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RECEIVE ALARMS AND FORM ITS DATABASE USING THE AD8232 EKG MODULE

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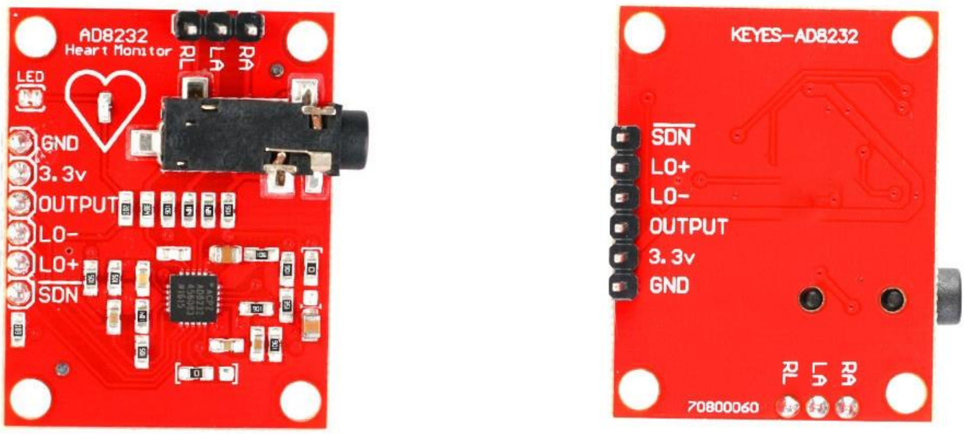
Abstract
To organize the data exchange process, we will implement it from the following to the top approach. This involves a process ranging from receiving an ECG to receiving data processed on the website by a doctor. First, the ECG module receives EKG data from the patient and transmits it via USB to the Arduino microcontroller in a sequence - sequence - to the computer. Second, the data collected on the computer is successfully sent and stored on a web server that is displayed over the Internet. For further analysis, the user (in our case, the doctor) is provided, and the doctor, with his own experience, diagnoses the patient.
This hardware model was accomplished by connecting different modules and small modules to each other. We will look at devices that play a major role in efficient data transfer and management

Keywords: Module AD8232, Analog Devices, Arduino MEGA 2560, eSP8266 and database.

Introduction

Application of the Ad8232 EKG module

The ECG AD8232 module, which adopts heart rhythm, was developed by Analog Devices. It is convenient for its analogues and requires 20 percent less energy. It is composed of the AD8232 plate and binds electrodes to the plate[1][2][3].
This module adopts a low voltage biomedicine signal, amplifying the signal and filtering it through the interference. AD8232 used two-box high-conductive filter and multi-powder low-frequency filtering technology to remove noise.



(a) (b)

2.8-rasm. AD8232 EKG module plate (a): preview; (b): View after

This (see picture 2.8) AD8232 EKG module has the following specifications

- source voltage: 3.3V
- output signal type: analog output
- output interface: 2.54 pins or headset
- module hype: 36mm*31mm*18mm
- nominal temperature range: from 0 ° C to + 70 ° C
- working temperature range: from -40 ° C to + 85 ° C

This module By means of a two-box channel method, the electrical field (electrodes) between the two points record the difference in potential and receive EKG data. This data can be used to monitor heart activity[4].

It is worth noting that it is necessary to correctly place electrodes. The device can then receive a moderate ECG, otherwise a broken or incomplete signal will be received. Therefore, all electrodes will have to be placed correctly, as recommended for use above.

To receive an EKG signal, you can connect via USB with AD8232 – Arduino Mega 2560 and check the incoming signal via serial monitor located in the upper right corner of the arduino IDE[5].

The requirement to receive a signal using the ECG module is as follows:

- Arduino Uno / Mega / Nano;
- ECG modules (AD8232);
- ECG electrodes - 3 dona;
- ECG electrode ulagichi - 3.5 mm;
- Data cable.

Table 2.6 below provides the necessary information to connect the devices.

