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The Microcircuit of the Shift Register 74HC595. 4-BIT Matrix Control

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ABSTRACT: The article shows the methods of managing the matrices with 4 razors using the sliding dimensions of 74HC595 and the method of creating a device using this microchemistry. With the help of the Arduino program, the issues of writing code on devices and their application in practice have been covered.

KEY WORDS: register, trigger, microcontroller, 74PC595 microcircuit, sensor, 4 – bit matrix.

I. INTRODUCTION

Registers are a continuous or operational element of exposure that serves to store information and perform certain actions on them.

Registers are usually built on the basis of triggers. The number of triggers depends on the discharge of the register.Registers are divided into parallel, serial, serial-parallel and parallel-serial types.

Parallel registers. Parallel registers can be built on the basis of D or RS-triggers. In Figure 1, the scheme of the parallel register, built on the basis of D-trigger, is presented. It provides information entry signals to the St input path and reading signals to the S2 input path. ikkilik codes that are written to a — register (information). [1]

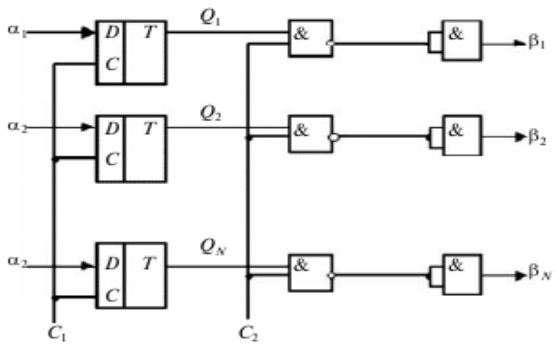

Fig 1. Parallel register based on D-trigger

Serial registers. The scheme of the serial register, built on the basis of DRS-triggers, is presented in Figure 2. The S access path of the Register gives signals for writing and reading information, while the F access path gives the 0 installation signal.

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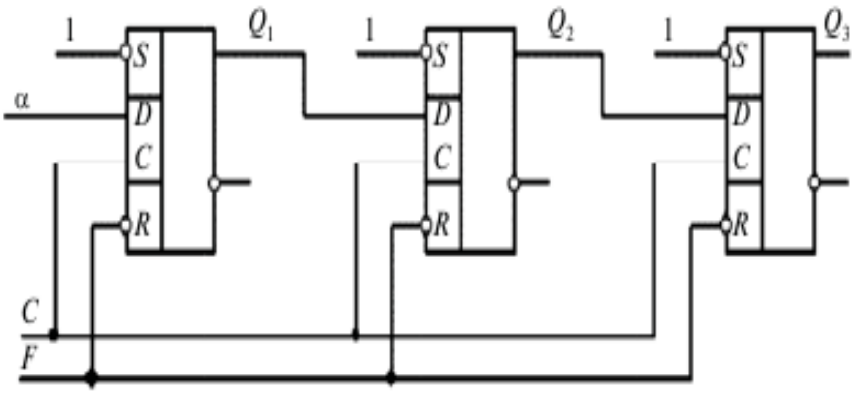

Fig 2. Serial register based on D-trigger

D-trigger, or standby trigger (Delay-wait), consists of One information entry D and a takt entry s, two output Q and $\bar{Q}$ (optional one may not participate). The D trigger scheme (Figure 3) differs from the RST-inverter trigger scheme, added to the range of S and R inputs. Now the position of the accuracy in the R and S inputs is excluded, whereas the inverter accepts the signal in the R input as S.

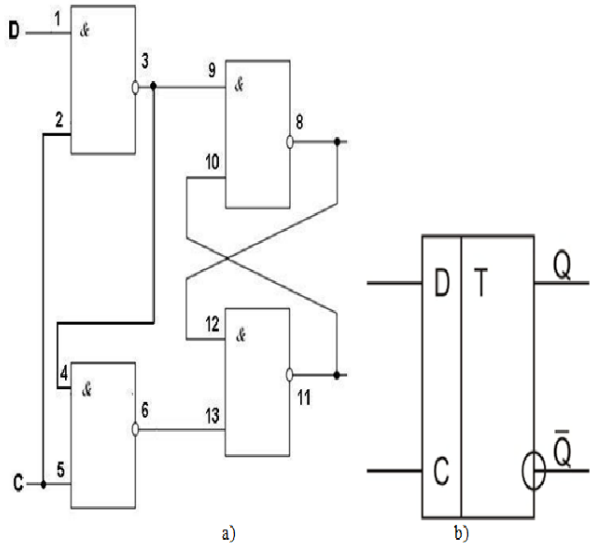

Fig 3. Synchronous D-trigger logical scheme (a) and its conditional graphic designation (b)

