
EPIC
CHALLENGE JNS
Halil Ibrahim Uluoglu

Existing Reference Idea Document

Problem and Idea Title

Solution Instruction Developing - Simulations

Author

Halil Ibrahim Uluoglu, UEF

Description

Mars has very rough conditions for human beings. It is very fatal compare to our planet Earth. As human-beings , we increase our knowledge about Mars and its unique conditions. However, It is still hard to predict all problems can happen. Fortunately, we can provide a solution with some techniques to fix immediately unpredictable problems. One of the solution developing method is simulations. Within simulations, we can create -at least with our knowledge- as same as conditions that Mars has. Nasa has unique simulations environments for solution instruction developing.

Bigelow Expandable Activity Module: Expandable habitat technology for astronauts.

Space Launch System/Orion Crewed Spacecraft/Space Launch Complex: Ensuring transportation capability for Mars missions and other challenging missions.

Asteroid Redirect Mission: Improving solar energy systems for the journey to the Mars.

Deep Space Network/Near Earth Network/Space Network: Significant communication tools for humans and robotic participants.

Rovers: Nasa sends vehicles to discover and develop instructions for can cause problems. Mars Exploration Rover, Perseverance, Curiosity, Insight Lander, Mars 2020, etc.

SimLabs: Developing new space shuttle vehicles.

Hi-Seas(Hawaii Space Exploration Analog and Simulation): Analog habitat for our journey to the Mars in Hawaii.

Instruction with Keywords

References

https://www.nasa.gov/press-release/nasa-releases-plan-outlining-next-steps-in-the-journey-to-mars
https://mars.nasa.gov/mer/
https://www.nasa.gov/simlabs/simulate-future-space
https://en.wikipedia.org/wiki/HI-SEAS

Idea Document

Sub-problem
Solution Instruction Developing

Author
Halil Ibrahim Uluoglu, UEF

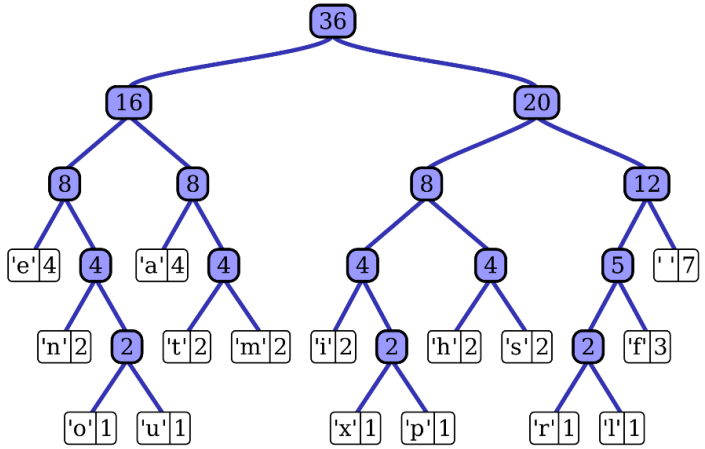
Description
The Communication method is highly important for sending solutions from Earth to the astronauts on Mars. All communication between Mars and Earth can happen with satellite. The minimum distance from the Earth to Mars is about 54.6 million kilometers(not often). Because of this enormous distance between Earth and Mars, a considerable delay signal happens between two planets even signal has the speed of light. It can take 3 to 22 minutes to reach a signal. Also considering the reply of the signal it can take a while for communicate.

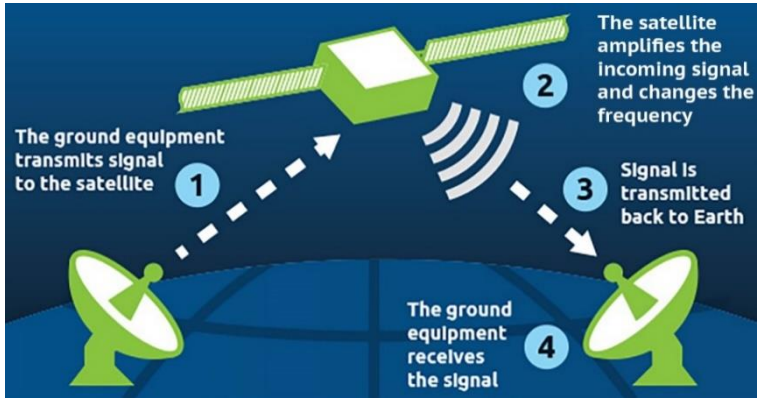
Such this case, the information /solution instructions which you send is highly significant. At this point, my idea is to use compression algorithms to send voice messages to the astronauts. There are methods for compression the file such as Huffman Coding, Elias Code, Unary Coding, SimHash, Parity Check Matrix, etc. The most well-known and efficient algorithm is Huffman Coding.

Huffman Coding: The Huffman Algorithm is a compression algorithm that represents the most used characters with shorter bits and the least used characters with longer bits. For instance, let's accept a word like "aaaaaaaccs". Structure of computer we represent 1 letter with 1 byte. So this word is 10 bytes long in computer memory. Instead of using, 10 byte long word we can represent (most used)a -> 0, s -> 10 c -> 11 . So, to represent our word we just need 7a*1bit + 2c*2bit + 1c*2bit = 12 bit which it is just 2 bytes long in the memory. So we applied a %80 reduction to our speech.

For solution instructions, we can record voice and apply this algorithm to our voice and reduce to file size. Then, we can send this file via satellite to the astronauts. The astronauts can use a special program which installed before their computers can convert to compressed file into a regular voice message. So, The time for instruction can efficiently reduce.

Instruction with Keywords





References
https://mars.nasa.gov/all-about-mars/night-sky/close-approach/
https://www.mars-one.com/faq/technology/how-does-the-mars-base-communicate-with-earth
https://www.geeksforgeeks.org/huffman-coding-greedy-algo-3/
https://en.wikipedia.org/wiki/Data_compression
https://www.mars-one.com/faq/technology/how-does-the-mars-base-communicate-with-earth