

# **VISVESVARAYA TECHNOLOGICAL UNIVERSITY**

**Jnana Sangama, Belagavi – 590018**



**Main Project Report On**  
**“FAULT DETECTION IN IEEE 9 BUS SYSTEM USING MATLAB & SIMULINK”**

**Submitted in partial fulfilment of the requirement for the award of degree of**

**BACHELOR OF ENGINEERING**  
**UNDER**  
**VISVESVARAYA TECHNOLOGICAL UNIVERSITY**

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**DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING**



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**2024-2025**



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## DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING



### CERTIFICATE

This is to certify that the project work entitled **“FAULT DETECTION IN IEEE 9 BUS SYSTEM USING MATLAB & SIMULINK”** is a bonafide work carried out by **BHUMIKA K RAMESH (1RR21EE004), VISHAL G (1RR21EE013), VIVEK N (1RR21EE014), JYOTI (1RR21EE408)** in partial fulfillment for the award of **Bachelor of Engineering in Electrical and Electronics Engineering** of the **Visvesvaraya Technological University, Belagavi** during the year 2024-2025. It is certified that all corrections & suggestions indicated for internal assessment have been incorporated in the report & deposited in the departmental library. The main project report has been approved as it satisfies the academic requirements.

Signature of the Guide

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Signature of HOD

**Dr. P Ebby Darney**

Signature of the Principal

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Name of the Examiners:

1. \_\_\_\_\_

2. \_\_\_\_\_

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## DECLARATION

We, **BHUMIKA K RAMESH (1RR21EE004), VISHAL G (1RR21EE013), VIVEK N (1RR21EE014), JYOTI (1RR21EE408)** students of 7th semester BE in Electrical and Electronics Engineering, **RajaRajeswari College of Engineering, Bengaluru** hereby declare that the project work entitled **“FAULT DETECTION IN IEEE 9 BUS SYSTEM USING MATLAB & SIMULINK”** submitted to the **Visvesvaraya Technological University** during the academic year 2024-25, is a record of an original work done by us, under the guidance of **Kiruthika K**, Assistant Professor, Electrical and Electronics Engineering, RajaRajeswari College of Engineering, Bengaluru. This project is submitted in partial fulfilment of the requirements for the award of the degree of Bachelor of Engineering in Electrical and Electronics Engineering. The results embodied in this have not been submitted to any other University or Institute for the award of any degree.

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# CONTENTS

CERTIFICATE	ii
DECLARATION	iii
ACKNOWLEDGMENT	iv
CONTENTS	v
LIST OF FIGURES	vi
ABSTRACT	vii
CHAPTER 1: INTRODUCTION	1
1.1: INTRODUCTION	1
1.2: LITERATURE SURVEY	2
1.3: OBJECTIVE OF PROJECT	5
1.4: OVERVIEW OF PROJECT	6
CHAPTER 2 : HARDWARE OF FAULT DETECTION IN IEEE 9 BUS SYSTEM USING MATLAB & SIMULINK	7
2.1: BLOCK DIAGRAM	7
2.2: COMPONENTS REQUIRED	8
2.3: CIRCUIT DIAGRAM	14
2.4: METHODOLOGY	15
CHAPTER 3 : SOFTWARE-MATLAB	16
3.1: MATLAB	16
3.2: SIMULINK	17
CHAPTER 4 : RESULTS & DISCUSSIONS	18
4.1: RESULT	18
4.2: CONCLUSION	22
4.3: FUTURE SCOPE	23
CHAPTER 5 : ADVANTAGES AND DISADVANTAGES	24
5.1: ADVANTAGES	24
5.2: DISADVANTAGES	25
CHAPTER 6 : APPLICATIONS	26
CONCLUSION	27
REFERENCE	28
ANNEXURE	29

# LIST OF FIGURES

<b>Fig 2.1: Block Diagram of Fault Detection In IEEE 9 Bus System Using MATLAB &amp; Simulink</b>	<b>7</b>
<b>Fig 2.2.1.1 :Arduino Uno</b>	<b>8</b>
<b>Fig 2.2.2.1: Dc Current &amp; Voltage Indicator</b>	<b>10</b>
<b>Fig 2.2.3.1: 4 Channel Relay Module</b>	<b>11</b>
<b>Fig 2.2.4.1: OLED Display</b>	<b>11</b>
<b>Fig 2.2.5.1: Rectifier Module</b>	<b>12</b>
<b>Fig 2.2.6.1: 4 Channel Relay Module</b>	<b>13</b>
<b>Fig 2.2.7.1: Bulb Holder</b>	<b>13</b>
<b>Fig 2.3: Circuit diagram Fault Detection in 2 Bus System</b>	<b>14</b>
<b>Fig.4.1.1 IEEE 9 Bus System</b>	<b>18</b>
<b>Fig 4.1.2 Voltage Characteristics of The Line – Ground Fault</b>	<b>19</b>
<b>Fig.4.1.3 Current Characteristics of The Line – Ground Fault</b>	<b>20</b>
<b>Fig.4.1.4 Voltage Characteristics of the Double Line – Ground Fault</b>	<b>21</b>
<b>Fig.4.1.5 Current Characteristics of the Double Line – Ground Fault</b>	<b>21</b>
<b>Fig.4.1.6 Current Characteristics of the Line-Line – Ground Fault</b>	<b>22</b>
<b>Fig.4.1.7 Voltage Characteristics of the Line – Ground Fault</b>	<b>23</b>
<b>Fig 4.1.8 Hardware Result</b>	<b>24</b>
<b>Fig.4.1.9 Hardware Result of Line to Ground Fault</b>	<b>24</b>
<b>Fig 4.1.10 Hardware Result of Line- Line Fault</b>	<b>25</b>
<b>Fig.4.1.11 Fault detected in Bus 1</b>	<b>26</b>
<b>Fig.4.1.12 Fault detected in Bus 2</b>	<b>27</b>

# ABSTRACT

This project presents a fault detection methodology for the IEEE 9-bus system using MATLAB and Simulink. The IEEE 9-bus system is a well-established testbed for studying power system stability and fault analysis due to its complexity and interconnectivity. In this study, various types of faults, including single-line-to-ground (SLG), line-to-line (LL), double-line-to-ground (DLG), and three-phase faults, are simulated and analyzed.

The primary objective is to develop a fault detection mechanism that accurately identifies and classifies fault types, location, and severity within the network. The system dynamics are modeled using MATLAB's Simulink environment, leveraging the capabilities of the Sim Power Systems toolbox for power systems simulation. The proposed fault detection algorithm employs wavelet transforms and signal processing techniques to analyze the transient response during fault conditions. By examining voltage and current waveforms at critical nodes, the algorithm pinpoint's fault locations and classify fault types based on characteristic transient features.

The findings of this research are essential for advancing the reliability of protection systems, as the early detection of faults minimizes system downtime and ensures stable power delivery. The project concludes with a performance analysis of the fault detection approach, illustrating its effectiveness and accuracy across different fault scenarios in the IEEE 9-bus model.