Table 2.6

Settings for receiving alarms from the ECG module

AD8232 Pins	**Pin Functions**	**Arduino ATmega2560**	**Pin Functions**
GND	Ground(minus)	GND	Minus Cylinder
3.3v	voltage source	3.3v	Voltage Source
OUTPUT	Cylinder Signal	A0	Analog pin butterfly
Lo-	extension of the comparable output port (-)	11	Pin Name
LO+	extension of the port of comparison (+)	10	Pin Name
SDN	Launch	-	

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Arduino MEGA 2560 Plate technical indicators

Technical indicators of ATmega2560 microcontroller: 256 Kb flash memory for program code storage (4 Kb for loader storage); 8 Kb RAM; performance voltage 6-12V; 56 digital input/exit; 16 analog inputs; Consists of 16 MGts of frequency[3][6].

2.9-rasm. Arduino ATmega2560 platinum

In addition, the ATmega2560 microcontroller is equipped with eSP8266 (WiFi) controls installed in the electronic circuit. The plate is also equipped with a USB-UART interface converter (CH340G), 54 digital input/output (of which 15 can be used as impulse width modulation output), 16 analogue inputs, 4 UART ports, 16 MGts crystal oscillator, USB micro B port, power supply connector, ICSP projections, and reset buttons. The Arduino Mega Android Development Kit (ADK) is specifically designed to work with Android smartphones - it has an IC-based USB interface of MAX3421e.

Characteristics of ESP8266 (WiFi module): support for WiFi protocols of flesh memory size-32Mb; 802.11 b/g/n; Wi-Fi Direct (P2P), soft-AP; TCP/IP stack is installed; TR switch, score, LNA, power amplifier and network type are installed; PLL, regulators and power management system are installed; Output capacity in 802.11b mode +20.5 dBm; support the diversity of antennas; discharge flow in the absence of up to 10 mkA; start and send packages within 22 ms; the waiting-mode consumption is 1.0 mW.

Support for ESP8266:

To transfer ESP8266 to programming mode, click the "ESP Reboot" button.

WiFi module performance is set by key (see chart 2.7).

Table 2.7

Schedule of mode change procedures

Work Order	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Having CH340 connected to eSP8266 (sketch loading)	off	off	off	off	on	On	on	-
Ch340 is connected to eSP8266 (performance)	off	off	off	off	on	On	off	-
Ability to connect to CH340 ATMEGA2560 (sketch loaded)	off	off	on	on	off	Off	off	-
ATMEGA2560+ESP8266	on	on	off	off	off	Off	off	-
independent work of ATMEGA2560 and eSP8266	off	off	off	off	off	Off	off	-

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To install the WiFi module on the Arduino IDE, you will need to load package data for eSP8266. This is done in the following order:

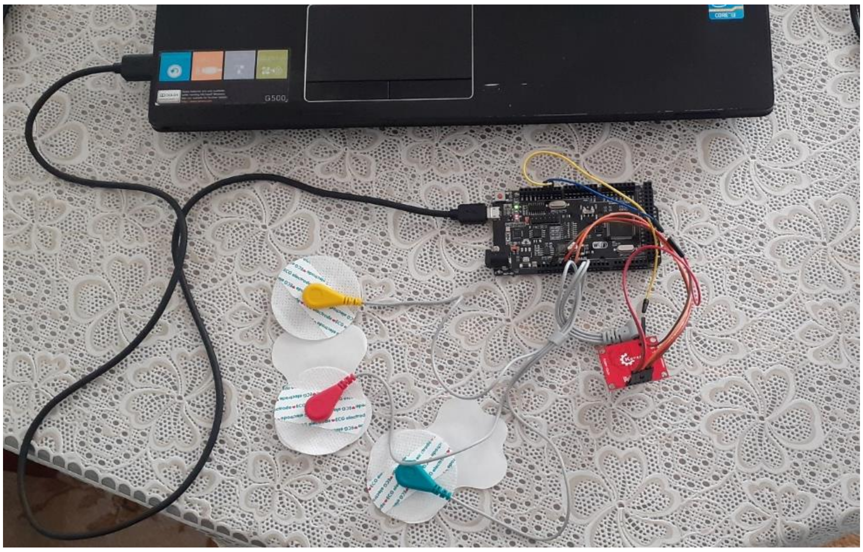
1) From the menu section, the "File is nastroyki" is entered and the window opens. http://arduino.esp8266.com/stable/package_esp8266com_index.json this link will be inserted into the "Ok" button;

2) Then enter the menu section "Information – Script" and click "Menu Sheet" from there. Select and install eSP8266 from the search section;

3) once eSP8266 is installed, it will be selected;

4) Thereby, the WiFi module will be in a working state.

