KITS EDUCATIONAL ELECTRONIC

AVT 723
Arcade game

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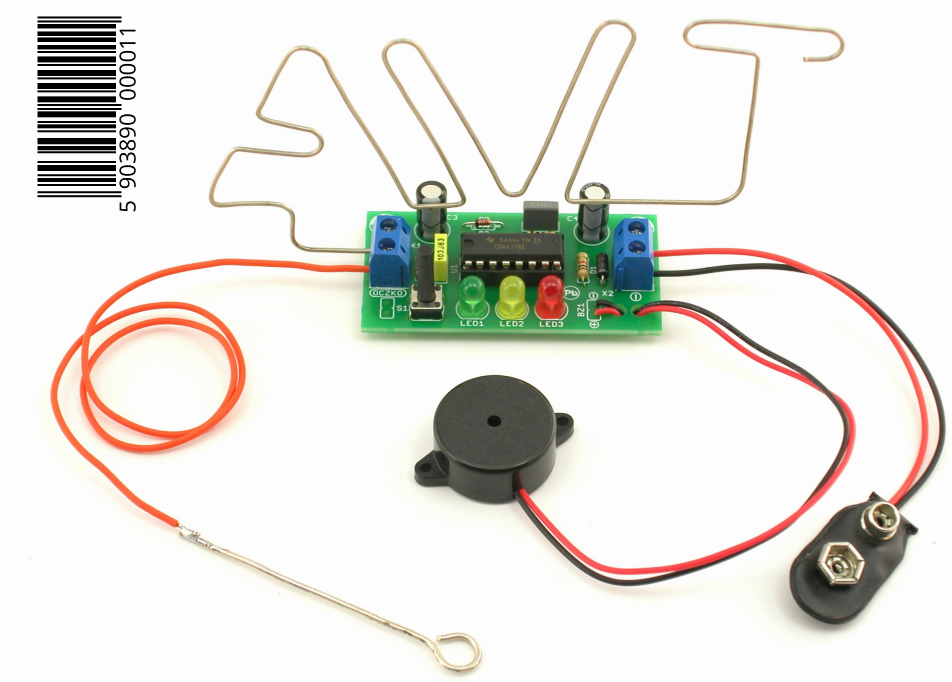

The game is to get out of the labyrinth as quickly as possible, without shaking your hand. The winner will be the one who will beat the whole tour without delay in the shortest possible time. The game allows two setbacks. Errors and the end of the game are signaled by the sound and the LEDs flashing. Difficulty can be adjusted by changing the shape and length of the route. The game can be powered from a battery or AC adapter.

Specifications

- great fun for everyone whether in the group or individually
- the goal is to get out of the labyrinth without errors and as quickly as possible
- excellent exercise skill and a steady hand
- power supply: 4.5-15V DC

Functional description

Schematic of the arcade game is shown in Figure 1. There are two blocks in the electrical circuit. The first is the circuit of the route and the error sensor with buzzer BZ1, the second is the error counter with the integrated circuit U1 and three LEDs. If the mesh does not touch the route, the resistor R2 has a voltage equal to zero. C2 and C4 capacitors are discharged and the BZ1 buzzer is inactive. When the player shakes his hand and mesh touches the wire route, the capacitor C2 will be charged, and also the capacitor C4 will be charged via the diode D2. A positive pulse will appear at the CLK input of U1. The capacitor C2 would be discharged by the R2 resistor in about 1 second. In practice, this time will be shorter due to the discharge of C4 and C2 via the BZ1 buzzer. Capacitors C2, C4 and resistor R2 are selected so, that the counter does not count several times single error (several hand shake associated with this error) and at the same time did not miss several consecutive errors. Due to the large C4 capacitance, even if the wire touch is short, the buzzer will produce a longer sound, as the C4 capacitor discharges with the current drawn by the buzzer for a

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relatively long time of about one second. CMOS integrated circuit 4017 works as a counter to four and stops counting in the last state. Two consecutive touches cause setting of the outputs Q1, Q2, and the switching on yellow and red LEDs. The third error will result in a high Q3 state and all LEDs will turn off. This high state will occur on the ENA input (pin 13 of the U1 chip) and will block further error counting. This state will also be indicated by the diode D3 on and the BZ1 buzzer will be permanently activated. The LEDs blink and the continuous buzzer sound indicates the end of the game. The game returns to its initial state after pressing S1 button. The high logical state given to the RST input (pin 15 of the U1 chip) resets the counter and causes the green LED to light on. Capacitor C1 and R1 resistor are automatically resetting the meter after each switching on of the power supply.