II. MICROCONTROLLER SELECTION INDICATORS AND DESCRIPTION OF SELECTED MICROCONTROLLER.

Registers that receive or transmit information in a row are called *shift registers*. With the input of the first discharge number X_1 in the silencer register to the right, The Last is transferred to the input portion of the left, the S_n is performed when the register is discharged and the first C synchronizing signal to it. With the arrival of the next signal, the X_1 synchronization value is entered from the S_n output connector into the S_{n-1} connector, while the Sn connector is transmitted to the X_2 connector. It happens that in each tract the incoming information is silenced to the right on one discharge.

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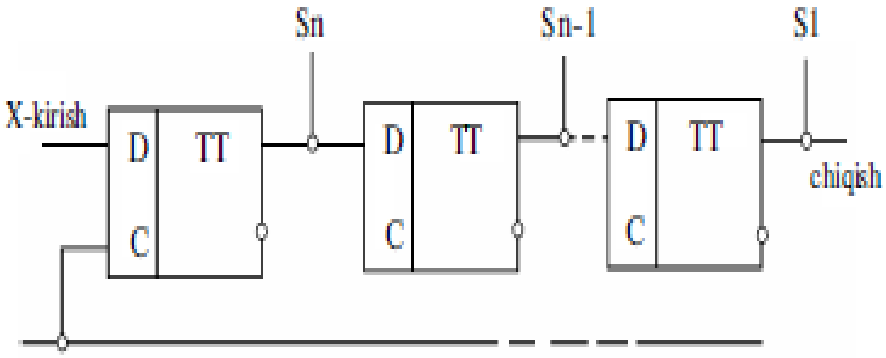

Fig 4. D-trigger.

In the synchronization of signals n, all registers are filled with the number of X discharge, and the first discharge number X_1, S_1 appears in the output. If N signals synchronization is transmitted to the input jack of the Sn X=0, then the number X in the register S_1 will exit the output and as a result the output part of the register will be free from maintaining the X number. Shift registers are performed on D-triggers (Fig 4) or RS-triggers (Fig 5). In the final scheme, an invertor scheme is connected to the first discharge to enter information.[2]

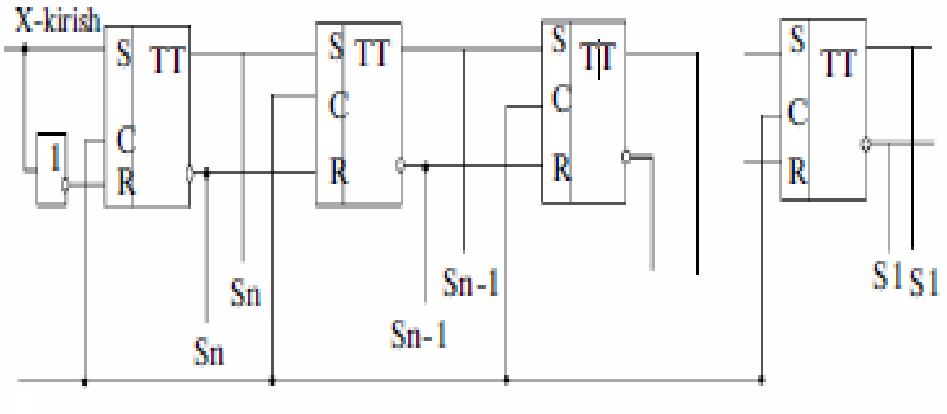

Fig 5. RS-trigger.

In order to extract information from the register in parallel, all output discharge parts of the shift register are connected to different poles S_n, S_{n-1},..., S_1. When creating a Shift register, dynamic controlled triggers are used on the C input part. The use of such triggers ensures that the shift register works in the norm. Figure 6 shows the D-trigger scheme of dynamic controlled chap swing sizes.