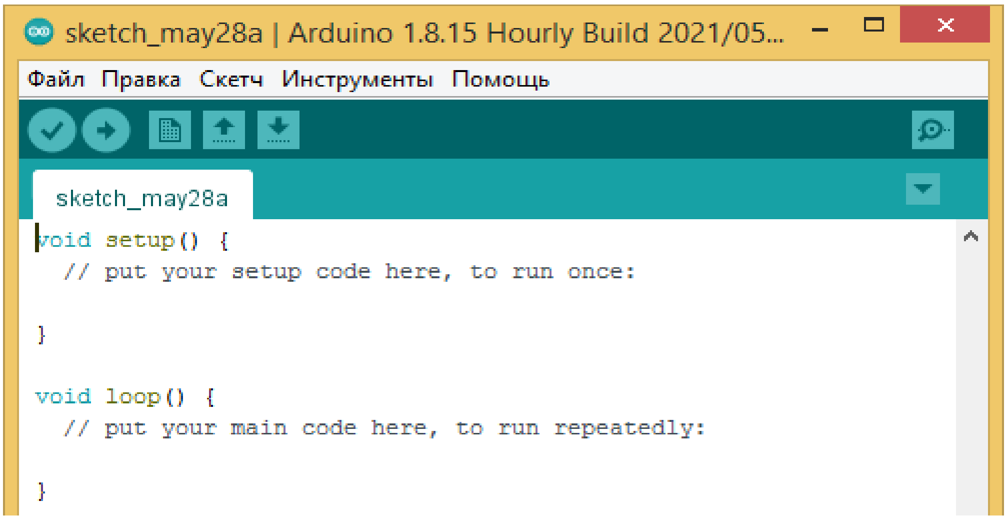
The device, consisting of the Arduino MEGA 2560, computer and ECG module, puts ECG electrodes on the patient's body for color coding. Then, heart rate is constantly monitored and an ECG is formed.



2.10-rasm. Ad8232 module, Arduino Mega 2560 and connecting electrodes to the computer

After the equipment is properly connected. The Arduino Mega 2560 configuration will continue.

Setting up arduino Mega 2560 on the Arduino IDE is done by performing the following steps.



2.11-rasm. Arduino IDE header window.

