STRUCTURE AND ALGORITHMS OF COMMUNICATION BETWEEN WIRELESS COMMUNICATION DEVICES AND SOFTWARE FOR FAST TRANSMISSION AND RECEPTION OF RADIATION GEOPHYSICAL SIGNALS

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Annotation. *In the last decade, there has been an increasing demand for wireless communication devices and technologies that transmit signals over a distance. The reason for this is that even today in the mining industry, the transmission and reception of radiation signals received by the method of sensing is carried out through wires. And this various interruptions and technical problems may occur. One of the currently widely used wireless communication devices, Bluetooth standard protocols, allows different devices to communicate by combining the connection procedure and mutual data transmission. reception, collection and transmission methods are presented.*

Keywords: *Neutron, γ - rice, Bluetooth , SPI, MISO, NRF24l01, GNU.*

INTRODUCTION

Methods of focusing radiation geophysical signals obtained by sounding method and their rapid transmission play an important role in locating chemical ores. This is because characteristic of radiation signals fading several thousand times within mls there is Detection and rapid transmission of these types of signals is very difficult. They are defined as follows. The gamma-neutron method for determining the amount of elements in rocks and minerals is based on the nuclear photoeffect phenomenon. This phenomenon or reaction is characterized by the fact that the nuclei of some elements absorb γ -rays and release a neutron particle from them. Gamma-neutron of the reaction

start energetic point each different in the elements different. This value is Be (beryllium) and $^{219}_{92}U$ (uranium) 1.660±0.002 MEV (megaelectron volt) in the element equal , different in the elements while this value from 4 .0 MOV will be higher. From ores coming out radiation amounts the following devices using determination possible , these radiometer and spectrometers , they two method separated measure sensor and perform from the remote control consists of measurement of tools performance and than that of radiometers almost difference does not , only measure on the sensor neutron counter installed will be Neutron counter from ores spreading radiation the amount measures and in signal form to the device transmits. From the device received signal, wired transmissions using is transmitted and electron table apparently is brought . In this process wired in transmissions interruptions surface will come and wrong data sent ores is located place in determining problems cause releases of these problems prevention get for wireless contact from devices use structures and algorithms work exit important is considered.

METHODS

To date, the widespread use of wireless communication devices has led to rapid data exchange and reduced energy consumption. One of these devices is the NRF24l01, which is designed to create distributed systems with sensors and controllers located at a distance of 100-250 meters from each other. The NRF24l01 is designed to operate in the 2.4 GHz band. With this module, it is possible to transfer data to several devices over the air. The NRF24l01 radio module is inexpensive, so it can be used in various processes. The internal working structure is implemented as follows. The principle of operation of these technologies is based on the use of radio waves. Bluetooth radio communication is carried out in the SFM band (Industry, Science and Medicine), which is used in various household appliances and wireless networks (with a limit of 2.4-2.4835 GHz range). Bluetooth uses a frequency spread method to distribute the spectrum[1-2]. These methods are easy to implement and the equipment is cheap. These devices are currently used in the following areas. In a Bluetooth device, the signal carrier frequency oscillates 1600 times per second (total width of 1 MHz). For each connection, the switching sequence between frequencies is transmitted synchronously from one carrier frequency to another every 625 μs (one time interval). If several transmitters or receivers work side by side, they will not interfere with each other. The basis of the Bluetooth architecture is a centralized network of up to seven direct nodes within a 10-meter radius . Wireless contact NRF24L01 Bluetooth model of the device signal transmission using structure seeing we go out[2].