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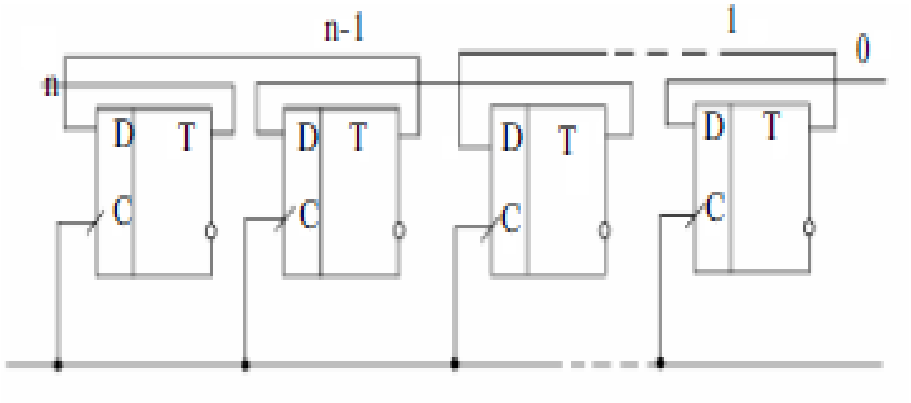

Fig 6. Dynamically controlled left shift register.

You can set the scroll register in both directions by combining the shift scheme to the right and left and using the control signal. Such a register (Figure 7) is called reversive. When the controller sends a signal to the V1 input, the shift scheme is connected to the right. In this case, the reverse register will turn right. When the controller is given a signal giving input to part B2, the shift scheme is connected to the left. In this case, the reverse register turns left. [3]

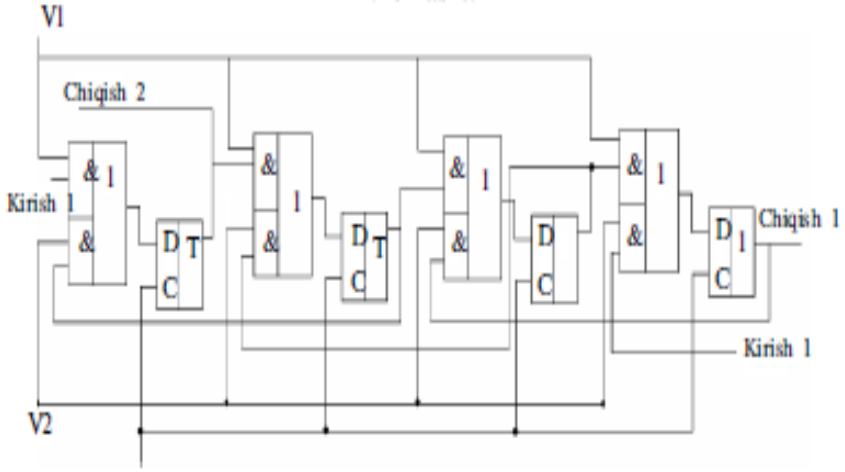

Fig 7. The reverse register.

In binary left and right, binary code extensions exceed the limit of the registrar. If the right-hand side register is connected to the left-hand section of the left-hand input, a circuit-cycling register is created. Reverse registers can be used to generate "stacked" registers. In this case there is a general access and exit. Such registers operate on the principle of "the first entered - the last is out". Stackable registers are also called store type registers.

III. TO CONTROL OR MANAGE AN ITEM SELECT A SENSOR AND ITS DESCRIPTION ACCORDINGLY.

Surveyor 74HC595 is mainly used to expand the number of microcontroller pins. For example, we need to connect 8 LEDs to the ATtiny13 microcontroller. This is not possible because the microcontroller has only 8 legs, two of which are for entry and one for exit. But if your device has a push register, the task is much simpler. You can control the register with only three feet. But what if you had to connect 16, 24 or more LEDs? It's very simple, the 74HC595 push register has the ability to increase bit depth using similar chips. However, the number of involved microcontroller legs remains unchanged. [7]

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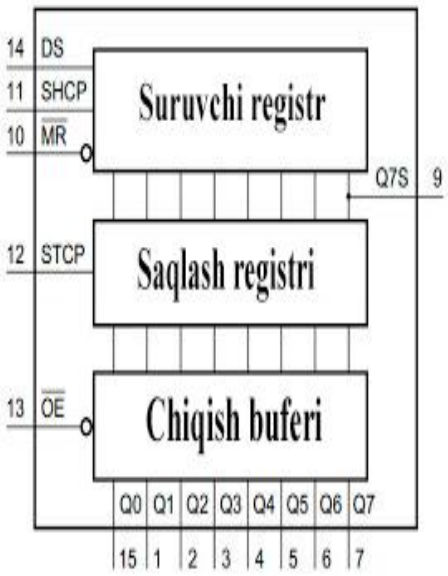

Here:

- ✓ **DS** - data entry
- ✓ **Q7S** - output for cascade registers
- ✓ **Q0-Q7** - working performances
- ✓ **SHCP** – input of a tactical impulse
- ✓ **MR** - login to reset the registry
- ✓ **STCP** - data storage
- ✓ **OE** - input that switches operating output from high resistance to working condition.

