a fully automated life (which is definitely hyperbolic given that one can completely depend upon a bot for a living), they'd have to buy a million different "hands" to do each specific task and will still not live comfortably but imagine having a single bot simulating a human's behavior; that would simplify things, by a LOT.

So, coming back to the original question that we intended to get an answer to, what is so different about the hand in the demonstration above? The answer is this: It can be easy for a bot to solve a cube if that's the only task we need it to perform. In fact, if a robot is built solely for the purpose of solving a cube, then we don't need any Artificial intelligence at all! We can just program the bot for the different "cases" which one may encounter ("cases" means the different F2L or OLL or PLL cases). But, if a bot is being programmed to simulate human behavior, then an IF-ELSE algorithm simply doesn't justify that the computer is actually "thinking".

Furthermore, like you have probably noticed when you yourself solve a cube, we, humans, often try to find certain "shortcuts" (which in a professional cubing language is basically "Zeroing") to reduce work and time. But imagine a machine trying to skim through each and every possible case in hope to the right one... That will be time-taking (maybe just a second more, but remember, world records have differences of less than a second too!)... So, what can we do to cut off that extra 1 second? This explains the 'failed' attempts of Open AI's robot because of the time problems.

## **Another spice on the plate: Artificial Intelligence**

The answer lies in Artificial Intelligence. If we can teach a machine how to think like a human, then we could get it to improve on its own as it identifies the cause of a particular problem. This not only increases the efficiency of the computer but also consistently improves the time per solve. Take a look at the cubing bot developed by Ben Katz from MIT's Biomimetics Lab and electrical engineering student Jared Di Carlo.

Actual time taken per solve: 0.38 seconds.

See the power of AI? If you take the first example GIF and compare it with the one above, there's a difference of just about 2-3 seconds. And, although this time is quite insignificant in terms of our day to day life, for a bot like the one above, it means the difference between being "just average" or being a World Record holder.

Of course, solving a cube isn't the most important aim of AI, but even in the real world, wherein more than half of the people in road accidents die because of late medications, these 2-3 seconds could also just as effectively save a life.

“AI is likely to be either the best or the worst thing to happen to  
humanity.”

-STEPHEN HAWKING