VISVESVARAYA TECHNOLOGICAL UNIVERSITY

"Jnana Sangama" Belagavi – 590018

Mini Project Report on

"ECHOS TO WATTS-Harnessing Sound Energy To Electricity"

Submitted in partial fulfillment of the requirements for the award of degree

BACHELOR OF ENGINEERING
IN
ELECTRONICS & COMMUNICATION ENGINEERING

Submitted By

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

CERTIFICATE

This is to certify that the following students,

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has submitted Project synopsis on **"ECHOS TO WATTS-Harnessing Sound Energy To Electricity"** for VI Semester B.E. in Electronics & Communication Engineering during the academic year 2023-24. The mini project report has been approved as it satisfies the academic requirements in respect of Project work prescribed for the Bachelor of Engineering Degree.

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ABSTRACT

The conversion of sound energy to electrical energy involves the use of a transducer, typically a microphone or a piezoelectric material. Sound waves, which are mechanical vibrations in the air, strike the diaphragm of the microphone, causing it to vibrate. These vibrations are then transferred to an electrical component, such as a coil or a piezoelectric crystal. In the case of a dynamic microphone, the vibrating diaphragm moves a coil within a magnetic field, inducing an electrical current through electromagnetic induction. In a piezoelectric microphone, the pressure from sound waves causes the piezoelectric material to generate a voltage due to the piezoelectric effect. This electrical signal, which corresponds to the sound wave's amplitude and frequency, can then be amplified and processed for various applications, such as audio recording, communication devices, and sensors. The efficiency and quality of the energy conversion depend on the materials used and the design of the transducer.

Dynamic microphones operate based on electromagnetic induction. They consist of a diaphragm attached to a coil of wire placed within a magnetic field. When sound waves strike the diaphragm, it vibrates, causing the coil to move within the magnetic field. This movement induces a voltage in the coil due to Faraday's law of electromagnetic induction. The generated electrical signal corresponds to the sound wave's characteristics (frequency and amplitude).

Condenser microphones use the principle of capacitance change. They consist of a diaphragm and a back plate that form a capacitor. Sound waves cause the diaphragm to vibrate, changing the distance between the diaphragm and the back plate. This change in distance alters the capacitance, which, in turn, affects the electrical charge stored in the capacitor. An external voltage source (phantom power) is often required to maintain the charge.