A PRACTICAL RESEARCH OF THE USE OF PUSH/PULL MODE IN THE RADIO TRANSMITTERS WITH A CARRIER FREQUENCY TO CONTROL OF OBJECTS

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Annotation: The main essence of the work is the analysis and determination of the capabilities of the control function of a double Arduino block. Installation capabilities and mode as well as software were used. It is the circuit and measuring system that are built for control. When the signal passes, the system determines the task. Next, decisions and measures are taken to manage the system components. This article explores theoretical and practical approaches to the use of a push/pull regime of the radio transmitter with a carrier frequency with a receiving unit in remote laser microphones for transmitting pulse-width modulation signals to control by the Arduino UNO board and control project with pulse-width modulation of pulse signals in push/pull mode has been developed. It considered signal prosecting by the system and transmission. Such mini devices are known to conveniently manage bulky objects. They are available to many users. And widespread. The pulse mode is used, this allows you to save power energy. It is well known all around widely used low-power radio transmitting devices, what we used too.

Keywords: PWM, radio interface, protocol, push/pull, terminal, data, block, board, carrier, RDC remote control, module, transmitter, receiver, sleep mode, leakage, quartz resonator, SAW resonator, super-regenerative, pulsation, choke element , axial output, transceiver, simplex.

Аннотация: Основная суть работы заключается в анализе и определении возможностей функции управления двойного блока Arduino. Были использованы возможности установки и режима, а также программное обеспечение. Для управления используется схема и измерительная система. Когда сигнал проходит, система определяет задачу. Далее принимаются решения и меры для управления компонентами системы. В данной статье рассматриваются теоретические и практические подходы к использованию режима push/pull радиопередатчика с несущей частотой с приемным устройством в удаленных лазерных микрофонах для передачи сигналов широтно-импульсной модуляции для управления с помощью платы Arduino

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UNO и управления проектом с широтно-импульсной модуляцией импульсных сигналов в режиме push/был разработан режим вытягивания. В нем рассматривался поиск сигнала системой и его передача. Известно, что такие мини-устройства позволяют удобно управлять громоздкими объектами. Они доступны многим пользователям. И широко распространены. Используется импульсный режим, это позволяет экономить электроэнергию. Всем хорошо известно, что широко используются маломощные радиопередающие устройства, что мы и использовали.

Ключевые слова: ШИМ, радиоинтерфейс, протокол, двухтактный, терминал, данные, блок, плата, носитель, дистанционное управление RDC, модуль, передатчик, приемник, спящий режим, утечка, кварцевый резонатор, резонатор SAW, сверхрегенеративный, пульсация, дроссельный элемент, аксиальный выход, приемопередатчик, симплекс.

Annotatsiya: ishning asosiy mohiyati ikki tomonlama Arduino blokini boshqarish funktsiyasining imkoniyatlarini tahlil qilish va aniqlashdan iborat. O'rnatish imkoniyatlari va rejimi, shuningdek dasturiy ta'minot ishlatilgan. Bu nazorat qilish uchun qurilgan elektron va o'lchash tizimi. Signal o'tganda, tizim vazifani belgilaydi. Keyinchalik, tizim tarkibiy qismlarini boshqarish bo'yicha qarorlar va choralar ko'riladi. Ushbu maqolada Arduino UNO platasi va boshqaruv loyihasi tomonidan boshqarish uchun impuls kengligidagi modulyatsiya signallarini uzatish uchun masofadan lazer mikrofonlarida qabul qiluvchi birlik bilan tashuvchi chastotali radio uzatgichning surish/tortish rejimidan foydalanishning nazariy va amaliy yondashuvlari ko'rib chiqilgan. surish/bosishda impuls signallarining impuls kengligi modulyatsiyasi bilan.pull rejimi ishlab chiqilgan. Bu tizim va uzatish orqali signallarni ko'rib chiqdi. Bunday mini qurilmalar katta hajmli ob'ektlarni qulay boshqarishi ma'lum. Ular ko'plab foydalanuvchilar uchun mavjud. Va keng tarqalgan. Pulse rejimi ishlatiladi, bu sizga quvvat energiyasini tejashga imkon beradi. Atrofda yaxshi ma'lum keng tarqalgan kam quvvatli radio uzatish moslamalari, biz ham foydalangan narsalar.

