
EPIC
CHALLENGE JNS

Requirement	Importance	Reference: Symbology and Satellites+Simulation for same situations+2D barcode Alphanumeric+Robot Crane+Chemicals,germicides	Concept 1: Optical Satellite+Using compression algorithms to send files+360° 3D-Cameras+3d printing parts and tools+Chemicals, germicides	Concept 2: Video+Simulation for same situation+2d barcode alphanumeric+Xr/Vr instructions+Mars Environment	Concept 3: Symbology Satellite+Phone Call+2D Camera to sense parts+3d-printing+ Boiling
1.Shall assist astronauts to repair robotic surgery equipment	3		+1	+1	+1
2.Shall allow experts on Earth who are not physically in the same space to collaborate and develop instructions for astronauts	2		0	+1	0
3.Shall minimize a chance of incorrect assembly	2		+1	+1	0
4.Shall minimize total time required to fix the medical equipment	1		-1	0	-1
5.Shall disinfect the fixed medical equipment at the level required for surgeries	2		0	+1	-1
6.Shall work on Mars	3		0	+1	0
7.Shall have high robustness	1		+1	0	0
8.Shall have high redundancy	1		+1	0	+1
TOTAL		0	6	10	1

Evaluation Table

Team 1

1st REQ: Shall assist astronauts to repair robotic surgery equipment

1st CONCEPT: Optical Satellite+Using compression algorithms to send files+360° 3D-Cameras+3d printing parts and tools+Chemicals, germicides

- **+1 Score.**
- **Based on personal estimation the 360° cameras allow experts to have a look at everything that is going on and lets them assist the astronauts during the process effortlessly. Using optical satellites increases the bandwidth which enables the usage**

Evaluation Table

Team 1

4th REQ: Shall minimize total time required to fix the medical equipment

1st CONCEPT: Optical Satellite+Using compression algorithms to send files+360° 3D-Cameras+3d printing parts and tools+Chemicals, germicides

- **-1 Score.**
- **Based on personal estimation the process of printing all the parts with a 3D-printer takes much more time than using stored parts brought to Mars in advance - in medical emergencies every minute counts so there is no time to wait for the printer**

Evaluation Table

Team 1

2nd REQ: Shall allow experts on Earth who are not physically in the same space to collaborate and develop instructions for astronauts

1st CONCEPT: Optical Satellite+Using compression algorithms to send files+360° 3D-Cameras+3d printing parts and tools+Chemicals, germicides

- **0 Score.**
- **Based on test data compression, using Huffman algorithm makes transmission as fast as with the reference idea.**

Evaluation Table

Team 1

5th REQ: Shall disinfect the fixed medical equipment at the level required for surgery

1st CONCEPT: Optical Satellite+Using compression algorithms to send files+360° 3D-Cameras+3d printing parts and tools+Chemicals, germicides

- **0 Score.**
- **The concepts idea and the reference idea are the same.**

Evaluation Table

Team 1

3rd REQ: Shall minimize a chance of incorrect assembly

1st CONCEPT: Optical Satellite+Using compression algorithms to send files+360° 3D-Cameras+3d printing parts and tools+Chemicals, germicides

- **+1 Score.**
- **Based on the personal estimation the 360° 3D cameras and 3D tools decreases chance of incorrect assembly because astronauts can have deeper understanding about the problem with different angles.**

Evaluation Table

Team 1

6th REQ: Shall work on Mars

1st CONCEPT: Optical Satellite+Using compression algorithms to send files+360° 3D-Cameras+3d printing parts and tools+Chemicals, germicides

- **+0 Score.**
- **Based on personal estimation the both concepts are designed for Mars so it is the main idea that they need to work on Mars properly.**

Evaluation Table

Team 1

7th REQ: Shall have high robustness

1st CONCEPT: Optical Satellite+Using compression algorithms to send files+360° 3D-Cameras+3d printing parts and tools+Chemicals, germicides

- **+1 Score.**
- **3d printing parts and tools have very high durability and different tests (1,2) show that they can easily replace parts that are usually made out of other materials. In addition it is easy to produce many parts on location if more are needed.**

Evaluation Table

Team 1

8th REQ: Shall have high redundancy

1st CONCEPT: Optical Satellite+Using compression algorithms to send files+360° 3D-Cameras+3d printing parts and tools+Chemicals, germicides

- **+1 Score.**
- **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.**