In the case of a tactical impulse for the SHCP input, the first bit is read from the DS input and written to the trivial part. In the next pulse, the least significant bit is converted to one bit, and the bit obtained at the DS input is replaced. This is always repeated, and when the push register is overflowing, the previously received bits appear sequentially with the output of Q7S. Registry cleaning is done by applying a low level of MR input. [5]

The data should be stored in a storage register first so that it can appear in the running outputs. This is done by applying a high impulse to the STCP input. The data in the storage register changes only when the next recording pulse changes.

High levels of OE input should be applied to enable performance results in a high resistance state.

The main features:

- ✓ voltage 2-6 V
- ✓ operating frequency 2-100 MHz (depending on power and manufacturer)
- ✓ maximum current 35 mA for output (75 mA for whole recording)

IV. DESIGN AND DESCRIPTION OF THE STRUCTURAL SCHEME OF THE COMPUTATIONAL SYSTEM FOR THE MANAGEMENT OF THE OBJECT

As everyone knows, there are a lot of pins that can be used in the development of Arduino, but there are also projects where the current pins are not enough, in this situation sliding registers will come to the aid. They allow us to significantly increase the number of output products, so using only 3 inputs, we can have up to 8 outputs. We can take 5 additional pins, using one 74HC595 sliding register. And also 74HC595 has a very good possibility to build cascades, that is, when two sizes are connected, we take only 3 pins in Arduino and make 16 outputs. Cascades can also be built from multi-digit sliding registers.[4]

Sometimes it happens when the situation requires a lot of control conclusions. This can be cited as an example of projects of different LED displays. To perform such a task, the purchase of a microcontroller with a cloud of

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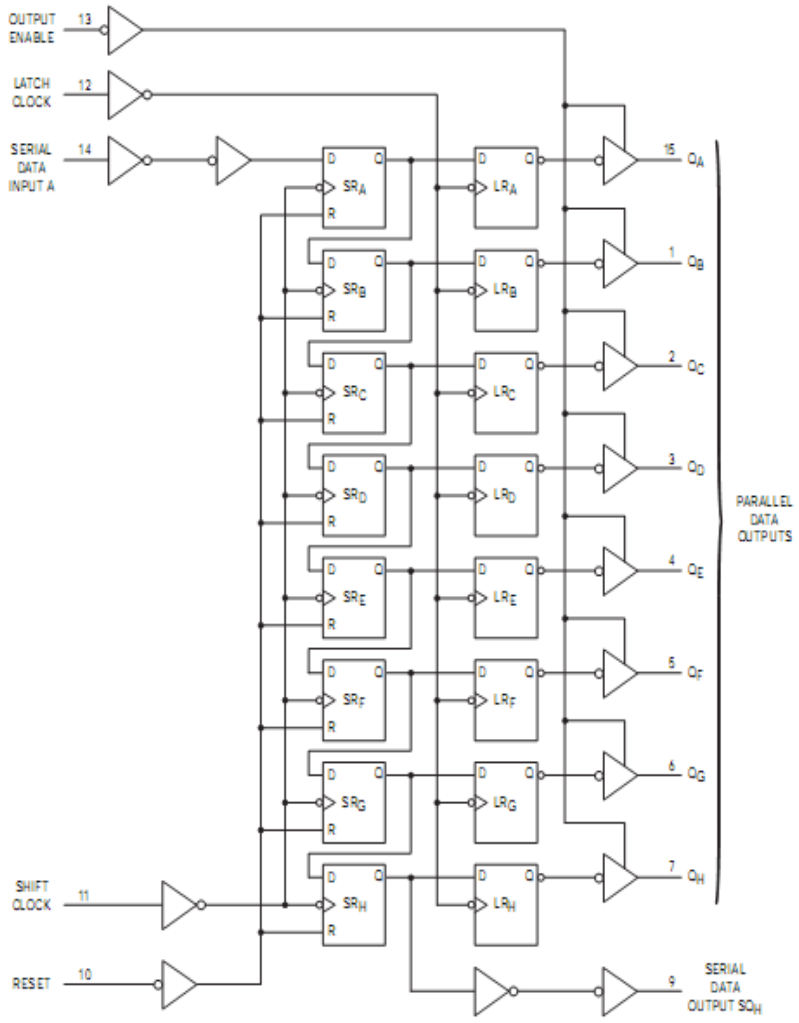
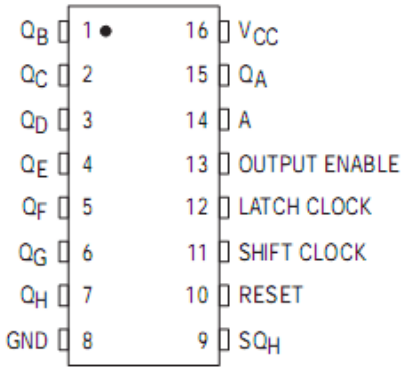
conclusions is unreasonably expensive. But from this situation, for example, if there is a solution for the use of registers HC595, we will consider its internal structure:



