DON’T PANIC

Experiment Design Document

Working with experts on Earth: Video/Phonecall vs. Simulations on earth

Question (uncertainty)

Does working together via phonecall make it easier to find a solution than simulating an issue on earth without constant connection?

Author

Simon Plank, Karelia UAS

Method

1. I will try to let my roommates figure out solutions to different problems alone and with a connection with delay from a few seconds to a few minutes to each other.
2. One part of the experiment is to describe 20 exercises one after another to one of them, he then has to describe a part of the exercise for his partner in written form, who is in another room. This person then gets the message to solve the part of the exercise and send the solution back to the first one to help him finish the exercise.
3. The second part of the experiment is to connect them together via a delayed phone call (can be done with an app for rooted Android phones) and let them solve another 20 similar exercises together.
4. Finally, the participants try to solve 20 exercises while being connected via a standard voice call via WhatsApp without delay.

The exercises are comparable/similar to each other. Mostly logical, mathematical and common knowledge exercises were used.

Prediction

I think, that finding solutions on earth alone is faster than working together on a (video)call

Model/Rationale

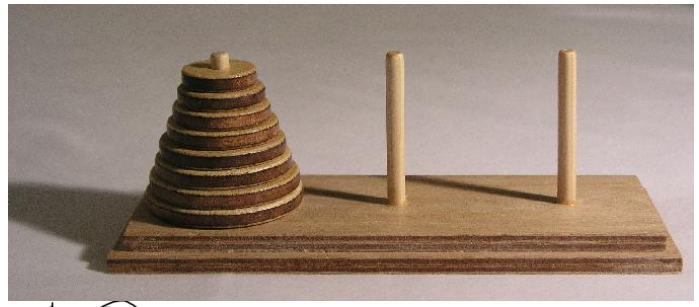
It is easier to let “one” expert or one side work alone on a problem (on a simulation or exact replica) than connecting two via a call that has a delay of about two minutes in both directions because they are constantly waiting for the a reply because without they cannot continue

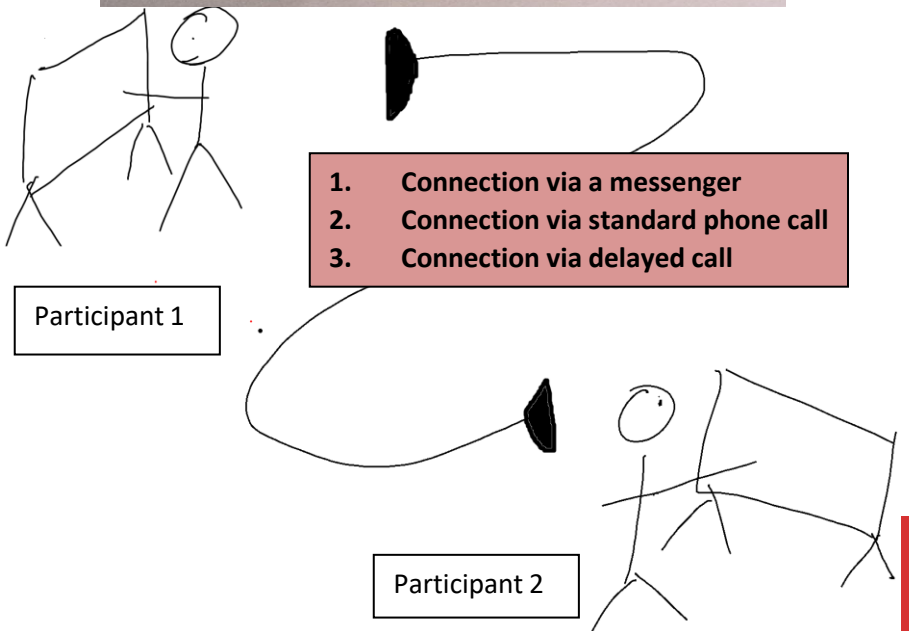
Illustration w. Keywords

Example exercise

One of the exercises the two participants had to solve was “The tower of Hanoi”. The objective of the puzzle is to move the entire stack to another rod, obeying the following simple rules:

1. Only one disk can be moved at a time.
2. Each move consists of taking the upper disk from one of the stacks and placing it on top of another stack or on an empty rod.
3. No larger disk may be placed on top of a smaller disk.





Experiment Results and Insights

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Results

- The 20 exercises I let my roommates solve separately in their rooms could be solved in an average time of 4:33 minutes.
- The 20 exercises I let my roommates solve connected together with a delay could be solved in an average time of 9:01 minutes.
- The 20 exercises my roommates had to solve together while being connected normally could be solved in an average time of 2:52 minutes.

