Sound-Activated Clap Switch

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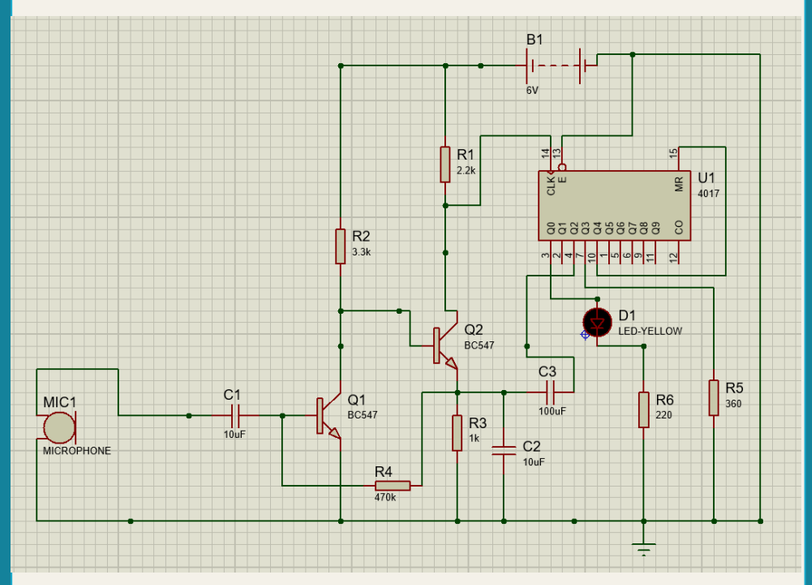
PROBLEM STATEMENT

A Clap Switch is an electronic circuit that allows users to turn electrical appliances ON and OFF using sound, eliminating manual operation. It detects claps via a condenser microphone, which converts sound waves into electrical signals. These signals are amplified using a BJT (Bipolar Junction Transistor) and processed using logic gates or a decade counter. When a predefined clap pattern is detected, the circuit triggers a relay to control the appliance. This system provides hands-free convenience, making it useful for home automation and assistive technology. The project aims to design a simple, efficient, and cost-effective clap-activated switch.

APPROACH / DESIGN/ METHODOLOGY

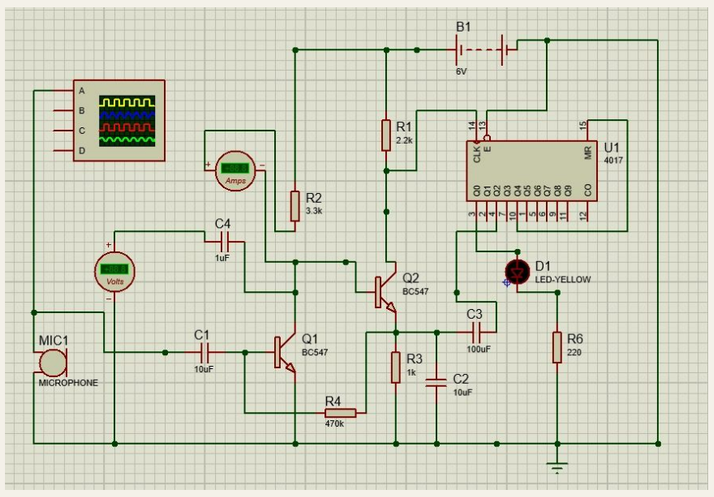
- A condenser microphone captures the clap sound and converts it into an electrical signal. A BC547 transistor amplifies the weak signal, while an R-C network filters noise. The processed signal triggers a CD4017 decade counter, generating pulses to toggle the connected device. One clap turns it ON, another turns it OFF, enabling hands-free control.

