ISSN 2312-2773

News of Science and Education

NR 2 (58) 2018

Sheffield

SCIENCE AND EDUCATION LTD

2018

News of Science and Education

Editor in chief: SERGIY YEKIMOV

Editorial board:
prof. Vaclav Helus, CSc.
prof. Jan Kuchar, CSc.
prof. Karel Hajek, CSc.
prof. Alena Svarcova, CSc.
prof. Jiri Cisar, CSc.
prof. Vera Winterova, CSc.
doc. PhDr. David Novotny, Ph.D.
doc. PhDr. Zdenek Salac, Ph.D.
prof. Pavel Suchanek, CSc.
prof. Katarzyna Hofmannova, CSc.
prof. Vaclav Grygar, CSc.
prof. Zuzana Syllova, CSc.
prof. Alena Sanderova, CSc.
prof. Marek Jerabek, CSc.
prof. Vera Perinova, CSc.
prof. Ing. Karel Marsalek, M.A., Ph.D.
prof. Ing. Jiri Smolik, M.A., Ph.D.

Technical editor:

Mgr. Helena Krzyzankova

Editorial address:

OFFICE2, VELOCITY TOWER, 10 ST. MARY'S GATE, SHEFFIELD, S YORKSHIRE, ENGLAND, S1 4LR

e-mail: praha@rusnauka.com

NR 2 (58) 2018

Date signed for printing , 25.03.2018
Publisher : Science and education LTD

Sokol G.V, Buriak T.V, Vasylevska V.A.,
Tkachenko V.R, Hudzenko I.Y, Vinogradova A.V.
Poltava National Technical University of Yuri Kondratyuk

RADIO PROGRAM ACCESS MODULE WITH INTERACTIVE WIRELESS CONTROL

The work analyzes microcontroller systems for online radio program listening based on ESP 8266-12F microcontroller with an integrated Wi-Fi module. Electronic components for the implementation of the proposed system were considered and selected. For review, the results of the system operation, wireless access and management capabilities were provided. The directions of further improvement of the developed device are offered.

Keywords: *microcontroller, Wi-Fi module, MP3 decoder, microcontroller system, wireless control, SPI.*

Introduction

Nowadays technology has become an integral part of every human being. This is especially relevant for representatives of the younger generation who can't imagine their lives without innovations such as, for example, smartphones, MP3 players, 24-hour access to the Internet and more. Undeniably, technical progress has helped not only to fully automate the production process, make the measurements more precise, improve the quality of medical care, but also to facilitate our daily life.

Microcontrollers play a special role in this process. They allow us to improve technical devices, make them more productive, reduce their weight and size, and, consequently, to obtain more attractive design options. Furthermore, the usage of the microcontroller technologies can reduce not only the cost of the gadgets, but also the amount of electrical energy that is needed for their operation.

This contributes to the development of information technology, allowing us to make software that is not only convenient, but also user-friendly to the average person.

Main Part

During the introduction to the theory of the working principles of microcontrollers the students had the idea to unite in a collective and to try to learn more about the functioning of microcontroller systems and the specifics of implementing devices on their basis. For the practical implementation of the idea, a Wi-Fi module for listening to online radio was chosen.

This module allows us to connect to the Internet via Wi-Fi, find the desired radio station, play a signal on end devices (headphones or speakers), and listen to music online without the need for an outlet (the device is powered by batteries). In addition, the USB connector will provide the ability to power the device directly from the computer.

Let's review the main components that were used to build this device. The main criteria for their selection are: low cost, sufficient quality and low energy consumption.

So, for the implementation of the device, the following components were selected: microcontroller with built-in Wi-Fi module ESP 8266, MP3 encoder VS 1053, 9 connectors.

Their appearance is presented in Figure 1.