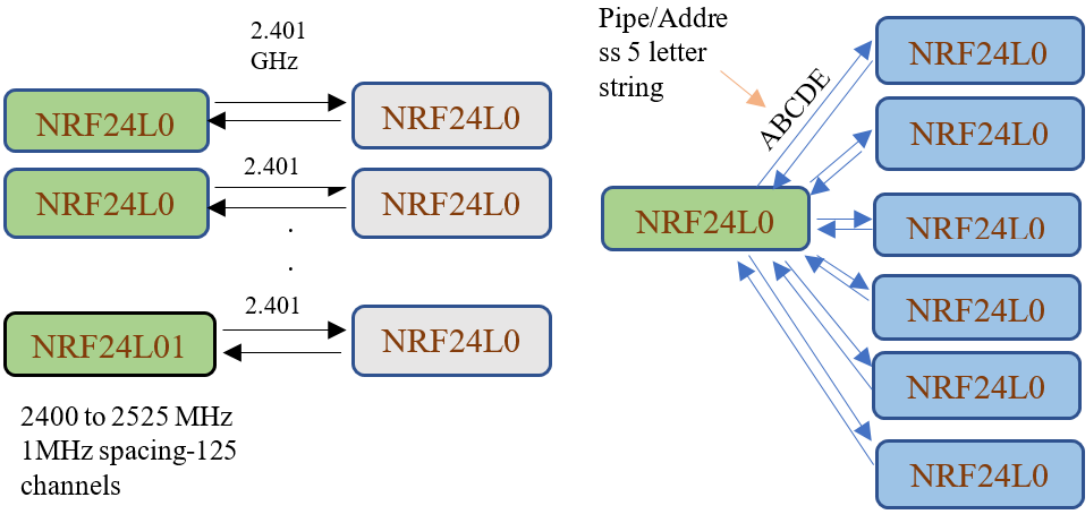


Figure 1. Timing diagram of the SPI write process

The Bluetooth architecture implements time multiplexing and manages time slots between key nodes and distributes them. There are following protocols that perform this process. A connection control protocol establishes logical channels between devices, manages power modes, encryption, and quality of service.

This protocol is located under the host controller, whose protocols are usually located on the Bluetooth chip.

The features of the NRF24L01 Bluetooth device are as follows.

The ability to deploy networks without laying cables, which leads to a reduction in the costs of deployment and expansion of networks.

The speed of modern networks is quite high (up to 600 Mbit/s), which allows them to be used to solve a wide range of tasks[5-7].

Users of mobile devices connected to local wireless networks can easily move within existing network zones.

The specifications of the NRF24l01 device are as follows.

Few energy expenses ;

Information transmission speed 250 Kbit/s, 1 Mbit/s and 2 Mbit/s;

All standard NRF24l01 series , as well as NRF24YE and NRF240 series with complete suitable comes ;

K tripling supply i 3.3V;

Work temperature from -40 C to 85 C ,storage temperature from-40 C to125C;

Communication range 100-250 up to m .

Information exchange interface : SPI;

Acceptance to do and transmission frequency : 2.4 GHz;

Channel number : 128, each one at 1 MHz stage ;

One on the channel network organize reach : 7 module (1 accept doer and 6 transmitters).

Above from analyses come out radiation signals NRF24l01 module using fast transmission technical property suitability table based on seeing we go out.

Table 1.

Radiation geophysicist of signals property and compatibility of wireless communication module properties

Elements	Energy (MEV)	Frequency (GHz)	NRF24l01 module frequency (GHz)	Information transmission speed (Mbs)
uranium (U)	24.6, 16.7, 14.8	2.2 GHz	2.4 GHz	1-2 Mbs
hydrogen (H)	2.23	1. 4 GHz	2.4 GHz	1-2 Mbs
carbon (C)	4.95, 3.68, 1.26	1.8 GHz	2.4 GHz	1-2 Mbs

Based on the information in the table, the NRF24L01 module has suitable parameters for the transmission of radiation geophysical signals. This module is adapted for use in a large number of systems integration, manufacturing and other industries. NRF24l01 wireless module communicates with arduino for data transfer. Signal transmission and reception structures are implemented as follows[8-10].

