

ПРИЕМНЫЙ МОДУЛЬ МИКРОКОНТРОЛЛЕРА ДЛЯ ДИСТАНЦИОННОГО УПРАВЛЕНИЯ БЫТОВОЙ ТЕХНИКОЙ ДЛЯ СЛАБОВИДЯЩИХ ЛЮДЕЙ

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Аннотация. Целью данной статьи является разработка мобильного приложения для дистанционного управления бытовой техникой, для людей с нарушениями зрения.

Ключевые слова: микроконтроллер, бытовая техника, мобильные устройства, Bluetooth, Wi-Fi

RECEIVING MICROCONTROLLER MODUL FOOR REMOTE COTROL OF HOUSEHOLD APPLIANCES FOR THE VISUALLY IMPAIRED PEOPLE

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Abstract. The purpose of this article is to develop mobile application for remote control of household appliances for the visually impaired people.

Keywords: microcontroller, household appliances, mobile devices, Bluetooth, Wi-Fi

In 2019, WHO estimated that there are 1.3 billion people live with some form of vision impairment [1]. Most of them are living in low income settings.

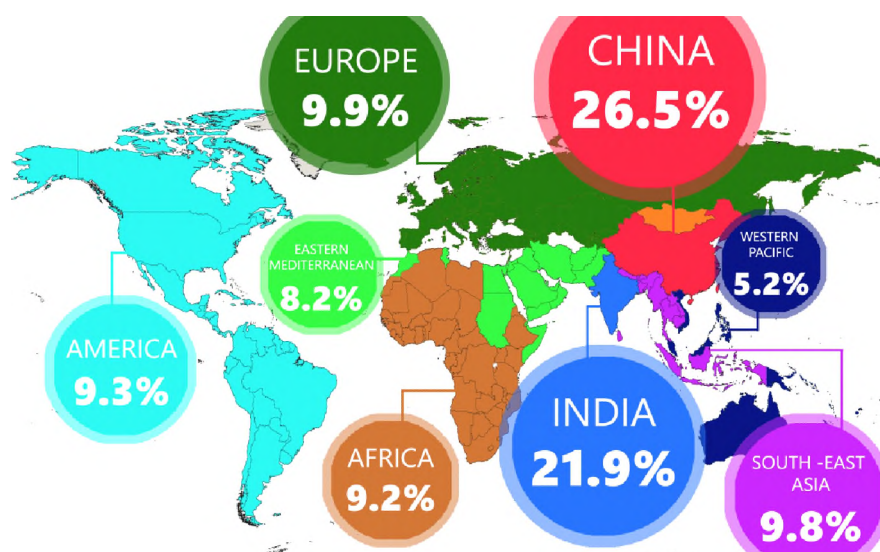


Fig. 1. The percent of visually impaired in countries of the world

Modern household electrical appliances are equipped with smooth touch panels with flat membrane control elements to set the operating modes of the device, which can be set by a complex sequence of

commands. Such an interface is difficult for visually impaired people. Millions people who are visually impaired, are finding the search for accessible home appliances to be Mission Impossible.



Alexa-powered microwave



Samsung Smart Washer/Dryer

Despite the fact that manufacturers of household appliances have recently been making efforts to introduce innovations that facilitate the use of household appliances for people with disabilities, nevertheless, their main goal is to promote new products. The cost of smart-controlled appliances is extremely high for people whose standard of living is below average.

For example, in 2018 Amazon announced a \$60 smart Alexa-powered microwave you can control with your voice [7]. Price of SAMSUNG Smart Washer/Dryer = \$1,169.99 [8].

Devices providing accessibility of people with low vision to control equipment with touch panels are implemented in the form of tactile panel covers [2-3]. In recent years, household electrical appliances have performed more and more diverse functions, each of which may require the input of additional data. In such cases, the abundance of tactile elements aren't much easier to people's understanding of the digital interface with low vision or the elderly people.

There are also complete solutions of electrical appliances with remote control of Bluetooth technology from mobile devices [5].

The Bluetooth module, located on the substrate of the electronic control circuit of the household appliance, receives control signals from the remote control or from a mobile phone and transfers them directly to the microcontroller of the control board.

Executive circuits of a household appliance are controlled by at least one microcontroller output.

The disadvantage of this method is that the Bluetooth module is part of the electronic control board of a household electrical appliance, and customers will be forced to purchase an entire household electrical appliance in order to be able to smartly control it.



