



Figure 4 – Compass

### 3. Conclusion

In this work the navigation and orientation devices used in ancient time were studied. Some examples of orientation determination such as Kamal, astrolabe, namesake, and compass were given. Except that is possible to use natural phenomena to determine the position of object and to navigate.

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### **Requirements for Life-Sustaining Activity in Space Vehicles**

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Active space exploration began in the second half of the XX century. In April 12, 1961 Yuri Gagarin made the first manned flight into space. The flight lasted 108 minute. It confirmed that a man can successfully endure the conditions of space flight keeping ability to work. At that time, the life support system provided flights lasting up to 10 days. However, the space research required more time. Thus scientists were actively involved in improving the conditions for life-sustaining activity in space vehicles. Despite the fact that space is extremely hostile environment to human life, the record for the longest flight is 803 days. The optimal conditions for life on a spaceship and a good training program for astronauts contributed to the record. [1], [2], [3].

Even now, when the experience of near-Earth flights is amounted to years, life support in space remains an extremely difficult technical and medical problem. Life-support system includes devices and supplies for the uninterrupted supply of the crew with air, water and food. Let us consider the factors that influence the effective work of the crew.

The essential component to support life is air. It is necessary not only for breathing, but also for the guarantee of the external pressure. Besides air transfers heat which is continuously emitted by the human body. Depressurization is one of the most serious dangers in space leading to the loss of air. To maintain the atmosphere, carbon dioxide and water vapor are removed by physical and chemical methods using various sorbents [3].

Drink and meals are essential human needs after breathing. Every crew member has an individual mouthpiece for drinking which is placed on the board syringes of the water system "Spring". The tubes with sublimated food are also put there. The water to the International Space Station (ISS) is delivered mainly by the cargo flights "Progress" and "Space Shuttle". There is no shower on the station and the crew use wet towel wipes. As for food, the norm of the daily intake is about 500-600 grams of food. Nowadays the food for the ISS crew is more diverse than earlier. It includes both dehydrated and ready-made meals. Fresh vegetables and fruits are sometimes served on board [3].

The developers of space stations and ships are concerned with the protection of the crew from space radiation. It consists of charged particles, mostly protons and electrons, as well as high frequency electromagnetic quanta. Some of them come from the Sun, some from deep space. Passing through the human body, radiation causes the ionization of the matter disrupting the irradiated cells, tissues and body [3].

Emergency or accidental situations do not occur often, but it is necessary to be ready for them. The sudden depressurization of units, acute disease of the astronauts or some sort of "space force majeure" may require emergency evacuation of the crew to Earth. Thus, a guard space vehicle "Union" is always docked to the ISS and serves as a lifeboat.

The safety precautions are very important for the crew. To reduce the impact of the acceleration states, developers try to distribute the weight evenly when an astronaut rests in the chair. They design anthropomorphous chairs with individual inserts – seat liners. The seat liners are made to fit astronauts individually. The astronaut's pose is also very important in descending. It should not let the blood pour off the brain. After landing, the astronauts undergo a careful medical examination.

Thus, the essential difference between the profession of an astronaut and other professions is the presence of aggregate factors of a space flight. These factors negatively influence the human body and they should be overcome by special measures (technical, psychological, medical, etc.).

#### References:

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