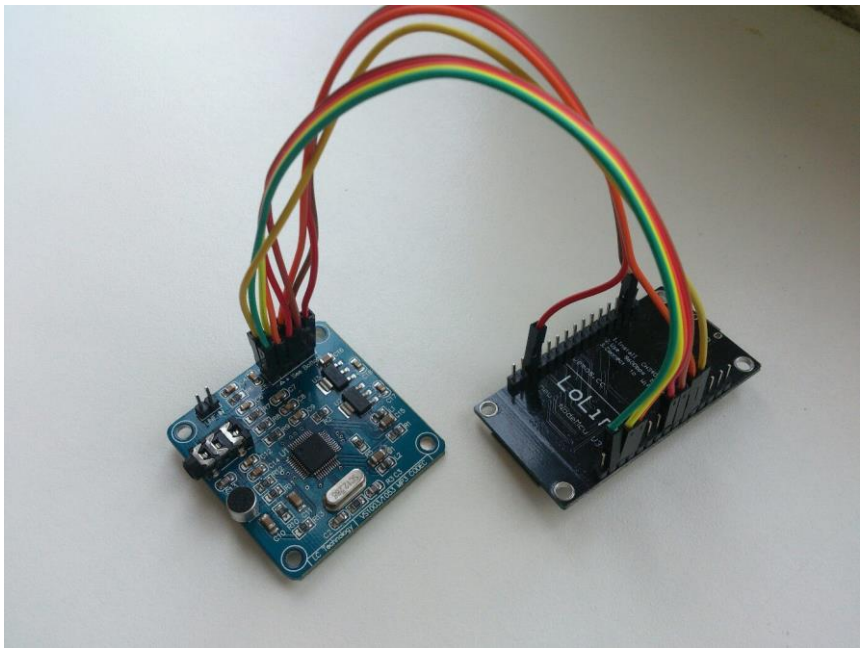

Fig.1. Appearance of microcontroller, MP3 encoder, connectors, integrated into a single device

Microcontroller with built-in Wi-Fi module ESP 8266

Microcontroller with a built-in Wi-Fi module ESP 8266 (fig.2) was selected for the project. It is cheap, but productive enough for our tasks. Its main feature is that it is possible to execute programs from external flash memory via SPI (Serial Peripheral Interface) [1].

Fig.2. General view of microcontroller with built-in Wi-Fi module ESP 8266

The main specifications of the microcontroller are show in Table 1 [3].

Table 1

Specifications of ESP 8266 microprocessor

Parameter	**Value**
Wireless Interface	Wi-Fi 802.11 b / g / n 2,4 ГГц
Modes	P2P (client), soft-AP (Access Point)
Maximum output power	89 mW
Rated voltage	3,3V
Input voltage	5V
Maximum input current	220 mA
Number of input / output ports for free use	11
Processor frequency	80 MHz
The amount of memory for the code	64 KB
The amount of RAM	96 KB

MP3 encoder VS 1053

The second component of the developed device was the MP3 encoder VS 1053, which converts the digital signal into an analog signal. It has a built-in microphone, a standard 3.5mm headphone jack, and two AMS 1117 stabilizers at 3.3V and 1.8V, which allow for a 5V power supply [4]. The general view of the MP3 encoder VS 1053 is shown in Figure 3.

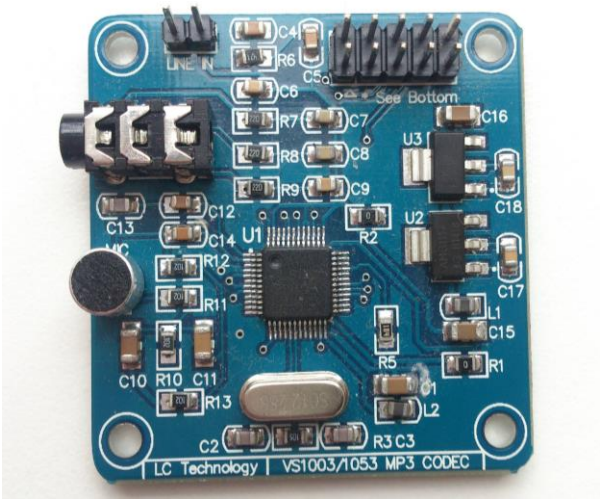

Fig. 3. General view of the VS 1053 MP3 encoder

Additional specifications of the selected MP3 encoder are presented in Table 2 [5]:

Table 2

Specifications of the VS 1053 MP3 encoder

Parameter	**Value**
Power supply	5V
Clock generator frequency	12,288 MHz
Formats	•MP3 MPEG 1 •MP1 and MP2 •MPEG4 •WMA4.0 •FLAC •WAV

Device features:

- online broadcasting of radio programs;
- selecting one of the presented online radio stations;
- the ability to change or edit software;
- power supply both from the batteries, and through the USB port;
- remote control via Wi-Fi.