CIRCUIT DIAGRAM /ALGORITHM

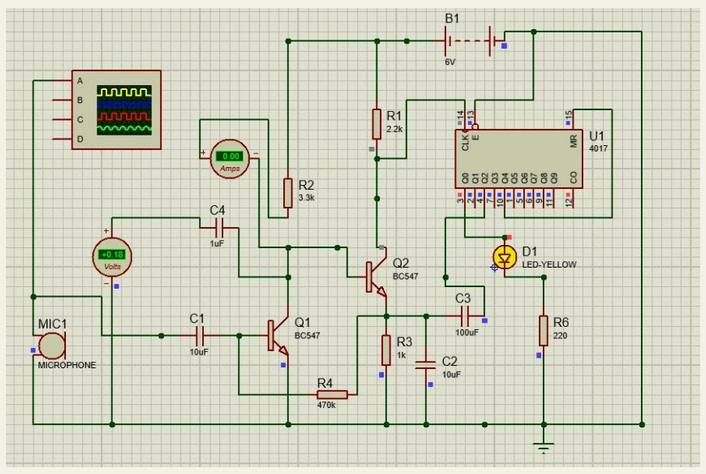


SIMULATION RESULTS

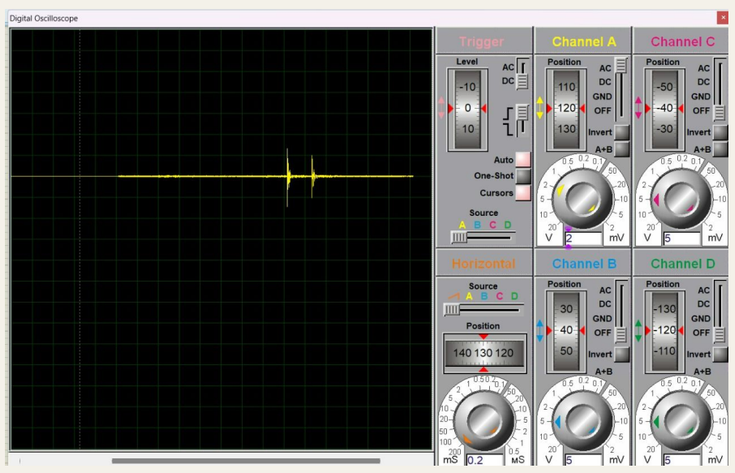
Before clap:



After Clap:

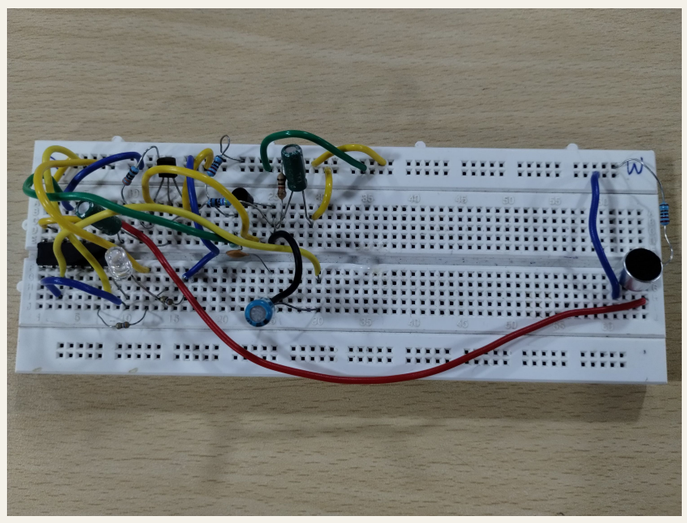


Clapping Sound Waveform:

