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Teleportation Could Soon Be a Reality

As a kid, many of us have enjoyed watching those TV Sci-fi serials 'Star Trek', 'Doctor Who' or 'The Fly' where the characters would travel millions of miles in a jiffy via teleportation. And today, when I ruminate over the various mundane problems, teleportation can just do the trick. Those traffic snarls, road rages, vehicular pollution or even the human desire to work from his/her home or visiting all the beautiful and exciting places in the world, I think teleportation does hold a key to many of our problems.

And Lady Luck really seems to be smiling on us as scientists across the world are busy trying to make it a reality. Teleportation may be just as easy as scanning our body down to the subatomic level, annihilating all our favourite parts at point A and then transmitting all the scanned data to point B, where an intelligent machine reassembles us in a fraction of a second. Just visualise dematerialising from your drawing room and materialising the next moment in Los Angeles or Switzerland at will for a morning walk or commuting every day to your office in Washington from the home in Lucknow or Kolkata.

A group of scientists at the California Institute of Technology is said to have successfully teleported a photon over a distance of one metre in 1998. They could transport an atom three metres with 100% accuracy. Another group in Australia bettered this in 2004, by teleporting a whole stream of photons, in the form of a laser beam, from one side of their laboratory to the other. They are said to have done it by using pairs of particles, through 'quantum entanglement' method.

Basically, two photons were so 'entangled' that they shared the same information. Thereafter, one of them was sent via cable to another point. Then, laser was used to change the data on one of the photons, which were copied to the other one immediately—due to the entanglement effect. The original photon was eventually destroyed, leaving only the copy behind. At the end, the original photon was gone, and only copy existed in another place.

The 'quantum entanglement' technology enables someone holding a particle to send, instantaneously, a chunk of information to someone else holding the other particle. Because of the weird quantum connection, the information goes from one person to the other without

physically passing between them. Quantum teleportation is a process by which quantum information (e.g. the exact state of an atom or photon) can be transmitted exactly from one location to another, with the help of classical communication. Because it depends on classical communication, which can proceed no faster than the speed of light, it cannot be used for superluminal transportation.

For beaming a solid object from one to another place, we need to turn the solid matter of the particle (paper clip, person or whatever) into information which is then sent to a destination via electrical cable, or transmitting the same in the form of radio waves. Then, the signal is received and processed to create an exact copy at the other end. As now it is both here and there, we need to destroy the original object so it isn't at the earlier location anymore; it's here instead.

As we know, all solid objects are made of atoms, and in order to copy or teleport an entire object, there is first the need to have all the information about every atom in the object. An ordinary steel paperclip contains around one thousand billion trillion iron and carbon atoms, structured into a simple, cage-like formation. The human body, however, contains around seven thousand trillion-trillion atoms—seven billion times more than a paperclip. There are multiple types of atom including hydrogen, oxygen, calcium, sulphur et al in a human body, and they are ordered in infinitely more complex ways than the simple, replicating cage-like structure of the paperclip.

Every atom in a human body is a set of data. The individual, like Captain Kirk, is nothing but a huge collection of those data sets. Extracting all the information from Captain Kirk's body requires knowing the physical state of every atom, which would require total disintegration. Every time Kirk steps into the transporter, he is committing suicide and then getting reborn at the other end. Second, the amount of information required to re-create him is staggering as mentioned above. Nobody knows how to collect and transmit that much information. Slightest disturbance during the process of reassembling can ruin quantum entanglement thereby inherently scrambling the information. This only means suicide at one end without rebirth at the other. Processing so much information would be practically impossible. Any slip-up and we may end up with our leg sticking out of our head, or our organs jutting inside out.

Physicists like Charles Bennett suggest that even if we can't do it now, teleporting an atom is theoretically possible. Star Trek-style 'beaming up' of people through space could become a reality sometime in near future. Nothing in the laws of physics fundamentally forbids the teleportation of large objects, including humans. If we believe that we are nothing more than a collection of atoms strung together in a particular way, then in principle it should be possible to teleport ourselves from one place to another. If realised for humans, this amazing technology would make it possible to travel vast distances without physically crossing the space between. Global transportation will become instantaneous as will be interplanetary travel.

As and when it happens, many of our problems would just disappear. We would no longer have to worry about increased vehicular pollution, or irritating traffic jams or an unfavourable

posting away from our home. We can attend a meeting in Washington the very next moment after having breakfast at our Kolkata or Lucknow home; could be back home immediately after the meeting, have a cup of tea with the spouse and can together take a walk by the Nile thereafter in the evening. We could be back again for the family dinner in time at Kolkata or Lucknow or Jhumaritilaiya as the case may be. After all, who ever thought of having a face-to-face conversation with our near and dear ones physically sitting thousands of miles away? If human ingenuity could realise its dreams of flying or mobile telephony, teleportation should definitely not appear that far-fetched. Mind you, many of scientific inventions and discoveries were unimaginable at one point of time to our forebears.

Salient Points

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Glossary

Jiffy: a very short time
Ruminate: to chew again or over and over
Ingenuity: cleverness or skilfulness of conception or design