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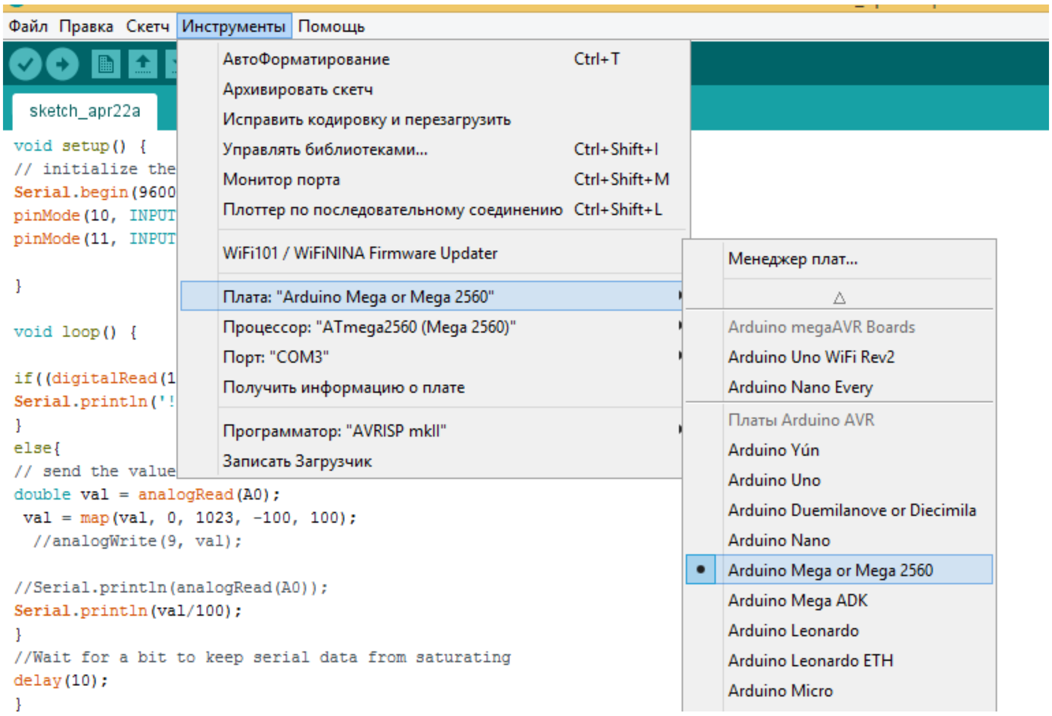
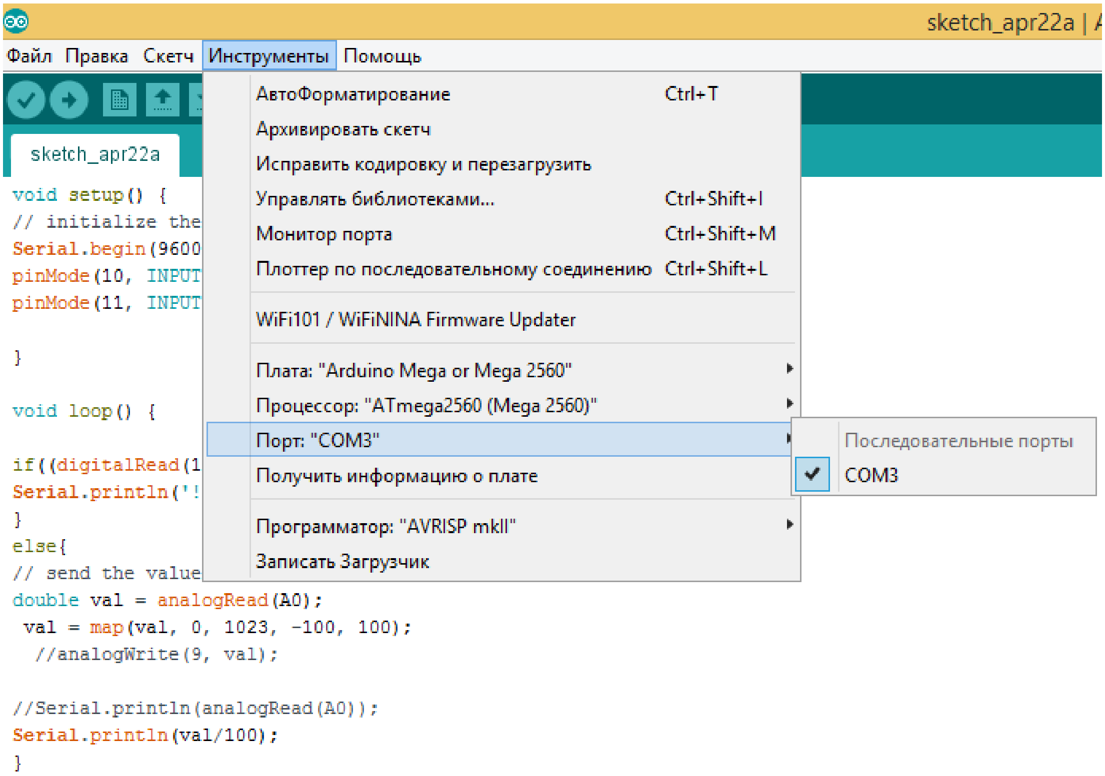
Arduino Mega 2560 will now be selected on the Arduino IDE. To do this, Arduino Mega or Mega 2560 will be selected > The Board (See Figure 2.12) > Tool.



