spacecraft, it is usually beneficial to wait until the solar max to use it because then it brings down three times faster than average.

In summary, the operation of GOLD has a lower risk of disabling than other operational satellites and a lower risk of creating large orbit debris. In addition, GOLD does not require an operating satellite to provide attitude stabilization or power as with propulsive de-orbit. GOLD can be integrated onto the satellite prior to launch or attached to derelict satellites by robots. De-orbit from LEO can be reduced, in some cases, from many centuries to as little as a few months. Finally, GOLD can assist civilian, commercial and military space satellite operators in meeting their obligations to mitigate the growing space debris problem in a cost effective and low risk way.

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PEDOMETER – PULSOMETER

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A pedometer is a special device which designed to automatically calculate the traveled man’s steps. Currently, pedometers are used not only by military or athletes, but also by all those who take care of their health. Handed pedometer is a way to control calories. There are various types of this device, among which primarily mechanical and electronic one distinguish. Mechanical pedometer, which is attractive to its low price, has the following principle of operation. Each step forces to move from side to side some weight in the device. As a result levers move – it is the result of counter indications increasing. Electronic pedometers have broader

functional capabilities. They not only count steps passed, but take into account the body weight, and measure speed, distance and heart rate(Fig 1). Due to the pedometer it is possible to monitor the amount of calories burned and the concentration of body fat and blood pressure. Such devices are gaining importance in recovery period after diseases of the cardiovascular system.

Fig 1. Electronic pedometer

The wrist pedometer(Fig 2) has an error in the testimony which is in the range of five to ten percent. Counting steps is carried out by multiplying their number on the stride length. For more accurate results, you must learn how to properly use the device. It is believed that ten thousand steps a day helps to maintain a healthy weight, increase efficiency, prevention of cardiovascular disease and lower levels of depression and stress conditions. But this figure is individual and depends on the individual, the state of his health and lifestyle. Measuring the distance traveled, the pedometer measures based on the number of steps multiplied by the stride length.[1]

Fig 2. Wrist pedometer

The monitor of heart rate.

The first samples of this device consisted of a box and the two electrodes, which were attached to the chest.

Modern heart rate monitors usually consist of two components: the chest strap and the sensor on the wrist receiver, GPS-navigator and mobile phone. Normally to obtain good contact sensor electrodes are wetted with water or a

special gel. Nearly all heart rate monitors have additional functions: clock, stopwatch, timer, statistics, time spent in a given heart rate zones, audible alarm pulse output from a given area. When entering the age, weight and height unit provides calculators BMI, calories burned, the burned fat, the latter is activated only when the pulse is usually above 120 beats / min. heart rate zones, you can choose from the options for the various degrees of training, or ask at your discretion.

More advanced models offer a heart rate monitor to measure the average and maximum heart rate, respiratory rate and frequency for estimating parameters associated with fitness - training, memory training circular. If the receiver is a GPS-navigator, the data can be compared with a moving speed, lifting speed, height and so on.

The chest sensor: The chest sensor - the most accurate sensor for detecting the pulse. Mounted on the chest with a special belt, it has a self-contained power supply, triggered when a heartbeat. It passes a signal over a distance up to 70 cm in the wristwatch receiver. The hands remain free.

Fig 3. Chest sensor of pulsometer

Built-in sensor: Heart Rate Monitors without a chest strap is now possible to determine the pulse rate simply by touching the two electrodes on the heart rate monitor body for a few seconds. These devices are popular because of the convenience and ease of use, even though they do not provide the same high accuracy as heart rate monitors that use the chest strap.

Sensor blood pulsation: The sensor on the earlobe or finger. Defines pulse blood pulsation in tissue. The sensor is mounted on the arm. By means of electrodes, it registers the potential difference in the skin at the time of contraction of the heart and thus measures the pulse rate at the current time. Previous information wirelessly transmitted to the receiving device, and as a result the athlete sees the on-screen heart rate monitor heart rate numeric value and can draw conclusions as exercise affects his heart.[2]

The following components are selected heart rate - to develop a pedometer:

• Microcontroller AtMega328 (Arduino nano)

• Sensor Real Time Clock (Tiny RCT I2C)
• Accelerometer sensor
• LCD - Display (LCD2004)
• The pulse sensor

Operation principle

Three-axis accelerometer for Arduino(Fig 4) based MMA7361 chip is capable to capture motion in three axes - X Y Z. With LCD2004(Fig 5) displays the number of steps the user passed and real time(Fig 6). By simple arithmetic microcontroller calculates the path traversed by man and displays. The path depends on the length of human steps:

$S = l * n$,

where S - the path; l- length of the step specified by the user;

n - the number of steps;

Calculation of calorie is calculated by the following formula:

$E = (0.007 * v^2 + 21) * m$,

where E - energy consumption; v - velocity of distance in m/min, m - mass of user - defined;

