



**PROJECT REPORT ON**

**“DESIGN AND OPTIMIZATION OF LOW  
POWER AND HIGH SPEED COMPARATOR  
FOR BIOMEDICAL APPLICATIONS”**

**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 & COMMUNICATION ENGINEERING  
ALVA'S INSTITUTE OF ENGINEERING & TECHNOLOGY**

**Accredited by NBA & NAAC with A+ Grade**

**MOODBIDRI – 574 225.**

**2023-2024**

# ALVA'S INSTITUTE OF ENGINEERING & TECHNOLOGY

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MOODBIDRI - 574 225

(Affiliated to VTU, BELAGAVI)

## DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

### CERTIFICATE

Certified that the project work entitled "DESIGN AND IMPLEMENTATION OF LOW POWER AND HIGH SPEED COMPARATOR FOR BIOMEDICAL APPLICATIONS" is a bona fide work carried out by

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in partial fulfillment for the award of **BACHELOR OF ENGINEERING** in **ELECTRONICS & COMMUNICATION ENGINEERING** of the **VISVESVARAYA TECHNOLOGICAL UNIVERSITY, BELAGAVI** during the year 2023-2024. It is certified that all corrections/suggestions indicated for Internal Assessment have been incorporated in the report deposited in the departmental library. The project report has been approved as it satisfies the academic requirements in respect of Project work prescribed for the Bachelor of Engineering Degree.



Signature of the Guide

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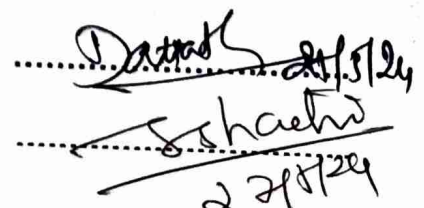
### EXTERNAL VIVA

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Signature with date



27/5/24

# ABSTRACT

The design and construction of a high-performance data collection system are the main objectives of this project, with a particular emphasis on the integration of dynamic comparators and analog-to-digital converters (ADCs). With the use of dynamic comparators' speed and signal processing power, the system attempts to precisely measure and manipulate real-time data from a variety of sensors and equipment. When used in advanced real-time applications that interface with digital processing systems, communication systems, and instrumentation for data gathering and analysis, this technique guarantees excellent performance in situations that call for quick data processing and precise signal interpretation. For biomedical applications, efficiency, downsizing, and improved functionality, ADCs and comparators must be integrated into Very Large Scale Integration (VLSI) technology.

In order to meet the changing demands of patients and healthcare professionals, manufacturers are able to build medical devices with enhanced functionality in compact form factors by combining various electrical components onto a single silicon semiconductor microchip. In order to improve precision in biomedical data collection, this study aims to investigate current advances in ADC technology. It also develops dynamic comparators suited for biomedical ADCs, analyzes crucial factors for biomedical comparators, and optimizes the design for biomedical applications. By enhancing digital signal processing, this research hopes to improve overall system performance and reliability in healthcare settings, particularly for biomedical applications like biosignal monitoring and medical imaging.