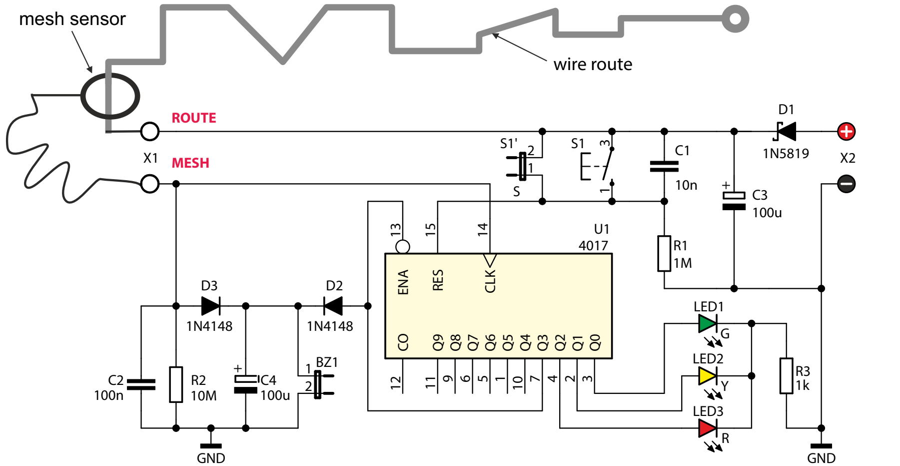

Figure 1. Schematic diagram

Assembly and test

The assembly is shown in Figure 2. Assembly is typical. It starts with the smallest components and ends up with the biggest ones. Particular attention should be paid to polarization of components. The path of the labyrinth can be shaped freely. You can also do it from the template shown on page 4. After checking the correctness of the assembly, the power supply can be turned on. The circuit can be supplied from 9V battery or wall power supply. Properly assembled unit will work properly just after switching power on.

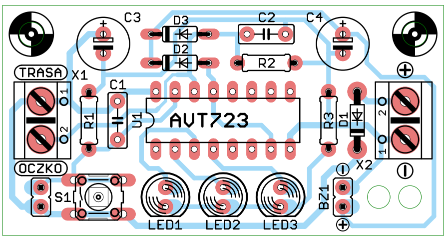

Figure 2. Components layout

Start off by soldering the printed circuit elements in order from smallest to largest. The unit assembled flawlessly, using the supplied components will operate immediately after switching on the power supply.

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Component list

Resistors:

R1: ....1MΩ (brown-black-green-gold)
R2: ....10MΩ (brown-black-blue-gold)
R3: ....1kΩ (brown-black-red-gold)

Capacitors:

C1: ....10nF (marked as 103)
C2: ....100nF (marked as 104)
C3, C4:.............100µF !

Semiconductors:

D1:...................1N4007 !
D2, D3:............1N4148 !
U1:...................4017 with 16-pin IC socket !
LED1: ....LED diode GREEN !
LED2: ....LED diode YELLOW !
LED3: ....LED diode RED !

Others:

S1:...................switch
X1, X2:............2-pin terminal block connector
6F22 snap-in connector (red wire ⊕ ; black wire ⊖)
BZ1:.................PIEZO (red wire ⊕ ; black wire ⊖)

! While assembling the components marked with an exclamation mark attention should be paid to their polarity. Symbols of the components on the PCB as well as photos of assembled sets may come in useful. To access high-resolution images, download the PDF file.

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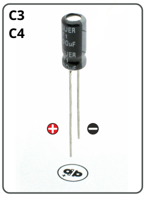
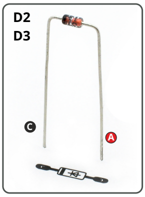
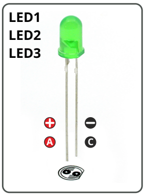
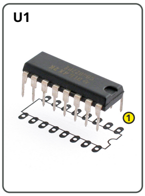


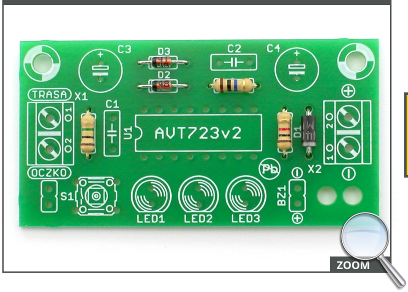




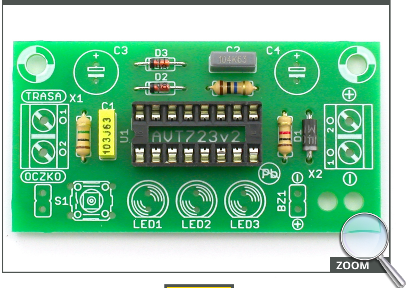


Assembly in 5 steps

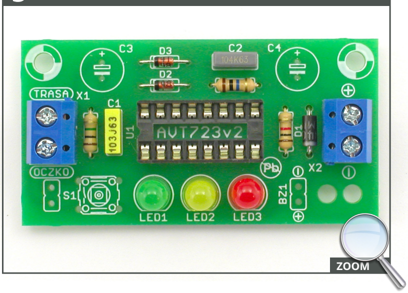
1 Solder diodes D2, D3, D1, resistors R1-R3