It can be seen that it consists of 8 triggers that transmit pulse data to SHIFT CLOCK. The LATCH CLOCK key outputs output data, the RESET pin returns the output to zero and the OE pin allows the output to be high if the output is low if the result is low.

Let's take a closer look at HC595:



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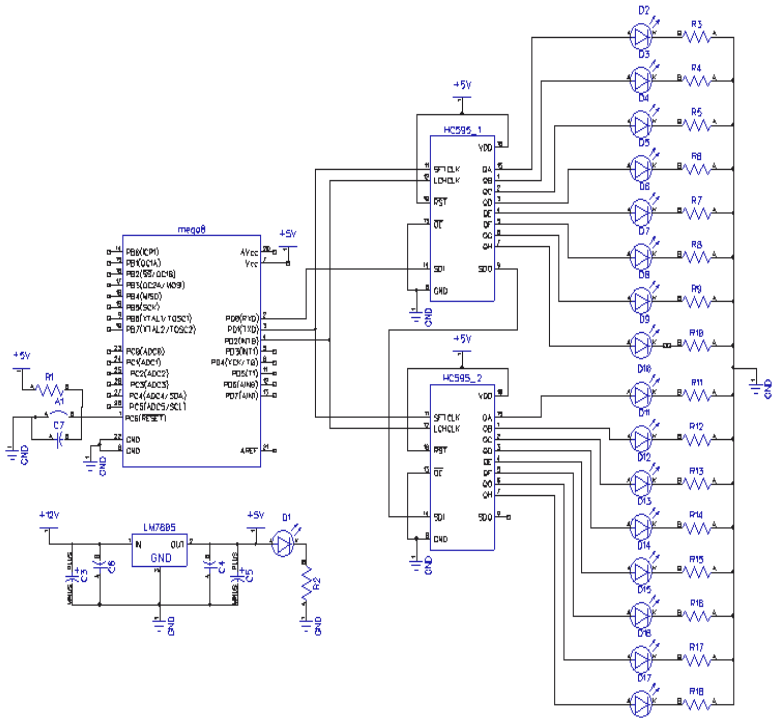
VCC data generator and GND data receiver, Qa-Qh-output (used for SQh Cascade), a – data input, SHIFT CLOCK-input bit input record, LATCH CLOCK-input data register recorder, output ENABLE - output for permission, (if it is a logical unit, then at Output Hi-Z will be in its own state, 0-if it is recorded, then something will be written), RESET – register Now I will describe the case verbally with this chip. We put the data on the A output, then the front of the SHIFT CLOCK pulse writes all 8 bits. Next, it will be necessary to give an impulse to the LATCH CLOCK output to record The entered data. If the output is turned on, then it is possible to track the data entered in the QA-Qh outputs. If we do not have 8 outputs, we can cascade the sliding registers with the help of the SQh output and have almost any finite port:



True, with the increase in the number of shift registers, the time required to connect the data chain to them increases. So with the help of the HC595 and the 4 pins of the microcontroller, we can control the LEDs in limited quantities.

V. THE GENERAL ALGORITHM OF OBYEKT MANAGEMENT CREATE AND DESCRIBE IT

The digital outputs of Arduino Nano and UNO's and in some cases the legs of Arduinome's can also be missed, if there is a need to manage multiple outputs. In this case, it is possible to use the 74HC595 microcontroller. 74HC595 microschema-eight-discharge serial input register, information serial or parallel output, recording trigger and output three-state. The function of the connection points of the 74HC595 microprocessor is shown in Figure 8.