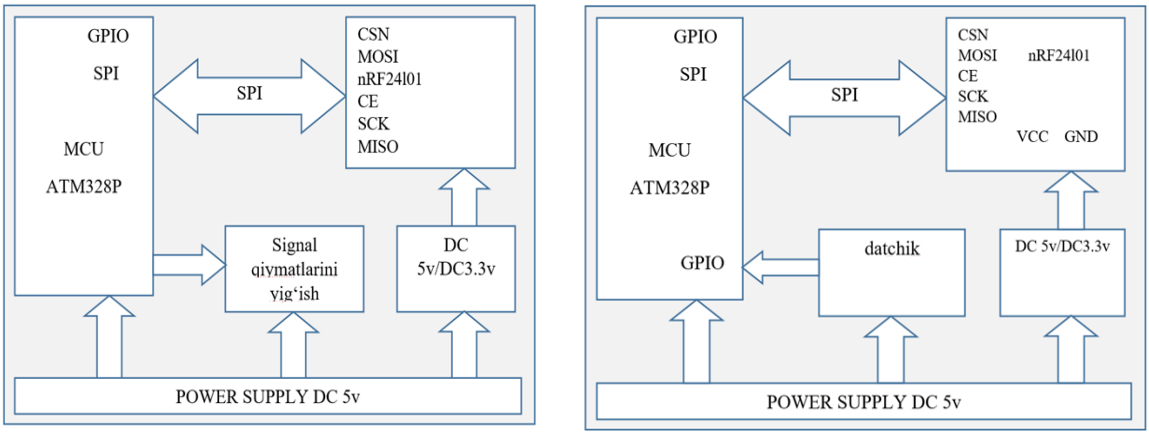


Figure 2. Transmitter of signals and acceptance operating block diagram of the device

Above ATM328P microcontroller in the picture and using the nRF24L01 module signal to send scheme given . Microcontroller and nRF24L01 sender device between communication SPI interface through done is increased. CSN, MOSI, CE, SCK and MISO pins of the NRF24L01 module using signal reading process done is increased and from a distance signal acceptance to the doer sends. In the diagrams in the second picture, the abbreviations have the following meanings. GPIO - *(general-purpose input/output*) - General input/output communication interface between

computer system components, microprocessor and various peripheral devices. GPIO pins are both input and output task perform it is possible usually configuration will be done. SPI (Serial Peripheral Interface) - basic task installed in systems short remote contact for used synchronous consecutively contact interface specification[8]. The usual applications among Secure Digital cards and liquid crystal displays there is One how many devices chips through selection (CS). Done to increase maybe sometimes while chips are called selection (SS) paths . MOSI- basic output (Master Out Slave In). Data from the transmitter acceptance to the doer transfer for is used . MISO is the main one access signals acceptance does (Master In Slave Out)[11].

RESULTS

Above offer done structure complete performance for to him software algorithm work exit Demand will be done . The first signal sender for after while signal acceptance doer module for software algorithm work we go out and as follows (Figures 3 and 4).