Kalit so'zlar: PVM, radio interfeys, protokol, surish/tortish, terminal, ma'lumotlar, blok, bort, tashuvchi, rdc masofadan boshqarish pulti, modul, uzatuvchi, qabul qiluvchi, uyqu rejimi, oqish, kvarts rezonatori, arra rezonatori, super regenerativ, pulsatsiya, chok elementi , eksenel chiqish, qabul qiluvchi, simpleks.

Introduction

In this article, the research is carried out on two information and telecommunication systems, both in the field of wireless communication systems and in the field of digital signal processing systems, i.e. about a hybrid information system (with Arduino block).

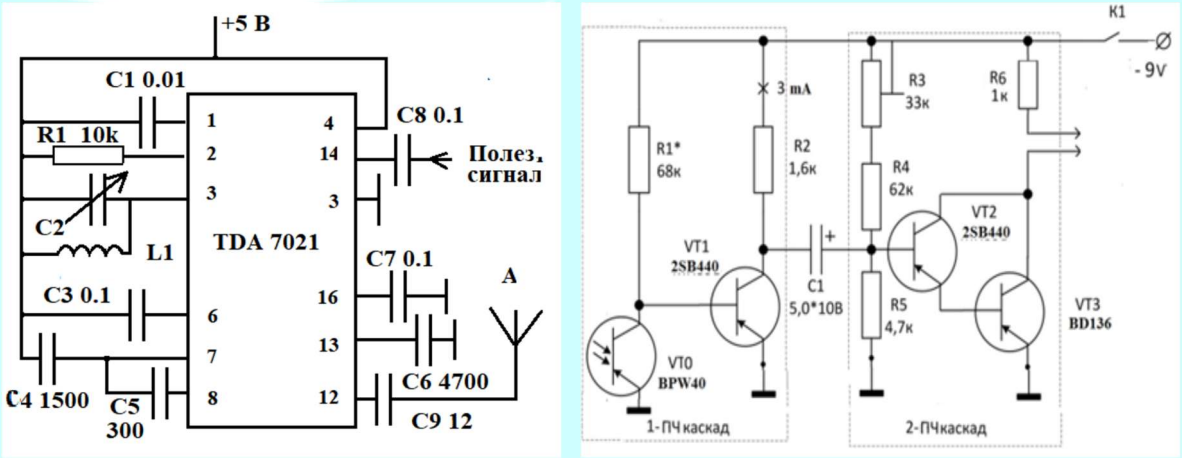
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You can organize wireless communication between the Arduino UNO board using several technologies. To implement a faster wireless connection, used technology in the RF, operated at a frequency. The frequency of this range does not need to be licensed; it is in the radio amateur band. Widely used in the world among low-power radio transmitting devices. Car automatic signaling alarms, RDC remote controls for garage doors and chandeliers, as well as low-power radio stations (walkie-talkies) work in this range. If the transmitter power does not exceed 10 mW, then used in such devices. They are permitted in many countries of the world.

For the Arduino blocks, a kit is available with a radio transmitter and receiver module, which, depending on the supply voltage and communication conditions, can provide communication up to 100m, in line-of-sight conditions [2,4]. Similar modules are available for frequencies of 315 MHz, 330 MHz and 433 MHz

The transmitter is supplied with 3.3 Volt pulses from the microcontroller. The input mode is set to push/pull. The duration of each pulse and each pause is a multiple of 200 microseconds. Duration of signals at the input (starting from low level): 200 200 200 200 200 200 2000 200 400 200 400 200 400 200 400 400 200 200. In this case, the following sequences are transmitted on air: 166 238 165 238 166 240 1984 240 367 240 367 240 367 240 367 441 165 241

It seems that the transmitter turns on abruptly at a high level, and turns off 0.04 ms after the low level is established. The transmitter can be powered by 5V (from the MK stabilizer) and 10V from an external source. In any case, the signal obtained is the same [1,3].



A. *B).*

Рис 4. Принципиальная схема приёмника лазера (А) и радиоволн (В).

A lot has been written in sources about 433 MHz receivers and transmitters (especially on the Internet). However, you will need to pay attention to correctly including the circuit in the Arduino board kit to process the transmitted information. There are also different types of modulations. The topic discusses

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specific theoretical and practical approaches to using the push/pull mode of a radio transmitter with a carrier frequency of 433 MHz with an MX-RM-5V receiving unit for transmitting PWM signals (Fig. 3) to control processes with the Arduino UNO board [1].