Three legs are also enough for us to manage: SH_ SR, STCP i DS. When a logical one appears in the sh_cp token entry, The Register reads the bit from the DS information entry and writes it to the smallest register. When the next impulse to the input of the token comes, it is all amplified, only the bit written before it is pushed into a single discharge, the bit from which it is replaced by a new one. When all eight bits are full, and after the first impulse of the current comes, the register begins to refill again from a small discharge,and all is again tossed. The Q0...In order for information to appear in Q7 exits, it is necessary to “record” them. To do this, the ST_CP entry must be given a logical one. In order for the information to change in their speeches, it will be necessary to “record” them.

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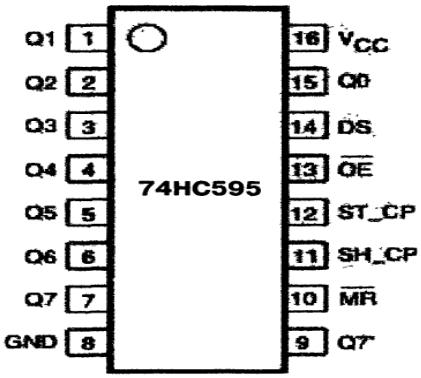

Fig 8. 74PC595 microcircuit

Q7" designed for serial connection (cascade) of output drive registers. In such a connection, the bits in the first register are pushed to the next connected register, from which to the next, etc. Thus, a cascade consisting of two 8-bit registers works like a single 16 – bit sliding register. Registers can be connected like this, if desired. In the next practical work, the Cascade connection of the 74HC595 microchem will be considered, in this practical work only one microchem will be used -8 outputs of the 74HC595 microchem will be connected to 8 segments of the Matrix, 4 outputs of the matrix will be connected to the Arduino's board to select the connection terminals. Figure 9 shows the connection scheme.[6]

0-999 sec up to 0.1 sec accuracy we will start recording the counter in seconds and stop the sketch in seconds. We use the Arduino SPI library. SPI because the library is used, the 11 and 13 footpaths of Arduino are used, the 4, 5, 6, 7 footpieces of Arduino are used to select the Matrix registers. The listing shows a sketch.

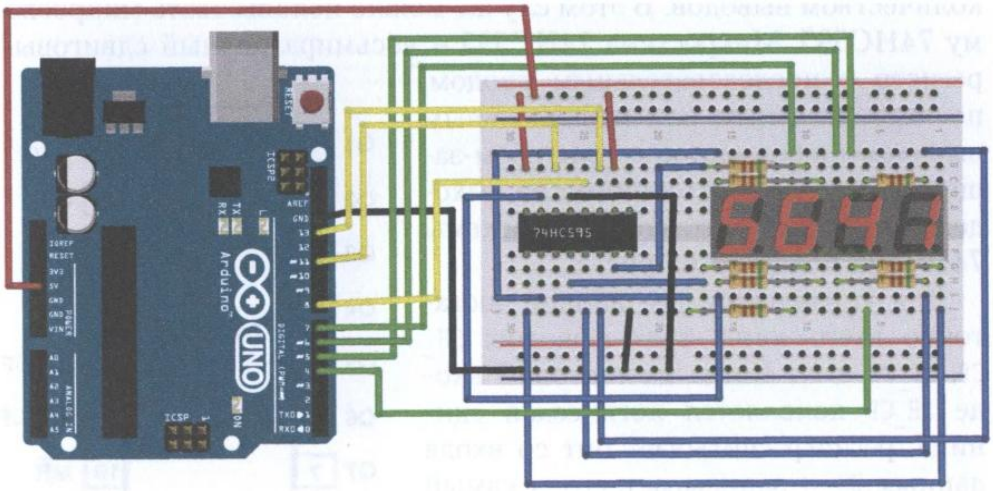

Fig 9. Connection scheme of a seven-segment 4-bit indicator with a shift register 74HC595.

VI. CONCLUSION AND FUTURE WORK

In general, we can say that it is very difficult to imagine mankind in the present time without technologies. Although their penetration into each area is somewhat complicated on the one hand, the result can be traced to many amenities. The age of information technology opens up different possibilities for us. We have the news that many things around us are automated and have their own private installed system. With the help of the article

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