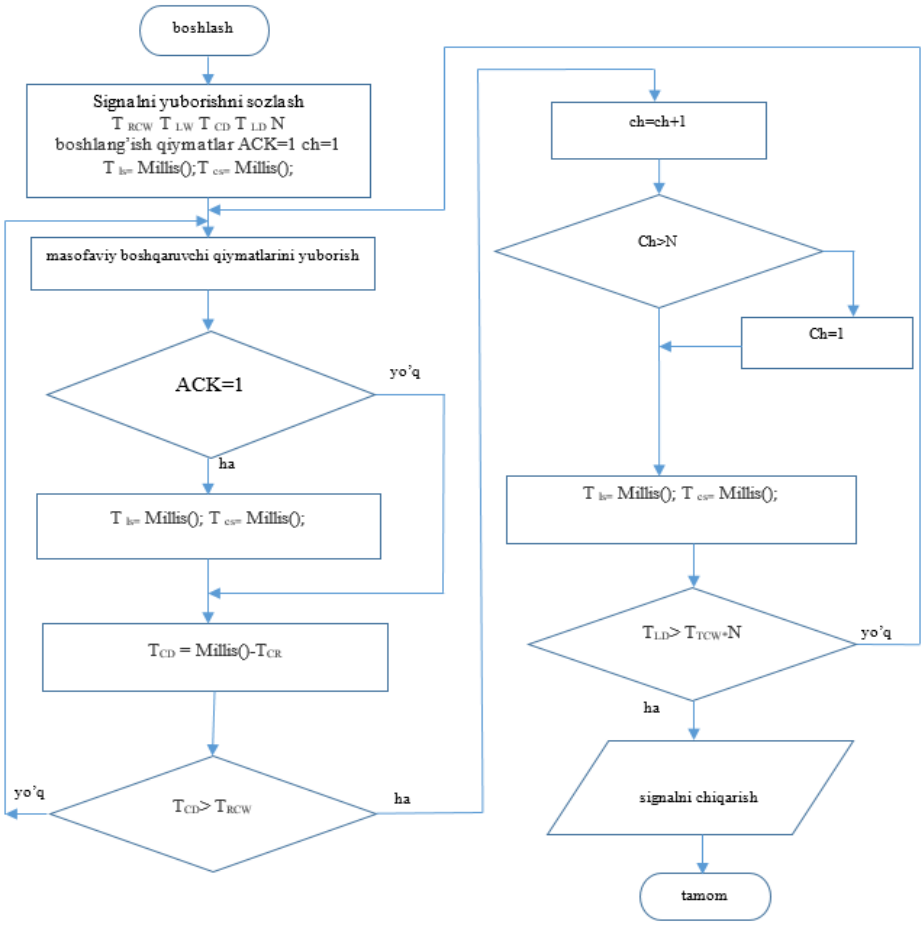


Figure 3 . Block diagram of the signal receiving algorithm

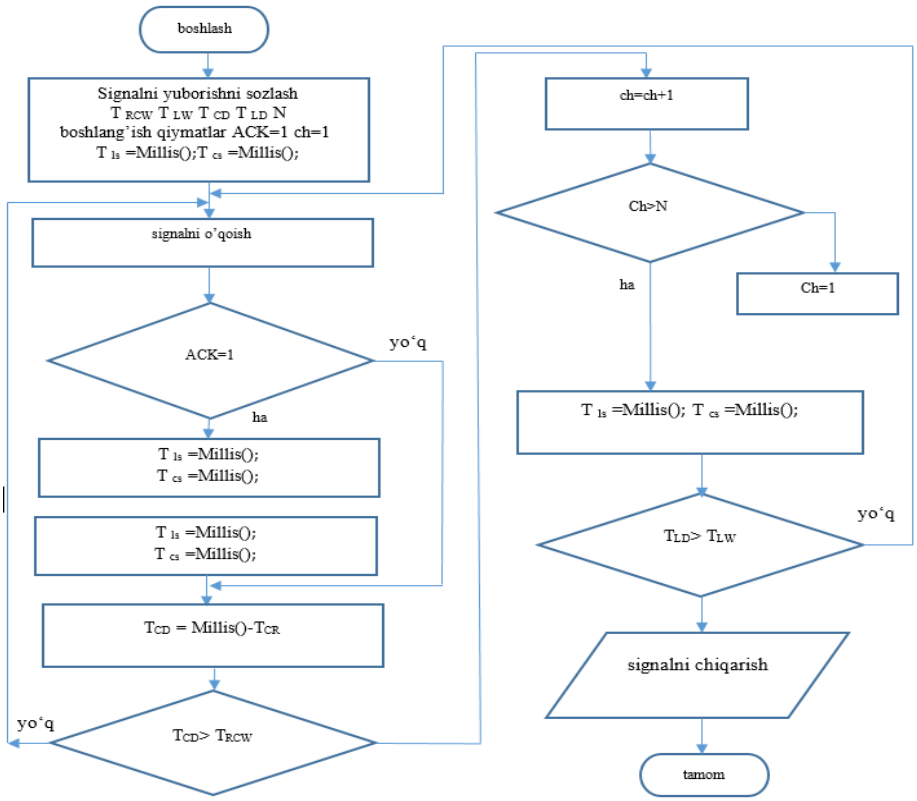


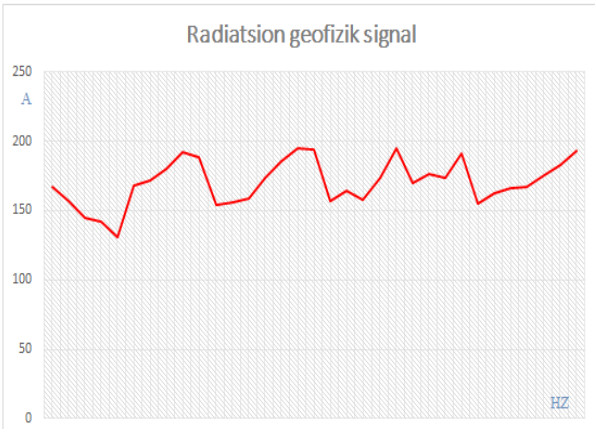
Figure 4 . Block diagram of the signal receiving algorithm