Insights

The results suggest that if it is not possible to work together on a call without delay the fastest, most efficient solution is to let one of the two separate teams work on a problem by themselves. Especially when only one of the sides has a specific knowledge about a certain field this makes the process of finding a solution easier.

Experiment Design Document

High redundancy: Taking only robot crane tool vs 3d printing parts and tools

Question (uncertainty)

Is communication with the Huffman Coding algorithm as good as from being in the same simulation room at Mars for instruction solution developing?

Author

Halil Ibrahim Uluoglu, UEF

Method

Firstly, I will search which simulation environment has been using for space missions. Also, I will use a 3d model that I created for our concept idea. Then, I will create a Huffman Coding algorithm for messaging using Java programming language. I will output the result of the algorithm.

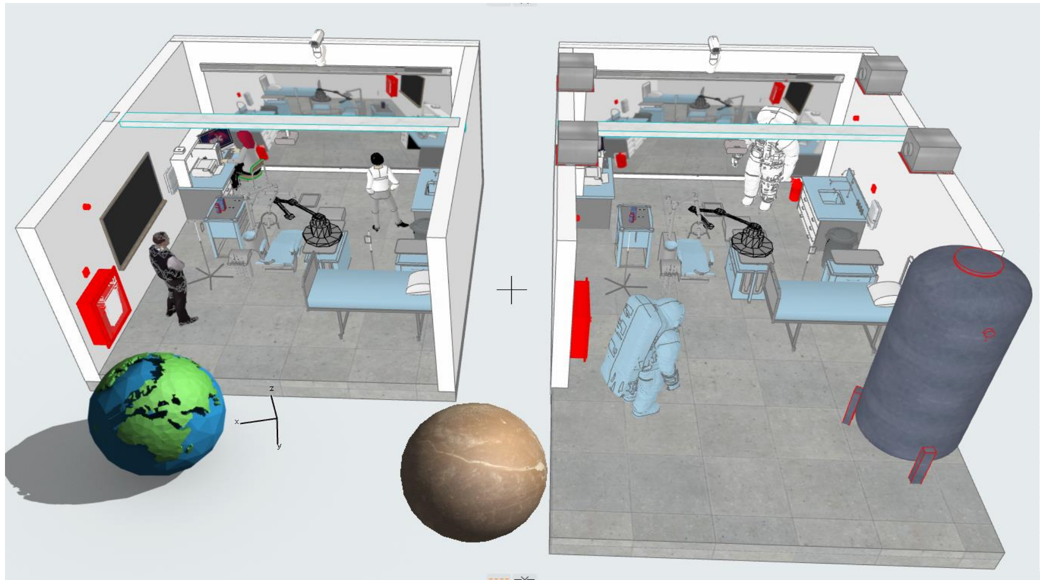
Prediction

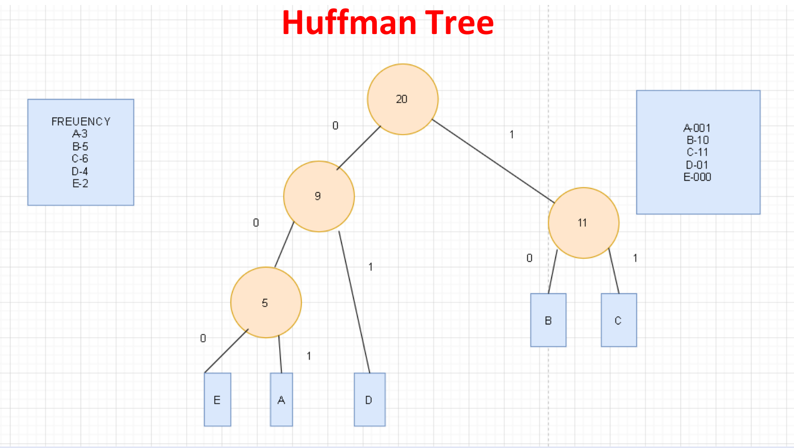
- Based on test data compression, using Huffman algorithm makes transmission as fast as with the reference idea.
- Simulation room can have multiple angles to see the problem and develop a solution for the problem.
- Huffman Coding can make quite fast communication for solution instruction developing.