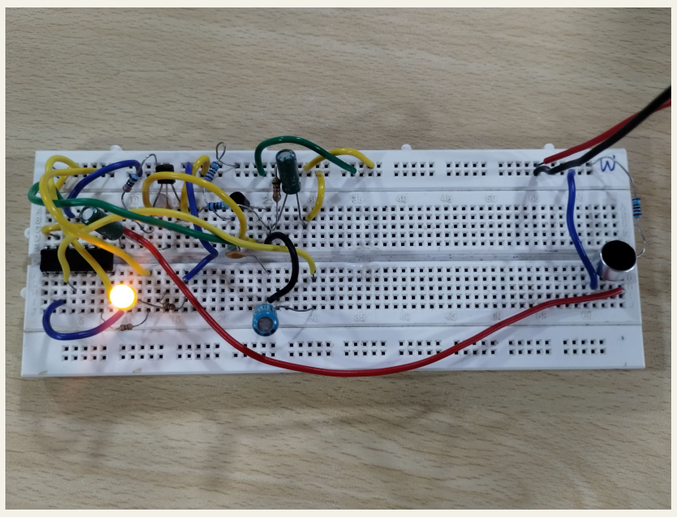


WORKING MODEL PICTURES

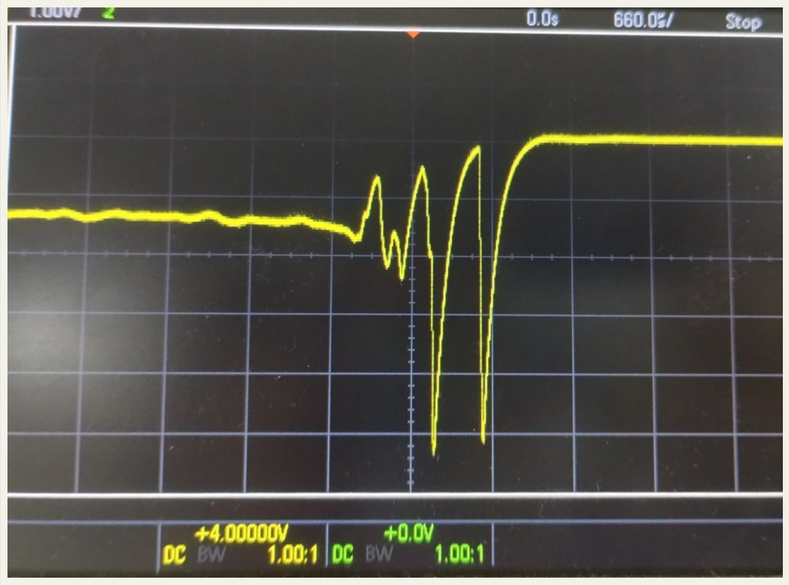
Before Clap:



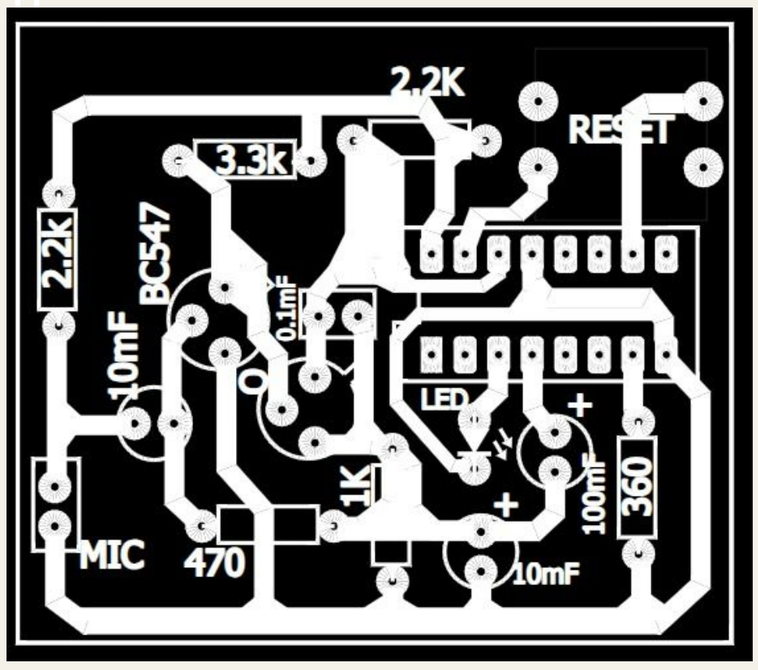
After clap:



RESULTS/ CALIBRATION/ ERROR GRAPH



PCB LAYOUT



REFERENCES

[1] Sedra, A. S., & Smith, K. C. (2015). Microelectronic Circuits (7th ed.). Oxford University Press.

[2] Malvino, A., & Bates, D. (2016). Electronic Principles (8th ed.). McGraw-Hill Education.

[3] R. K. Megalingam, R. N. P. Raj, and M. Manoj, "Clap based switch for physically challenged," International Journal of Engineering and Technology (IJET), 2011.