In algorithms abbreviation words the following meanings means.T_{RCW}-is incoming on channel n waiting time to receive a signal . T_{LW} - signal on the link waiting time for reception. T_{CD}-is the channel interruption time. T_{LD} - link interruption time ch – channel order number N - used channels the number C(N)- Used channels row. ACK - incoming signals acceptance to do confirmation T_{LR} - link last signal acceptance to do time T_{CR} - channel last signal acceptance to do time Millis( ) - Time reading function [2-4]. Using the above software algorithm, we can make the two-dimensional radiation signal received from the sensor look like the array we need based on the receiving and transmitting module (Table 2).

Table 2.
Two measured radiation geophysicist signals collection

No	Mev	**No**	Mev	**No**	Mev	**No**	Mev
1.	167	**7.**	172	**13.**	159	**19.**	164
2.	157	**8.**	180	**14.**	174	**20.**	158
3.	145	**9.**	192	**15.**	186	**21.**	174
4.	142	**10.**	188	**16.**	195	**22.**	195
5.	131	**11.**	154	**17.**	194	**23.**	170
6.	168	**12.**	156	**18.**	157	**24.**	176

Two measured radiation geophysicist of signals in the image appearance



Schedule and in the image from the results apparently as it is two measured radiation signals in collection one measured matrix apparently come the rest And this land top from the layer land bottom layer ores in determining error surface will come radiation signals two measured matrix to look to bring for while addition algorithm demand will be done [8-10].