Figure 4 shows the interface of remote device control panel.

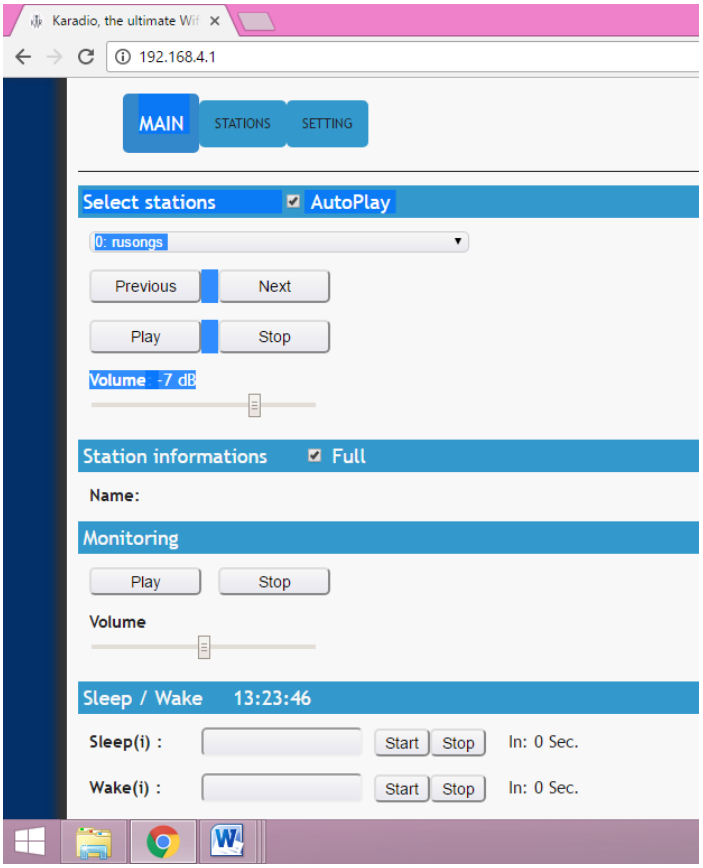

Fig. 4. General view of the control panel interface

The appearance of Wi-Fi radio with interactive control is presented in Figure 5.