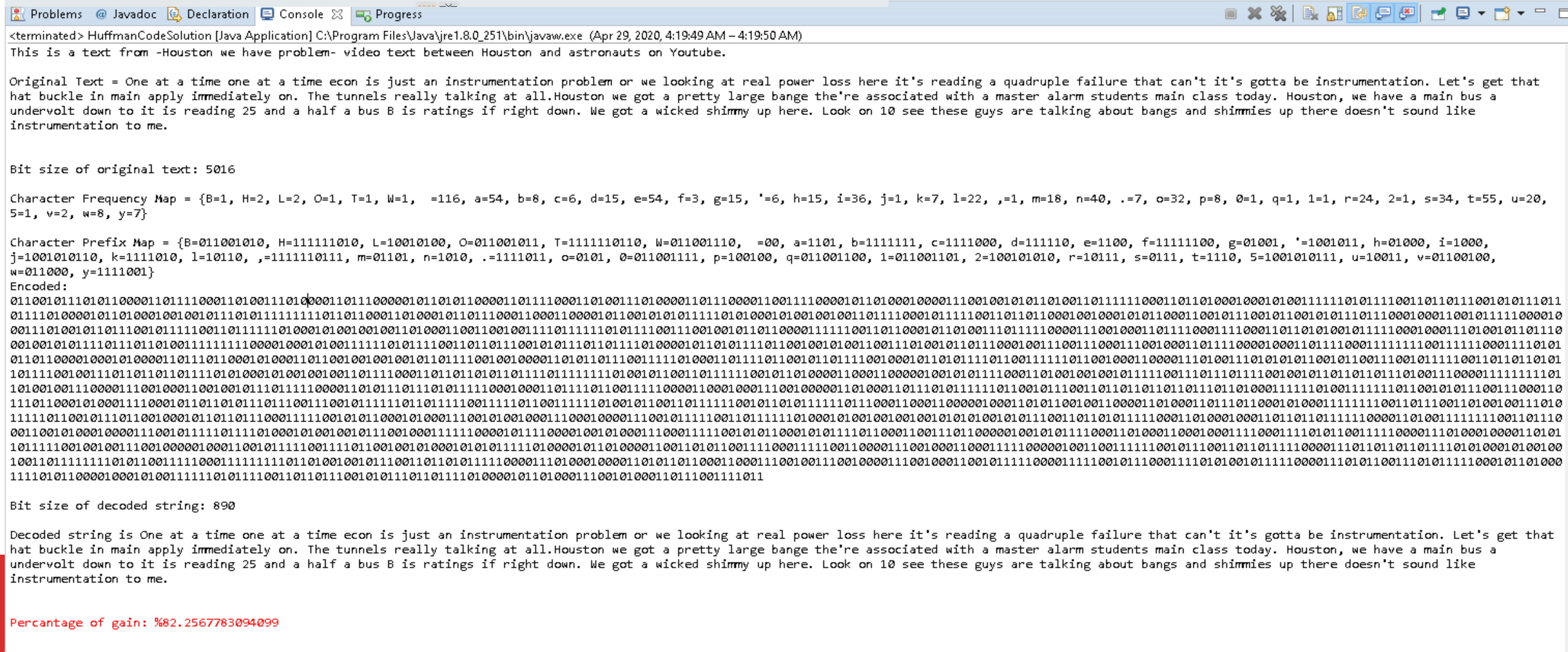
Model/Rationale

We believe that solution instruction developing is a very significant task for experts on Earth. Because It can be fatal every movement for astronauts on Mars. The experts must think every steps very cautiously. In this model, the simulation room needs to be created early from the Mars exploration. Also, experts need to learn basic computer program skills for the program with the algorithm in it.