MATERIALS AND METHODS

In practice, it was proven that the kit received a signal at 18 meters within the line of sight without problems, but 50-100 meters was started difficulties.

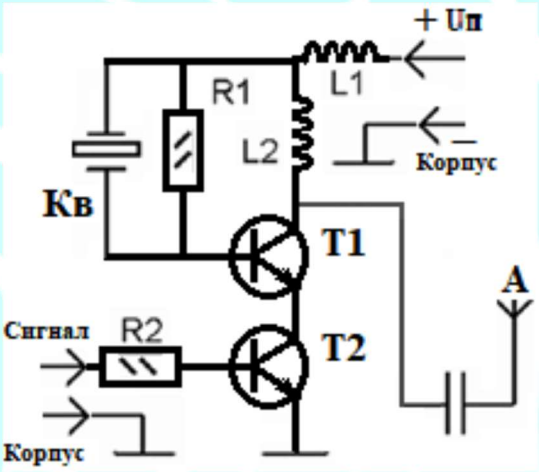
It is worth noting that further the problem of creating a line for transmitting arbitrary data is being solved, and not just controlling some smart Internet things or the motors of a smart model of a boat or car. The task can be more complicated, but still the distance of reliable operation is much greater. Moreover, in such a task, it is not only and not so much the distance within the line of sight that is important. But the ability to penetrate transmitted waves through various obstacles and other propagation media is also required [3].

Part of the program in the programming language for transmitting signals by a message transmitter looks like, this:

```
// sending:
vw_send((uint8_t *)msg, strlen(msg)); // send data
vw_wait_tx(); // waiting of ending of transmission
//(original list is in 1 page
```

In practice, communication has been achieved at a distance of 25-35 m. However, often, at a much shorter distance, right almost behind the wall, Wi-Fi can completely lose the signal. In urban and cities conditions, the signal may disappear from one end of a three-room city apartment to the other through two interior partitions, as well as from a balcony where there is a brick wall or plaster partition in a straight line between the transmitter and receiver. I did not use any of the more expensive kit options mentioned in the above review. An additional advantage of such a kit is that during pauses the transmitter does not consume energy, and without any special Sleep modes, simply according to the principle of its internal structure (current consumption in rest mode is comparable to the collector leakage currents of a locked bipolar transistor, i.e. 100 nanoamps The push/pull mode of the transmitter is called the pulse mode of signal transmission. This mode is more convenient when transmitting signals from Arduino and for processing, on the contrary, when receiving.

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Pic 2. Transmitter with quartz stabilizer.

The transmitter (marked FS1000A), (Fig. 2) is a simple generator based on a SAW resonator at a frequency of 433 MHz. The generator in it is assembled on transistor Q1, and transistor Q2, to the base of which digital data is supplied, is simply a switch that connects the generator to the power supply (to the GND-ground bus) when there is a high level (logical one) at the input. Electrical power can range from 5 to 12 volts, and, according to the manufacturer, the higher Up, the further the communication distance. The PWM signal is known (Figure 3); it can be transmitted by both analog and digital modulation [1].

The article briefly discussed the issues of the transmitter program code and described the important part and moments of the program transmission of the transmitter code. Next, you can show the main point of the receiving program, where the receiver is launched to receive data.

```
void loop() {
vw_rx_start() ;  // ready to receive
 buflen = VW_MAX_MESSAGE_LEN; //size of bufer must by entered
if (vw_have_message()) { //wate of reacive data
if (vw_get_message(buf, &buflen)) // If data received
{
vw_rx_stop(); //stop reacive and transmission:
//    (in original list is 1page)
```

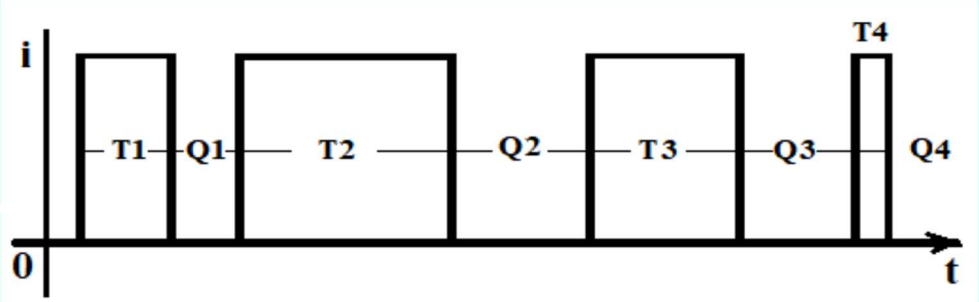


Fig 3. An example of a constant equivalent control signal with a PWM module.