Fig. 2. Tactile pads on household appliances

Also, currently developing concepts of microwave oven with a voice control, which in addition to the microwave oven control panel is connected Arduino microcontroller board, and small microphone, a microcircuit RSC 4128 and VoiceGP module [6]. VoiceGP modules include the use of embedded software that implements speech synthesis and recognition technologies and can record and play three minutes of compressed speech. The developed board carries out input-output of voice control over the existing microwave control as an addition to the touch interfaces of consumer electronics.

The disadvantage of this method is the need for preliminary training of the speaker, if an external speaker will be used, in the case without a speaker, the development of a vocabulary of voice commands is necessary, which will depend on a particular user. It may be difficult to recognize speech in conditions of external noise, also.

The developed in this work model is a microcontroller board that plays the role of entering control modes for household electrical appliances not from touch panels, but through a mobile device, working on top of existing controls as an addition to touch interfaces of consumer electronics to allow remote control of household electrical appliances from a mobile device.

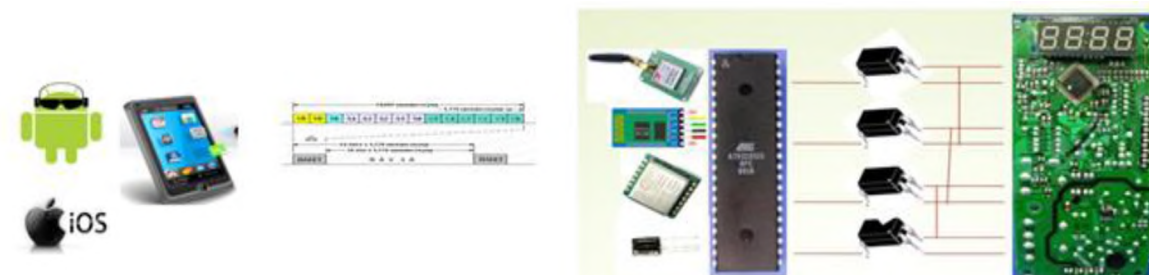


Fig. 3. Schematic diagram of the proposed device

In figure 3, shows a schematic diagram of the proposed model.

- 1 – the microcontroller module contains a housing;
- 2 – power source;
- 3 – microcontroller;
- 4 – wireless signal receiver,
- 5 – switching circuit;
- 6 – loop.

As a power source, a mobile device charger can be used, the voltage of which is in the range of 3.5-5 Volts;

As a microcontroller, you can use any microcontroller, e.g. the AVR controller;

An infrared receiver, Bluetooth, GSM, Wi-Fi modules can be used as a wireless signal receiver, and the receivers can be connected simultaneously.

The main purpose of the device is the ability to remotely control household electrical appliances, primarily by the visually impaired people using the voice assistant of the mobile device, which using the developed mobile application, fig. 4.

The advantages of this utility model:

1) This receiving microcontroller module can be used as an additional module to set operating modes in all household electrical appliances. It has an electronic control board in remote control mode from a mobile device, complementing the existing interfaces of a household electrical appliances.

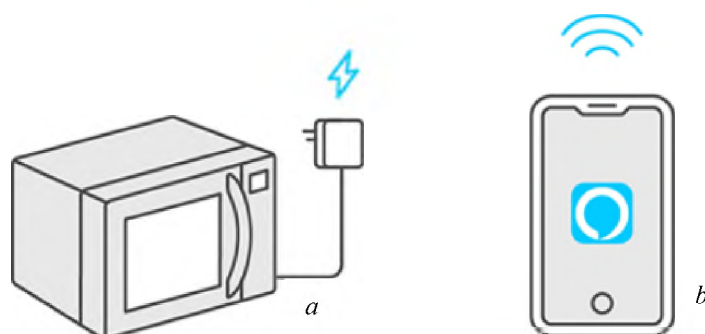


Fig. 4. Sample of the proposed device, a – plug the microwave, b – connect to the internet with the mobile application

2) The program of the receiving microcontroller module can be configured on the protocols of any remote control in case the user does not have a smartphone.

3) In the absence of infrared ports on mobile devices, the receiving microcontroller module can operate on other wireless signal receivers, Bluetooth module, Wi-Fi module or have different receiving modules. Naturally, the cost of the shield will increase.

4) The presence of a microcontroller in the module allows you to increase the functional capabilities of interaction with the user, e.g., connect a voice notification of selected modes.

5) This utility model is a ready-made module for connecting a household device to a single Smart Home system.

6) Low cost receiving microcontroller module.

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