Illustration w. Keywords






Problems @ Javadoc Declaration Console Progress
<terminated> HuffmanCodeSolution [Java Application] C:\Program Files\Java\jre1.8.0_251\bin\javaw.exe (Apr 29, 2020, 4:19:49 AM – 4:19:50 AM)
This is a text from -Houston we have problem- video text between Houston and astronauts on Youtube.
Original Text = One at a time one at a time econ is just an instrumentation problem or we looking at real power loss here it's reading a quadruple failure that can't it's gotta be instrumentation. Let's get that hat buckle in main apply immediately on. The tunnels really talking at all.Houston we got a pretty large bange the're associated with a master alarm students main class today. Houston, we have a main bus a undervolt down to it is reading 25 and a half a bus B is ratings if right down. We got a wicked shimmy up here. Look on 10 see these guys are talking about bangs and shimmies up there doesn't sound like instrumentation to me.
Bit size of original text: 5016
Character Frequency Map = {B=1, H=2, L=2, O=1, T=1, W=1, =116, a=54, b=8, c=6, d=15, e=54, f=3, g=15, '=6, h=15, i=36, j=1, k=7, l=22, ,=1, m=18, n=40, .=7, o=32, p=8, 0=1, q=1, 1=1, r=24, 2=1, s=34, t=55, u=20, 5=1, v=2, w=8, y=7}
Character Prefix Map = {B=011001010, H=111111010, L=10010100, O=011001011, T=1111110110, W=011001110, =00, a=1101, b=1111111, c=1111000, d=111110, e=1100, f=11111100, g=01001, '=1001011, h=01000, i=1000, j=100101010110, k=1111010, l=10110, ,=1111110111, m=01101, n=1010, .=1111011, o=0101, 0=011001111, p=100100, q=011001100, 1=011001101, 2=100101010, r=10111, s=0111, t=1110, 5=1001010111, u=10011, v=01100100, w=011000, y=1111001}
Encoded:
Bit size of decoded string: 890
Decoded string is One at a time one at a time econ is just an instrumentation problem or we looking at real power loss here it's reading a quadruple failure that can't it's gotta be instrumentation. Let's get that hat buckle in main apply immediately on. The tunnels really talking at all.Houston we got a pretty large bange the're associated with a master alarm students main class today. Houston, we have a main bus a undervolt down to it is reading 25 and a half a bus B is ratings if right down. We got a wicked shimmy up here. Look on 10 see these guys are talking about bangs and shimmies up there doesn't sound like instrumentation to me.
Percantage of gain: %82.2567783094099

Experiment Results and Insights

High redundancy: Taking only robot crane tool vs 3d printing parts and tools

Question (uncertainty)

Is communication with the Huffman Coding algorithm as good as from being in the same simulation room at Mars for instruction solution developing?

Author

Halil Ibrahim Uluoglu, UEF

Results

- Huffman Coding algorithm succeeded to increase %82 percent of gain from a template text. (Bit size of original text: 5016 – Bit size of decoded string: 890 – Percentage of gain: %82). It can understand like this: The algorithm can present 100 letters text within 18 letters.
- Huffman Coding algorithm can able to make a very fast communication environment for solution developing the algorithm for experts that apart from each other.
- Simulation environment enables every angle that astronauts have. It allows to see every detail for instruction developing.
- The experts can access and test every element in the simulation room. Also, they can feel the same environment with astronauts, so it helps to understand the inside of the problem. It produces right on spot solutions.

Insights

The findings suggest that communication with Huffman Coding algorithm and being in the same simulation room for solution instruction developing are quite good two options. They produces fast and reliable outcome for developing solutions.

Experiment Design Document

Disinfecting the fixed medical equipment at the level required for surgeries:

Simulation on for same situation vs Using compression algorithms

Question (uncertainty)

Is Concept 2* better than the reference* from the perspective of disinfecting the fixed medical equipment at the level required for surgeries?

Author

Charles Rambo, UEF

Method

I will interview Dr. David Baker about the effectiveness and reasonability of using the Mars atmosphere as a disinfecting solution.