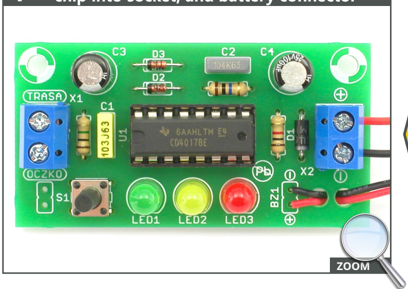
2 Solder IC socket and capacitors C1-C2



3 Solder LED diodes and connectors



4 Solder capacitors C3, C4, S1, piezo, insert chip into socket, and battery connector



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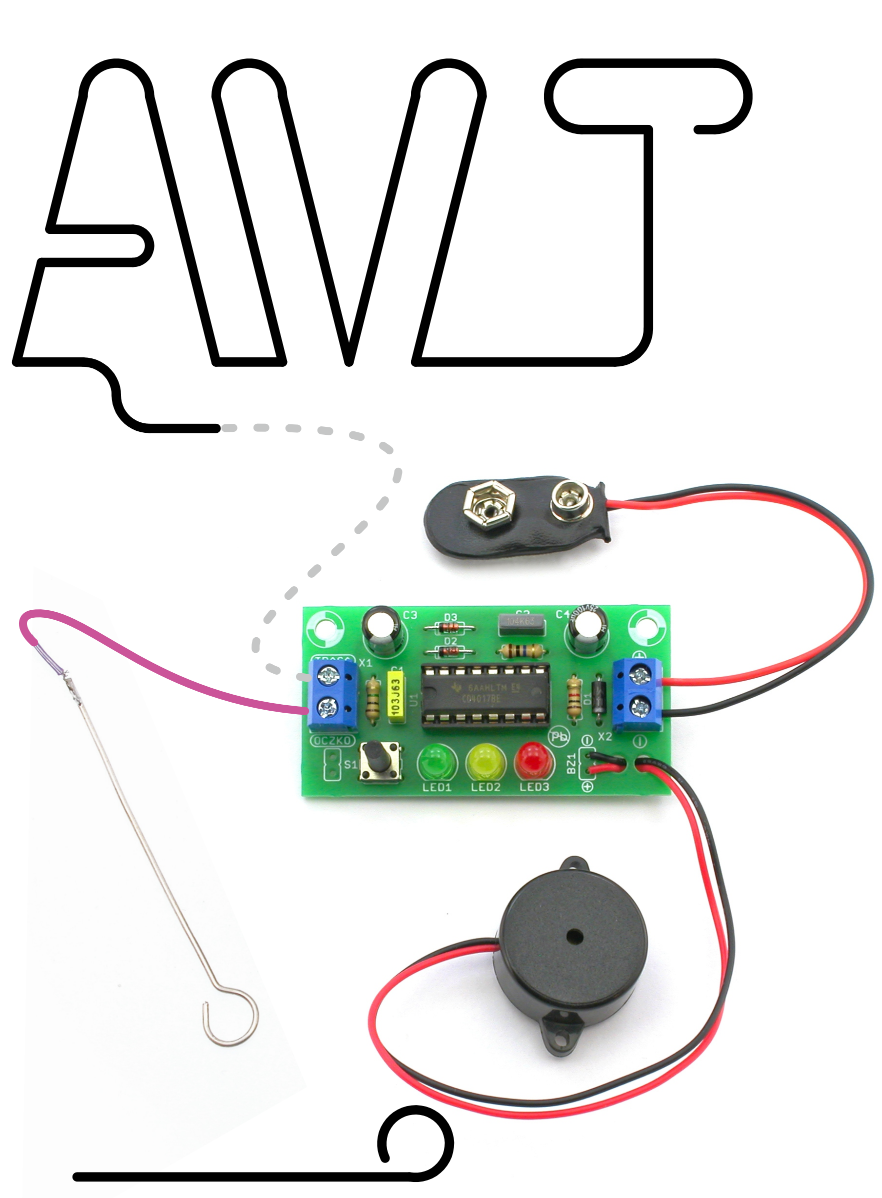
5 **Bend and attach the rigid wire to connector X1, point "ROUTE" (TRASA), attach the hose to the connector X1, the "MESH" (OCZKO)**



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