International Journal of Science and Research (IJSR)
ISSN: 2319-7064
SJIF (2022): 7.942

The Closest Humanity has Come to Time Travel

Anhad Khurana

High School Student (Grade 12, Non-Medical), Sat Paul Mittal School, Ludhiana, India
Email ID: *anhadkhurana008008[at]gmail.com*

Abstract: ***This article explores the concept of time travel through the lens of space technology. It talks about the James Webb Space Telescope (JWST) as the most advanced telescope ever deployed. The article explains how observing distant galaxies allows us to see light from the past, shedding light on the origins and composition of our universe. It delves into the functioning of the JWST, emphasizing the need to maintain low temperatures and describing the intricate sun shield designed to achieve this. Also, the article addresses the question of why space missions are worthwhile, arguing that space exploration and discovery have led to advancements and solutions in various fields.***

Keywords: JWST, Time Travel, Space Technology, Aerospace, Astronautics

1. Introduction

Is it even possible to travel in time? Technically, yes. All of us are traveling in time at a whopping rate of 1 second per second. But is this what you think when you hear the words time travel? What actually comes to mind is the kind of time travel shown in movies like 'Doctor Who', 'Back to the Future', 'And Doctor Strange', in which the characters hop into some crazy vehicle and create parallel timelines. Although it might not be possible to physically blast into the past or the future, it is possible to take a glance into the past, to the edge of time itself.

The James Webb Telescope is the most advanced telescope ever launched into space. The Webb Telescope was launched into space on 25th December 2021, to answer the many questions that astronomers have been pondering for the past many years. With a hefty price tag of about $10Billion, one expects the telescope to function and deliver on its goal. But for the Webb telescope to achieve its potential goals, a lot of functions and procedures have to go just right. The deployment sequence of the Telescope is so complicated thatNASA has identified over 300 single-point failure items and 50 major deployment issues which must function for optimal science. [1]

Time Travel… But how?
One might ask how looking into a telescope might relate to taking a peek into the past. Consider this: the light from the sun takes approximately 8 minutes and 20 seconds to reach us here on our home planet Earth. When we look at the sun, we aren't seeing the sun in the present time. Instead, because of the delay of 8 minutes in the light from the Sun reaching us, we see the sun how it was approximately 8 minutes in the past. So, say, for instance, the sun disappears into the void of space, we wouldn't notice that here on Earth until after the 8 minutes and 20 seconds have passed

Now let's apply this concept on an even larger scale. The farthest galaxies in the cosmos are located about 13 billion Light Years away from us. When the light from these distant galaxies reaches us, we can see what these galaxies used to look like 13 billion years ago.

Why can't we see the light from these distant galaxies?
The answer to this question is quite simple. The electromagnetic spectrum shows us various types of EM-Waves. Out of all of these EM-Waves, we can see just 0.0035%, namely the "Visible Spectrum".

Our universe is expanding, thus causing the distance between the celestial bodies to increase. When the EM-Waves from these different galaxies reach us, their wavelength "stretches out" or displaces towards the red side of the visible spectrum, and eventually below the red light into the category of Infrared Rays.

The James Webb Telescope detects these IR Rays to study the origin and composition of our universe.

How does the James Webb Telescope work?
IR Rays are given out by any object that radiates heat. Any IR Rays given out by the telescope during its working would interfere with detecting the Infrared Rays from the galaxies under study. Thus, for the optimal working of the telescope, temperatures as low as 50K (-223℃) must be maintained. To avoid this problem, a sun shield has been installed on the Telescope. This sun shield is made up of 5 layers of an artificial material called "Kapton", each layer (except the one facing the sun) being thinner than an individual human hair (0.025mm). Every layer has a coating of Aluminium and the two outermost layers have a coating of doped silicon. [2]These sun shields have an area larger than a full-sized tennis court.

Also, the location where the Telescope is being deployed helps in reducing the temperature. The 2nd Lagrange Point (L2 Point) has been chosen as the deployment location for the telescope, as it orbits the sun while staying in line with the Earth and at a constant distance of 1.5 million Kilometres away from the Earth. Here, the Earth blocks most of the direct light from the sun, thus keeping the telescope cool and in proper working condition.

A general rule of thumb in telescopes is that the larger the mirror, the more light is captured by the telescope. The mirror of the James Webb Telescope's mirror is about 5 times larger than the mirror of the Hubble Telescope. Also, the mirror has a coating of 24-karat gold over its surface,

this is because gold reflects red and Infrared Rays the best. The telescope's mirror thus has 98% reflectivity.

Where is the James Webb Telescope now?

After about 30 years in the making, the James Webb Telescope embarked upon its journey to "Unfold the Universe" at 0720 hours EST on the 25th of December, 2021 on an Ariane 5 rocket from Europe's Spaceport in French Guiana. At L+27 minutes, the JWST separated from the Ariane 5 booster.

Next, the JSWT team started to unfold the delicate sun shield on the 3rd of January, 2021. On 4th January, after the successful deployment of all 5 layers of the sun shield, 75% of the 344 single-point failures have been retired. [1] [3] On 9th January, the Mirrors of the Webb Telescope were latched into place by highly skilled team members.

On 25th January, the Webb Telescope successfully completed its burn to start on its orbit of the 2nd Lagrange Point, where it shall orbit the sun, in line with the Earth.

On the 16th of March, the mirror alignment process had been successfully completed. The Telescope's optical performance is set to meet (or even exceed) the scientific goals the observatory was built to achieve.

As of today, the JWST is in proper working condition and we had already received the first-everfull-colour images and spectroscopic data from the telescope on the 12th of July, 2022.

Why should we spend so much money on space missions when we have so many problems here on Earth?

Let me ask you a question. Why did our ancestors spend so much time figuring out agriculture, when they could have spent that time perfecting hunting? Reaching new heights and goals often creates solutions and opportunities for problems in other fields.

The first person to step foot on Mars is alive right now. He or she might be in school or college, and he or she might be reading this article at this very moment. As humans, we have an "inbuilt" need to answer the questions that intrigue us the most. And it is only imagination, exploration, and creativity that can help us in answering these them.

"We are just an advanced breed of monkeys on a minor planet of a very average star. But we can understand the Universe. That makes us something very special"

-Stephen Hawking

References

[1] Chelsea Gohd, https: //www.space. com, 3 Nov 2021, "There are over 300 ways that the new James Webb Space Telescope could fail, NASA says"
[2] NASA, https: //webb. nasa. gov, "About the Sun Shield"
[3] Nancy Atkinson, https: //www.universetoday. com, 4 Jan 2022, "Success! Webb Sunshield Now Fully Deployed"