ACOUSTIC CONTROL SYSTEM IN MEDICINE

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Annotation: This article describes a device, which allows to control various elements using sound signals of different tones remotely. Its possible application are also described in various control systems.

Key words: sound, acoustics, distance, control, management, efficiency, simplicity, cheapness

Objectives

Acoustic switch is a simple and inexpensive device. One of the main advantages of the device is cheapness, it does not require any expensive microcontroller or other components. Also one argument in support of this device is the simplicity of management, for example: one clap of hand, and we open the door, two clap of hand blinds open. Especially it can be useful in a hospital where patients are forbidden to stand up, for example, if a patient needs to turn on the light at night

Discussion

The microphone amplifier is assembled on two KT315 transistors, but KT368 transistors or foreign analogues are desirable to use to increase the sensitivity of the microphone

The main circuit is a powerful bipolar transistor which controls the resistive load. The relay operates high resistive load (12, 24 or 220 voltage).The signal from the microphone is amplified and transmitted to the base of a key, junction opens and at this moment the relay is switched on, the microphone responds to loud noises (e.g. clap), and the sensitivity of such circuits is 4-5 metres. With the second clap, the circuit turns off automatically, therefore the current is zero on resistive load.

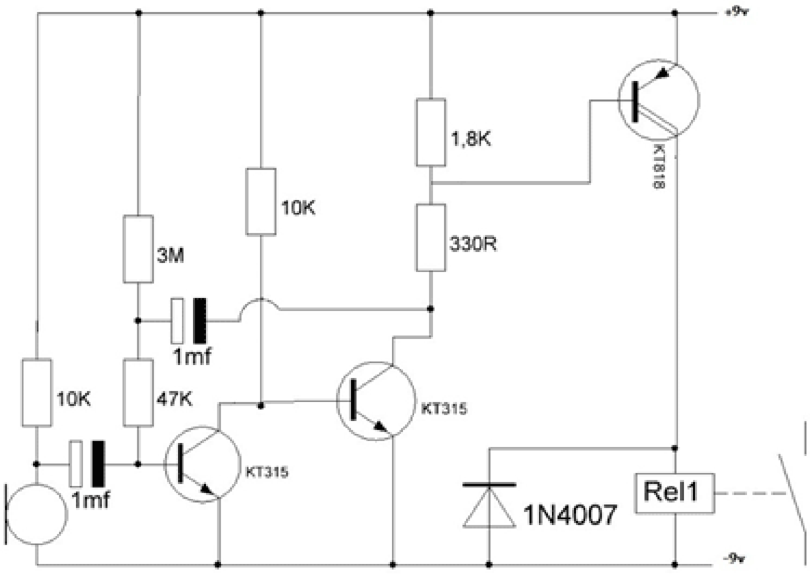

Figure 1. Demonstration electric circuit

Conclusion

Research results suggest the following:

The acoustic switch is easy to manufacture. Its price is about $ 2. We can buy all elements of the device in a usual radio store.

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SIMPLE PHYSICAL MODELS IN PRACTICAL APPLICATIONS FOR NEW ENGINEERING TASKS

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There is a traditional opinion that modern physics can evolve only by using more and more complex mathematical and physical models. In practice, this often appears as division of a single common problem to multiple small problems with complex description. In this case, complete picture of actual process can be lost in a huge amount of practically unimportant details. Sometimes the simplified description is better, when more understandable global description is more preferable compared with more precise, but also more complex for understanding physical models. We describe a few simple models that can be applied in the practical engineering to understand the basic behavior of modern semiconductor devices.

Various types of detectors with internal amplification of weak signals produced by ionizing radiation are used in modern physical experiments. There is a large class of gaseous detectors and presently widely used semiconductor avalanche photo detectors (APDs) [1]. Avalanche physical processes in semiconductors are more complex to describe and understand compared with simple Tungsten model for avalanche in gaseous detectors. However, it is not necessary to solve the fundamental system of partial differential equations to understand the processes in this type of detectors. Well known by radio engineers common conception of feedback can be applied for simple description of such a complex system [2]. Simple feedback model can be used for the classification of different types of modern APDs and for description of its internal processes. Simple "Logistic" model is applied to explain how the rising time of avalanche depends on the probability of avalanche occurrence in the APD. To understand how carriers generation-recombination processes are affected by traps created during irradiation and self annealing in semiconductors, one can apply a simple model based on assumption of a single traps level and a single lifetime of carriers on this level [3]. Interpretation of results obtained for a few types of commercial APDs is presented. Example of method of the detector noise introduction applied to the detector SPICE model is discussed. In addition, simple SPICE model describing gain coefficient and applicable for transient analysis of APD is proposed.

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