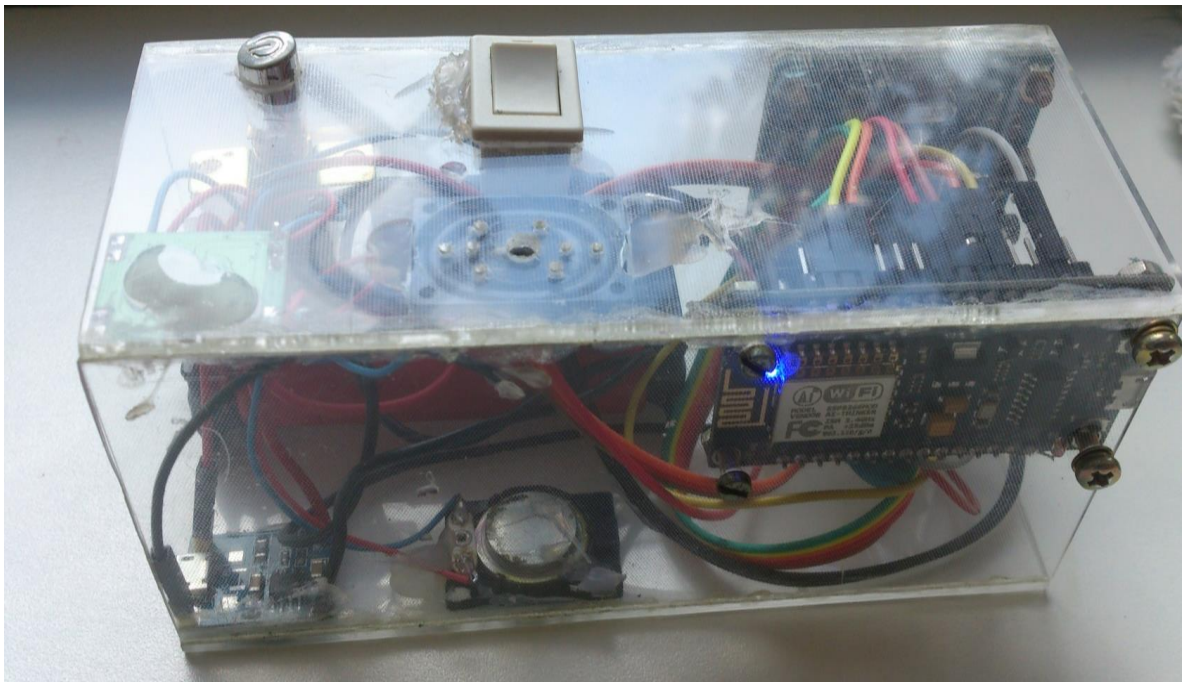

Fig. 5. Appearance of Wi-Fi radio

Summary

The work proposes the practical implementation of a Wi-Fi module for online listening of radio programs that is sufficiently functional for the tasks assigned to it, and also allows for remote control via Wi-Fi. The capabilities of the developed device can be expanded, for example, the ability to record audio files, obtain weather forecasts, synchronize time, etc., can be added.

This device allows you to solve the following tasks:

Device features:

- online broadcasting of radio programs;
- selecting one of the presented online radio stations;
- the ability to change or edit software;
- power supply both from the batteries, and through the USB port;
- the ability to execute program from external flash memory with the inerface;
- remote control via Wi-Fi.

Thanks to the level of development of modern technology, it is possible to create many useful devices, including microcontroller-based ones, with wireless control, etc.

In general, such “know-how” flooded the current market, and they also are in great demand. In this work, a similar device was developed. In the process of assembling, programming and studying the capabilities of microcontrollers, students, from their own experience learned of the wide potential of the devices that are based on microcontrollers.

The developed device is sufficiently functional to perform its tasks, and also allows you to control it remotely using Wi-Fi. The capabilities of the developed device can be expanded, for example, the ability to record audio files.

References

1. ESP8266 [ONLINE]. - Available at: https://ru.wikipedia.org/wiki/ESP8266.

2. Микроконтроллер [ONLINE]. - Available at: https://ru.wikipedia.org/wiki/Микроконтроллер.

3. Wi-Fi модуль ESP8266 [ONLINE]. - Available at: http://amperka.ru/product/esp8266-wifi-module.

4. Модуль проигрыватель MP3 обзорModule VS1003 VS1053 MP3 [ONLINE].- Available at: https://youtu.be/ohTiy59R8dk.

5. MP3 кодек VS1003/1053 [ONLINE].- Availabe at: http://www.mini-tech.com.ua/index.php?route=product/product&product_id=162.

CONTENTS

ECONOMIC SCIENCE

Krainiuchenko O., Mazur N. MARKON METHOD AS AN OPTIMIZATION TOOL FOR INDUSTRIAL ENTERPRISE ASSORTMENT **3**

PEDAGOGICAL SCIENCES

Kachmarchyk S., TECHNOLOGIES OF INTERACTIVE METHODS APPLICATION IN PROFESSIONAL COMMUNICATION CULTURE FORMING OF FUTURE MANAGERS OF FOREIGN ECONOMIC ACTIVITY **8**

Tkachova N., Long Feng THE ANALYSIS OF THE EXPERIENCE OF THE FORMATION OF POLITICAL CULTURE OF UNIVERSITY STUDENTS IN UKRAINE AND CHINA..... **15**

Sikaliuk A.I., Perminova V.A. TEACHING ESP IN UKRAINIAN NON-LINGUISTIC UNIVERSITIES **21**

LAW

Turlayev A., Birmanova A., Raikhanova K. PROSPECTS AND PROBLEMS OF THE CULTURAL HUMAN RIGHTS..... **27**

TECHNICAL SCIENCE

Sliusar I.I., Slyusar V.I., Voloshko S.V., Smolyar V.G. THE MULTI-BAND ANTENNA BASED ON FRACTAL **32**

Sokol G.V, Buriak T.V, Vasylevska V.A., Tkachenko V.R, Hudzenko I.Y, Vinogradova A.V. RADIO PROGRAM ACCESS MODULE WITH INTERACTIVE WIRELESS CONTROL..... **44**

CONTENTS **51**

234057
234326
235822
235959
234384
235237
235872