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RESULTS

This behavior of the waveform is the behavior of the voltage and current of the capacitor integrator of the PWM signal modulator. Mathematical expression for voltage across a capacitor:

$$U(T) = U(To) = \int_{To}^{T} \frac{I(t)}{C} d(t) \qquad (1)$$

In turn, the MX-RM-5V unit is a super-regenerative receiver. Equipped with a comparator LM358 (its analogues are KR1040UD1, KR1053UD2, KR1401UD5, GL358, NE532, OP295, OP290, OP221, OPA2237, TA75358P), pulse corecting capacitor C3. The receiver is very sensitive to power supply ripples [3]. Small ripples on the power bus can affect the quality of the signal, after which the reciever module could not “see” the transmitter. Capacitor C3 was imstalled to reduce such phenomena. Instead, it can be connect a 10-20 mkF capacitor between the plus and minus of the power supply. To reduce the influence of the ripple amplitude on the receiving process, it is also desirable to power either the receiver itself or devices that introduce ripple (PWM, servos, etc.) from a separate stabilized power source. Inductance L2 can be presented on the board in the SMD version or in the form of a choke with axial leads. Receiver sensitivity: 100dBm (50Ω). The power supply can be within 4.5 - 5V, current consumption is 4 mA.

The modules operate in a temperature range from −10 to +70°C. The pair can operate without external antennas. To increase the quality of communication, you can use an antenna in the form of a quarter-wave vibrator (173 mm), which is a piece of single-core wire connected to the appropriate contacts. You can also use an antenna in the form of a half-wave vibrator (345 mm) or a piece of wire equal to the wavelength (691 mm) [1-3].

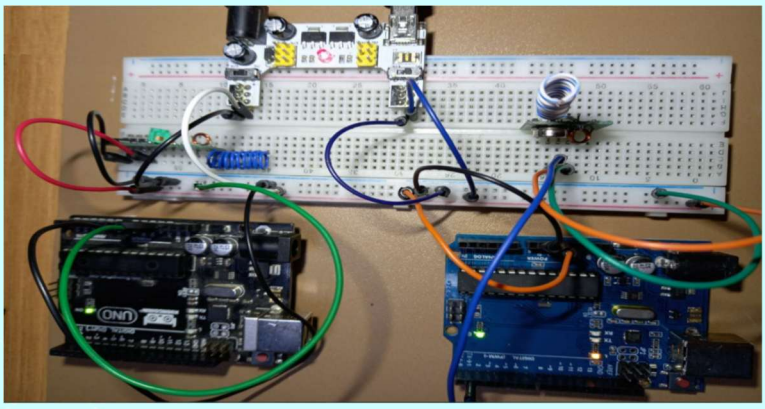


Figure 5. Connecting the transceiver to Arduino blocks

CONCLUSION

In conclusion, it can be noted that research has show practical results that DALM (distant acoustic laser microphone) signals can be transmitted over distances via PWM; however, processing requires more complex software since an

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analog signal must be extracted from PWM. This mechanism complicates in processing of results or addition signals.

The following aspects were discovered during the study:

1. Due to the fact that many different devices operate on the radio amateur band, they all create noise that can interfere with the system under study.
2. Data transfer speed is not high, approximately 8 kb/sec, and at the receiver 5 kb/sec.
3. It is not possible to use such technology to transmit video data or large amounts of data.
4. Simplex mode i.e. there is no feedback (confirmation) mode .

The main essence of the article is the determination of the capabilities of the control function of a double control system blocks. Installation problems and mode as well as software use. It is the circuit and measure system for control. When the signal determines the task and measures system component parameters. This, article explores theoretical and practical approaches to the use of a push/pull regime of the radio transmitter. It consider signal processing by the system and transmission. Such mini devices are known to conveniently manage bulky objects. They are available to many users. And widespread.

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