After the important, for the user, part of the code for selecting an object, you need to find this object and carry out its identification. Due to the small size of the device, a USB camera is used to process and take data.

Receiving a video stream is accompanied by enumerating the received frames, converting them through a neural network and selecting an object in the correct frame.

If the object belongs to the class, then the class label is retrieved and the coordinates of the bounding rectangle are calculated. These coordinates will allow you to draw a bounding box around the object in the image along with the corresponding class label.

Thus, the computer vision system used on the Raspberry Pi single-board computer is suitable for detecting moving objects in real time. The only problem is that the bandwidth of ~ 0,9 frames for detecting output objects will lag behind what is displayed in real time on the screen.

If a fast-moving object is recognized, then it, with a high degree of probability, will be skipped, because the object will be outside the frame before the response of the neural network.

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PHYSICS OF SEMICONDUCTOR DETECTORS

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Since the invention of nuclear radiation detectors about 115 years ago, they have become the sixth human feeling and have significantly expanded the range of his perception of environment. Nowadays there are a large number of reliable devices to detect and measure ionizing radiation. Due to the existence of these devices, the nature of radiation and its sources has been studied. Detectors are used in medicine, industry, in science, in the field of nuclear and radiation safety.

Keywords: radiation, semiconductor, photocell, detector, photodiode.

In 1888, a professor Alexander Stoletov discovered the photoelectric effect. It is the basis of the action of devices called photocells. Under the influence of external factors, some electrons pass from the valence band of the atom to the conduction band. As result of the application of voltage in the electric circuit, current increases. As a result of ionizing radiation the neutral atoms and molecules of the substance get an electric charge. Alpha, beta, gamma radiation, x-rays, neutron flux have a direct and indirect ionizing effect. Particle registration began with the use of a zinc sulphide screen; vapour-saturated chambers, photo-emulsions, scintillators, and gas-filled detectors were used. The advantage of using solid-state detectors having a relatively small size, a much higher density of the working medium (about 1000 times) compared with gases was found later.

A semiconductor is a substance electrical conductivity of which strongly depends on the influence of external factors (temperature, electric field, light, radiation). When a temperature T> 0 is more than zero, a part of the electrons passes from the valence band to the free band. Two partially filled zones become the conduction zones and a substance becomes a conductor. Electrons and holes create current in intrinsic semiconductors, electrons carry charge in impurity donor semiconductors, and holes in acceptor semiconductors. Electrons and holes in this case are the main carriers of charge minor carriers also take place.

A diode is a two-electrode electro vacuum, ionic, or semiconductor device with the property of conducting current mainly in one direction. A photodiode is a semiconductor diode, the design of which allows the working medium to perceive optical radiation. The case of the photodiode has a special transparent window, behind which there is a photosensitive area of a semiconductor crystal. Minor carriers of charge determine the parameters of photodiodes. A semiconductor detector is a device for detecting ionizing radiation. Its main element is a semiconductor crystal. At the p-n junction boundary, a double electrostatic layer forms because of the interaction of donor and acceptor ions, electrons, and holes. The application of reverse voltage to the crystal enhances the action of the double electrostatic layer. In the centre of the semiconductor material, a depleted transition region appears, consisting of semiconductor atoms, donor ions, and acceptors without charge carriers. This area is sensitive to radiation and, depending on the device of the detector, defines beta, gamma radiation or charged particles. High-purity semiconductors in the region of not too low temperatures have electrical

conductivity due to their own charge carriers. The temperature dependence of the conductivity of a semiconductor determines by the formula.

$$\sigma_i = \sigma_0 e^{\frac{Eg}{2kT}}, \quad (1)$$

where σ_0 expresses the electrical conductivity of the semiconductor as T—>∞. From the experimental curves of the temperature dependence of the intrinsic conductivity of the semiconductor for germanium and silicon, the band gap was calculated. As a result, E_g = 0,79 eV for germanium and E_g = 1,10 eV for silicon. The conductivity values for germanium and silicon at room temperature are σ_1 = 2,13 $\Omega^{-1}\cdot m^{-1}$ and = 3,30 10^{-4} $\Omega^{-1}\cdot m^{-1}$ correspondingly, they were determined from the experimental curves and the formula (1). Due to the relatively high intrinsic conductivity at room temperature in germanium, the number of free carriers is large; therefore, when operating germanium-based detectors, should be cooled to a temperature of about 77 °K.

In the Republic of Belarus radiation and environmental monitoring is carried out around the clock in places near the nuclear power plants surrounding the Republic of Belarus, monitoring is also being carried out in the area of the Belarusian nuclear power plant.

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METHODS FOR NO_X MEASUREMENT IN EXHAUST FROM AIRCRAFT ENGINES AT CIVIL AIRPORTS

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The operation of mobile and stationary emission sources at airports causes ambient air pollution. The fuel combustion leads to the emission of nitrogen oxides (NO_x), carbon monoxide (CO), soot and particulate matter. The risk to the population's health from nitrogen dioxide is due to both the direct action of NO_x and the products of its reactions – O_3 and PM.

Keywords: aircraft engine, ambient air pollution, nitrogen oxides, air quality, monitoring, exhaust.

More than 99,9 % of the molecules comprising the Earth's atmosphere are nitrogen (N_2), oxygen (O_2), or one of the rare gases. Inorganic compounds in atmosphere consist of acids, bases, salts, and oxides of metals or nonmetals, together with the elements that comprise them and the ions and radicals derived from them [1]. Nitrogen oxides (NO_x) are formed as a result of atmospheric oxygen interaction with nitrogen at high temperatures, which is prerequisite for aircraft operation at maximum thrust [2].

Ground-level emissions associated with the airport have the biggest impact on local air quality whereas elevated aircraft emissions have less impact because they take place at increasing height. However, aircraft produce approximately 54 % of ground level emissions, whereas airport related traffic is estimated to emit a further 28 %. Analysis of inventory emission results at major European highlighted, that aircraft are the dominant source of air pollution in most cases under consideration [3, 4].

In order to assess the emissions from aircraft engines, the pollutant emission index (EI) was introduced as the basic criterion. In accordance with the aviation regulations of the Ukraine and the corresponding ICAO standards [5], the emission values of selected pollutants are determined on engine test beds under atmospheric conditions and are summarized in an ICAO database [6]. However, the test bed conditions do not reflect the operating conditions in the "real world" [5].

The ICAO Airport Air Quality Control Guide offers active and passive methods for monitoring instrumentation. The experience of leading European airports indicates the prevalence of spectroscopic methods FTIR, DOAS, and the chemiluminescence method for detecting and determining the emission components of aircraft