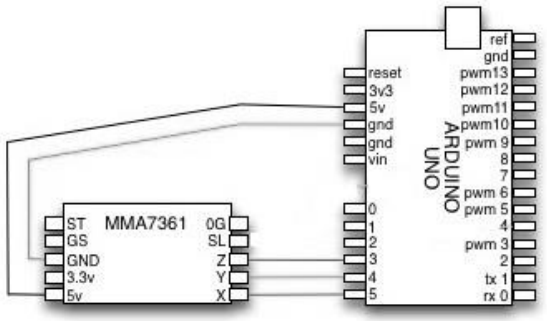

Fig 4.Connection Arduino with accelerometer(MMA7361)

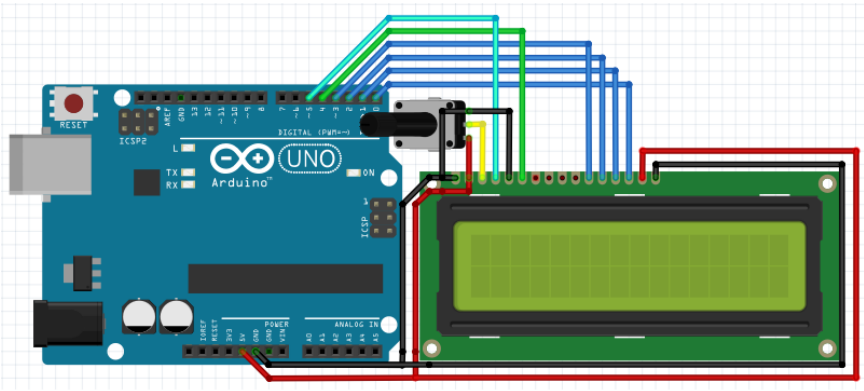

Fig 5.Connection LCD1602 with Arduino

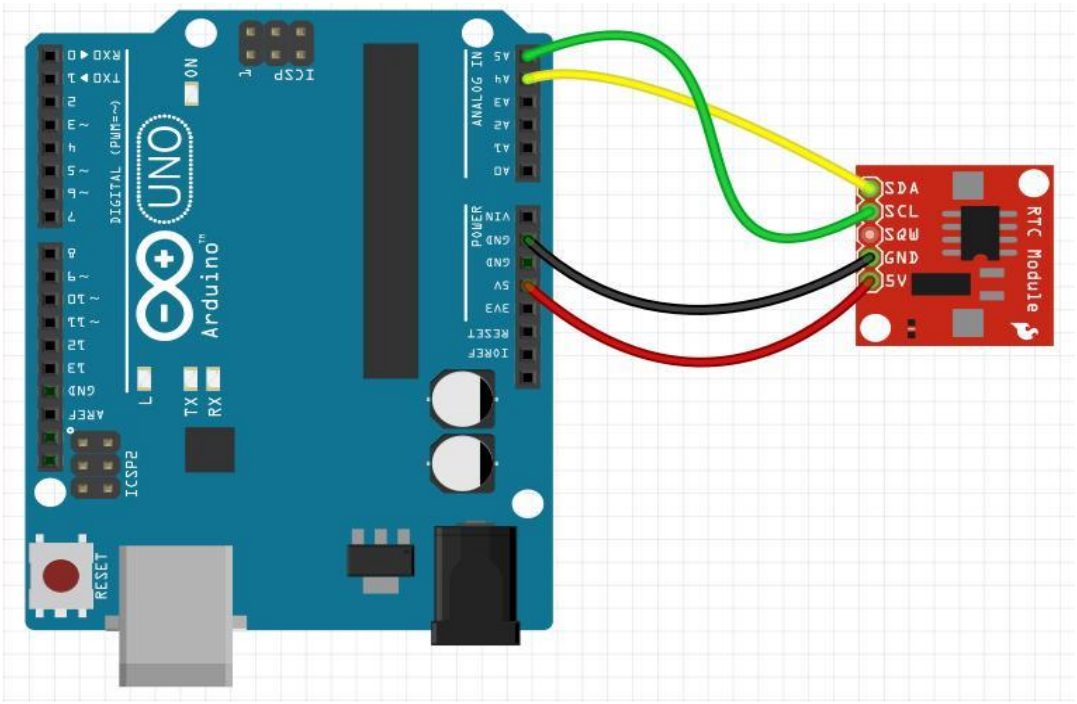

Fig 6. Connection Sensor Real Time Clock with Arduino

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COMPARISON OF X-RAY DIAGNOSTIC UNITS “PROTON” AND “MOVIPLAN”

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X-ray units are widely used in modern medicine to diagnose and treat a variety of diseases. Depending on the purpose, X-ray units are divided into medical and technical. In our research, we are going to consider medical X-ray units. They are divided into roentgen diagnostic and roentgen therapy units. Roentgen diagnostic units can be: stationary, mobile and portable. Roentgen therapy units can be general-purpose and specialized [1].