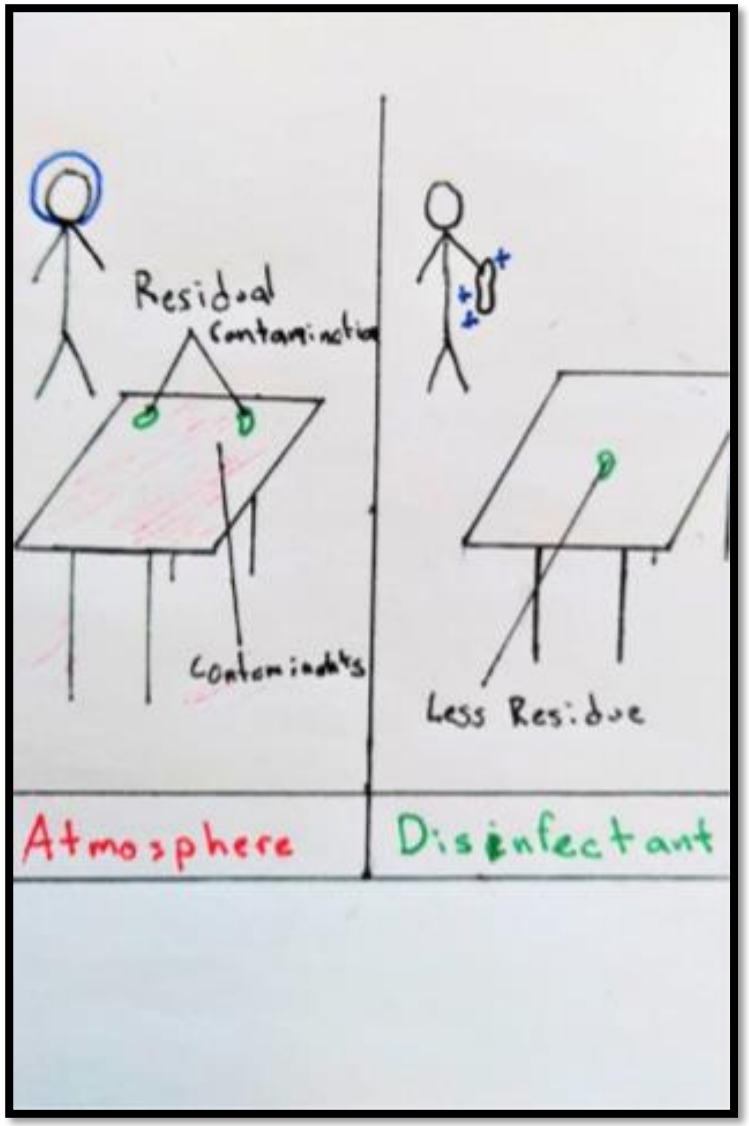
Prediction

The atmosphere will have disinfecting properties however we will learn that using the atmosphere cannot be relied on to disinfect to a surgical level.

Model/Rationale

I believe that using atmosphere for disinfection will generate other issues and importantly will be less effective at disinfecting the surgical robot than using the chemical disinfectants of the reference.

Illustration w. Keywords



***Concept 2:** Video+Simulation for same situation+2d barcode alphanumeric+Xr/Vr instructions+Mars Environment

***Reference Idea:** Symbology and Satellites+Simulation for same situations+2D barcode Alphanumeric+Robot Crane+Chemicals,germicides

Interview with Dr. Baker

Experiment Results and Insights

Disinfecting the fixed medical equipment at the level required for surgeries: Simulation on for same situation vs Using compression algorithms

Question (uncertainty)

Is Concept 2* better than the reference* from the perspective of disinfecting the fixed medical equipment at the level required for surgeries?

Author

Charles Rambo, UEF

Results

Dr. Baker believes that that the UV radiation that the Mars surface experiences is a good source for disinfection

Insights

From Dr. Baker's advice, if the design of the lab is adjusted such that it can be exposed to the natural UV radiation via a window of something we can disinfect and avoid the outside contamination that the environment might create.

Experiment Design Document

Solution Instruction Developing: Simulation on for same situation vs Using compression algorithms

Question (uncertainty)

Is taking raw material, printing 3d parts, and tools better than only taking necessary tools in Mars exploration considering redundancy perspective?

Author

Halil Ibrahim Uluoglu, UEF

Method

I will create a scenario and record a video from a video game simulation which is based on real physical rules and facts.

Prediction

- Based on expert estimation, It is important that to bring what you need considering about every pound is worth 10K$ even more for Mars. In this matter, It is to bring just raw material and convert to useful tools and parts. Also, It is good to recycle the tool and make another tool for its purpose. Therefore, 3D printing provides high level redundancy for Mars exploration.
- Taking raw materials more convenient than taking only some tools because you may able to convert raw materials to different tools.
- Therefore, we think printing tools will make good difference about time and cost.

Model/Rationale

We believe that if we want to understand and see the real results of the Mars atmosphere outcome and for this challenge, we need to arrange the same conditions as same as the real world. So, we use a video game simulation for this better and deeper understanding of this experiment. It based on facts and physical rules. Therefore, using this game for the experiment will help us to see millions of possible probability atmosphere and It will show quite close real results.

Illustration w. Keywords

If you can't play the video, please click here to go the video source.

Experiment Results and Insights

Solution Instruction Developing: Simulation on for same situation vs Using compression algorithms

Question (uncertainty)

Is taking raw material, printing 3d parts, and tools better than only taking necessary tools in Mars exploration considering redundancy perspective?

Author

Halil Ibrahim Uluoglu, UEF

Results

- Time and cost are one the main issues, so it is important to consider wisely. Therefore, taking only some tools increases redundancy because of reusability.
- Taking raw materials and printing parts and tools method is can create different tool options.

Insights

The findings suggest that some basic changeable possibilities are fixed for general purpose such as which material type. It is assumed that the materials suit printing tools and parts for this purpose. Also, including the life of a tool is important for redundancy. If a tool runs out of its time, converting that tool is a better option comparing from throw away.