2.12-rasm. Arduino Mega 2560 board setup in Arduino IDE



2.13-rasm. Setting up the port to receive alarms in Arduino IDE

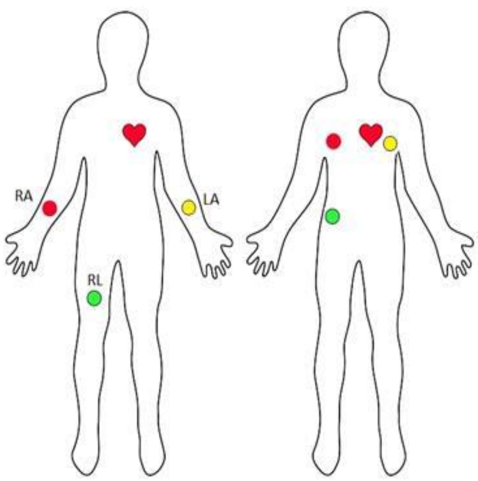
After connecting the device to the computer via USB, the port is activated (see fig. 2.13). After performing the required settings on the Arduino IDE, the following application code will be written.

```
void setup() {
initsialize serial communication:
Serial.begin(9600);
setting up alarm retake for pinMode(10, INPUT);/LO+
pinMode(11, INPUT);/ Set up alarm rendering for LO+
}
void loop() {
if((digitalRead(10) == 1)||(digitalRead(11) == 1)) {
Serial.println('!');
}
else{
get at analog value:
double val = analogRead(A0);
val = map(val, 0, 1023, -100, 100);
Serial.println(val/100);
}
set the waiting time for the signal retriender range (frequency)
delay(15);
}
```

The application code is verified in the Arduino IDE. To do this, in the upper left corner of the Arduino IDE, the application is pressed to check the code using the "Provy" icon.

Connect electrodes:

To obtain an ECG, electrodes are attached to the chest and limbs (depending on the selected channel), from which signals of the electrical activity of the heart are obtained.



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2.14-rasm. Install the electrodes of the AD8232 EKG module and receive EKG signals.

2.15-rasm. EkG image taken using the AD8232 EKG module. time in the ordinary-amplitude, obsissada.

EkG data obtained using the device will be recorded in the digital form and will later be able to be processed based on algorithms.

Formation of a database for STORING ECG signals

This database is designed to store EKG signals and veyvlet function values and coefficients. This database can be used by doctors and researchers.

Functional features of the database:

- sort the veyvlet function coefficients in accordance with EKG signals;
- enter data;
- obtain the values of the veyvlet function by requesting a record (record);

- request the values of the veyvlet function by base type;
- get coefficients by signal type;
- obtain coefficients by EKG record;
- obtain the coefficients by the type of EKG base.

The database is written in MY SQL language.

The database consists of the following tables:

1. Veyvlet table structure. This table links coefficients (coiff), boundary value (epsilon), time (time_interval), function height (amplitude), function width (sigma) and signals (id_ekg_signal), and veyvlet functions (veyvlet_func) tables.

The table data structure will be as follows.

The veyvlet table is the following fields:

id (int IDENTITY(1,1))
id_veyvlet_funk (int)
id_ekg_signal (int)
koiff (nchar(10))
epsilon (nchar(10))
time_interval (nchar(10))
amplitude (nchar(10))
sigma (nchar(10))
created_at (datetime)
updated_at (datetime)

2.ECG base table structure. This consists of the EKG base name (name) and annotations.

The EKG base table consists of the following fields:

id (int IDENTITY(1,1))
name (nvarchar(50))
Annotations (Nvarchar(50))
created_at (datetime)
updated_at (datetime)

3. Structure of the alarm schedule. At the same time, the signal name (e.g. signal – e.g. the standard channel I, II, III, three enhanced channels are connected to the aVL, aVR, aVF, and chest channels V1,V2,V3,V4,V5,V6) and the entries (id_record) table.