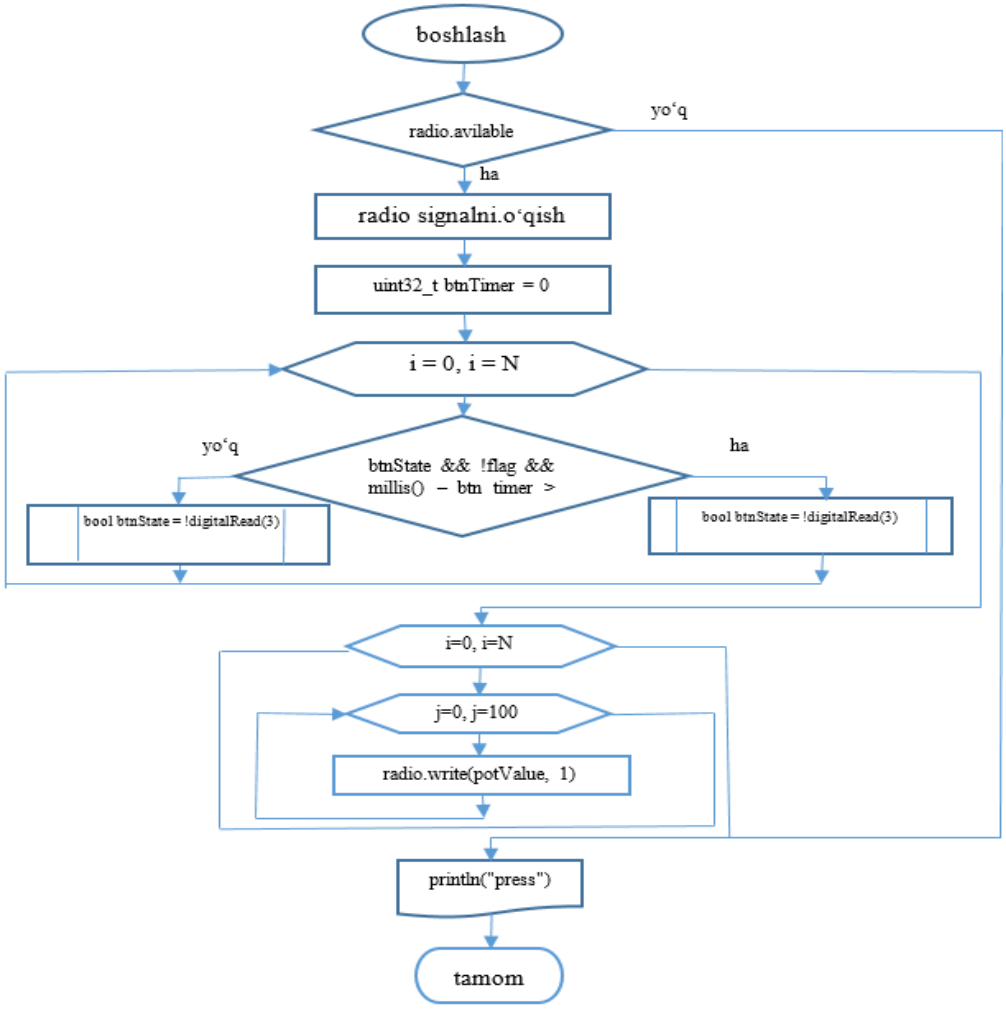


Figure 3. Algorithm block diagram for receiving and displaying data

Using the above algorithm, the two-dimensional signal received from the receiving module can be presented in a tabular form. It is carried out as follows, in the first case, the amount of radiation received from the upper layer of the earth is measured every 100 meters, and in the next case, it is re-measured at a horizontal distance of 10 meters, and these values are stored in the second column of the table.

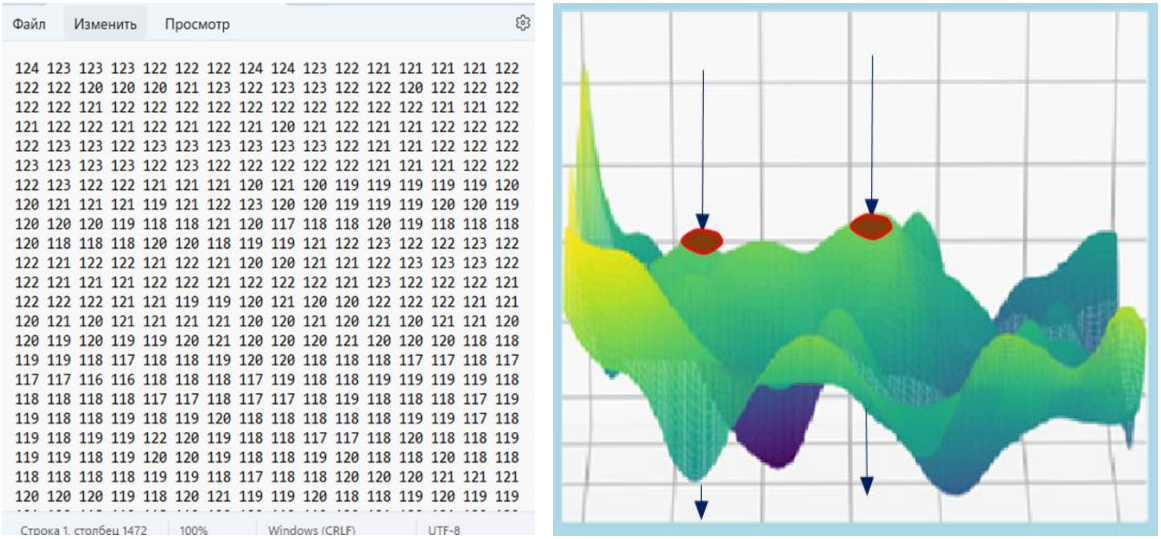


Figure 5. Sensing method received radiation geophysicist signal matrix in appearance from collection harvest has been graph

Figure 5 shows the process of gathering radiation signals in the form of a two-dimensional matrix using our proposed algorithm. It is possible to predict the location of ores by digitally processing signals in the form of a two-dimensional matrix with the help of the developed algorithm in figure 3. In this case, the highest points indicate the place where the amount of radiation is the highest[3-5].

CONCLUSION

NRF24l01 the possibility of rapid data transfer using the device was investigated, but it was necessary to use an additional Arduino device to analyze and process these data on a computer. Structures providing interaction between the computer and the device have been developed. This is from the technical capabilities of the device come radiation in the range of 2.4GHz geophysicist able to transmit signals the fact that known it happened. In the research work of this part, a structure and an algorithm were proposed for applying Bluetooth technology to the process of transmitting radiation signals. According to our experimental results in the research process, the proposed algorithm is proven to be appropriate of the device invasive didn’t happen feature him research for both, the field to himself in the circumstances special to the tool turns.

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