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THE DEVICE FOR DETERMINING THE DIRECTION OF THE INFRARED RADIO WAVES ARRIVAL FROM A BRIGHTLY CONTRASTING OBJECT

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An analysis of radar methods. Various ways of viewing are mentioned by moving the directional beam of a radar antenna. A review of the main physical phenomena directly affecting the radar. An assessment of the most promising parts of the device to accomplish the goal of the study. The characteristic of the main parameters of the key elements of the device is shown. The proposed parameters for the technical performance of this device. The results of the study can be used to develop a device for determining the direction of arrival of infrared radio waves from a brightly contrasting object.

Determining the direction of physical quantities arrival is one of the most important aspects in radar systems. Radiolocation is a field of science and technology that combines methods and means of locating (detecting and measuring coordinates) and determining the properties of various objects using radio waves. Radionavigation is a close and somewhat overlapping term, but in radio navigation an object plays a more active role, the coordinates of which are measured, most often this is the definition of its own coordinates. The main technical device radar - radar station (radar). Distinguish active, semi-active, active with a passive response and passive radar. Radars differ in the range of radio waves used, the type of the probing signal, the number of channels used, the number and type of measured coordinates, the installation location of the radar.

There are two types of radar:

1. Passive radar is based on receiving the object's own radiation;

2. With active radar, the radar emits its own probing signal and receives it reflected from the target. Depending on the parameters of the received signal, the characteristics of the target are determined.

Active radar is of two types:

With an active response - the facility assumes the presence of a radio transmitter (transponder), which emits radio waves in response to a received signal. The active response is used to identify objects, remote control, as well as to obtain additional information from them (for example, amount of fuel, type of object, etc.);

With a passive response - the request signal is reflected from the object and is perceived at the receiving point as a response one.

To view the surrounding space, the radar uses various ways of viewing by moving the directional beam of the radar antenna:

- circular;
- sector;
- overview of the helix;
- conical;
- in a spiral;
- "V" review;
- linear.

In accordance with the type of radiation radar are divided into:

- radar continuous radiation;
- pulsed radar.

Radar is based on the following physical phenomena:

- radio waves are scattered by electric inhomogeneities (objects with other electrical properties that differ from the properties of the propagation medium) encountered on the path of their propagation. In this case, the reflected wave, as well as the radiation of the target itself, makes it possible to detect the target;
- at large distances from the radiation source, we can assume that the radio waves propagate in a straight line and at a constant speed, due to which it is possible to measure the distance and angular coordinates;
- the frequency of the received signal differs from the frequency of the emitted oscillations due to the mutual displacement of the receiving and emission points (the Doppler effect), which makes it possible to measure the radial velocities of the target moving relative to the radar;
- Apassive radiolocation uses the radiation of electromagnetic waves by the observed objects, it can be thermal radiation characteristic of all objects, active radiation created by the technical means of the object, or spurious radiation created by any objects with working electrical devices.

The purpose of this work is to develop a device for determining the direction of arrival of the infrared radio waves from a brightly contrasting object [1-4].

Principle of operation of the device. The diagram contains 4 infrared receivers, they work in pairs. Those. each pair is responsible for turning the motor on its axis. With the passage of IR radiation through the lens, it will be focused at a certain point. If the spot does not uniformly illuminate all the plates, then a potential difference will occur and a pulse is generated at the receiver output, which is fed to the motors. If it is positive, then the motor moves in one direction, and if it is negative, then in the other. By the same principle, the second pair of the receiver and the motor works, the only difference is that each pair drives the motor moving along its axis, one along the X axis, and the second along Y.

Simultaneously with the work of the motors, the circuit responsible for the derivation of coordinates works. The MPU6050 chip is the main element of the GY-531 module. It has an accelerometer, a gyroscope and a temperature sensor. During the movement of the gyroscope and accelerometer, the information received is stored in the registers of the chip. The transfer of the value to the microcontroller is carried out via the I2C interface.

The microcontroller is used to control and transmit signals to other parts of the circuit. After receiving information from the sensors, the microcontroller displays data on a liquid crystal display, which has 4 lines of 20 characters each. The screen displays information received and converted from the MPU6050 chip. The first line contains the values along the three axes of the accelerometer, the second values along the three axes of the gyroscope, the third temperature, the fourth line on the left, the deflection angles according to the accelerometer and the right rotation of the Z axis according to the gyroscope. The values of the fourth row are calculated by the microcontroller itself. Also on the diagram there are 6 LEDs that light up depending on the position of the GY-531 module on the Y axis.

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