The alarm schedule consists of the following fields:

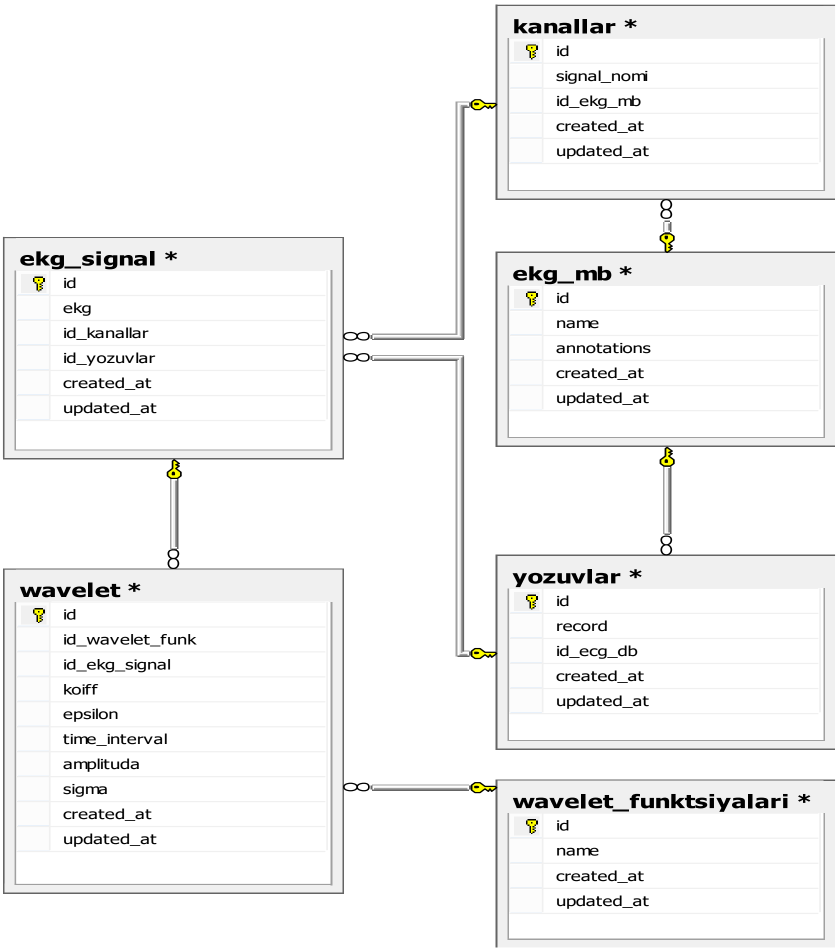
id (int IDENTITY(1,1))
signal_nomi (nchar(10))
id_ekg_mb (int)
created_at (datetime)
updated_at (datetime)

4. Structure of the entries table. In this case, the table is linked to the record name and the EKG base (ecg_db_id) table.

The record schedule consists of the following fields:

id (int IDENTITY(1,1))
record (nvatchar(50))
id_ecg_db (int)

created_at (datetime)
updated_at (datetime)
5.EKG alarm table. At the same time, the potentially downloaded EKG is linked to a table of signal values (ecg) and signals (id_signal).
The ECG signal schedule consists of the following fields:
id (int IDENTITY(1,1))
ekg (text)
id_kanallar (int)
id_yozuvlar (int)
created_at (datetime)
updated_at (datetime)
6. Table of veyvlet functions . The resulting embryo was allowed to develop in nutrients and then inserted into her womb, where it implanted.
The veyvlet functions table consists of the following fields:
id (int IDENTITY(1,1))
name (nvarchar(50))
created_at (datetime)
updated_at (datetime)
After creating all the tables, a giagram is generated to connect them to each other (see figure 2.16).



2.16-rasm. Database table linking scheme.

Summary

It was carried out on the basis of the above-page approach to organize the data exchange process. This involves a process ranging from receiving an ECG to receiving data processed on the website by a doctor. First, the ECG module receives EKG data from the patient and transmits it via USB to the Arduino microcontroller in a sequence - sequence - to the computer. A database was also created on the server to store EKG data.

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