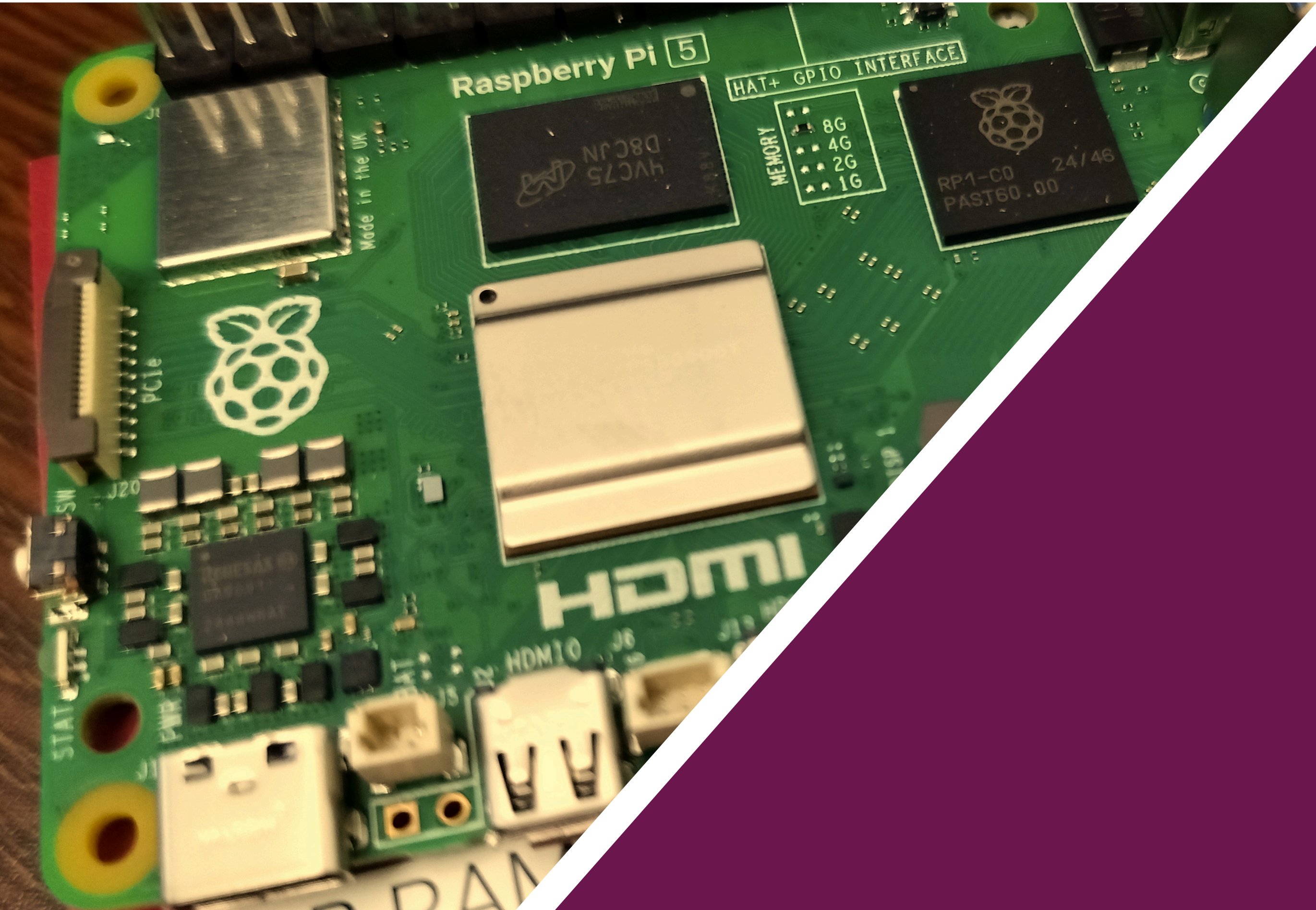




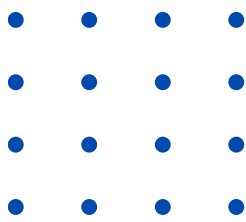
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EESEE 2025

10TH ELECTRICAL ELECTRONICS SYSTEMS
ENGINEERING EXHIBITION 2025
VOLUME 1



FACULTY OF ELECTRICAL ENGINEERING
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JOHOR BRANCH
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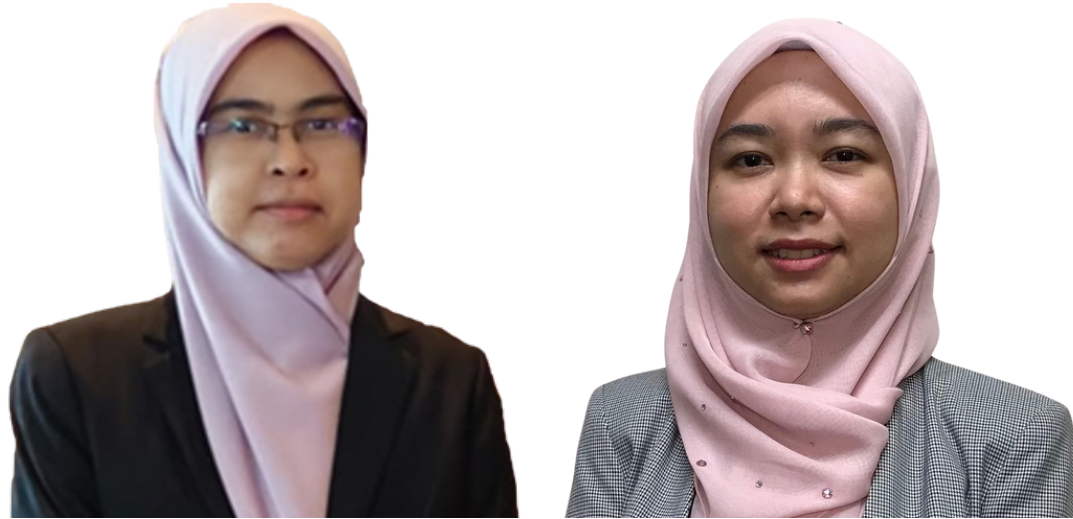
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FOREWORD BY THE PROGRAM CHAIR



Greetings from the Electrical, Electronics, and Systems Engineering Exhibition 2025 (EESEE 2025).

As the Program Chairs, it is our great pleasure to present this compilation of extended abstracts, showcasing the remarkable projects developed by our final-semester students from the Diploma in Electrical Engineering (Power) and Diploma in Electrical Engineering (Electronics) programs at Universiti Teknologi MARA, Cawangan Johor, Pasir Gudang Campus.

This exhibition marks a significant milestone in our students' academic journey, representing the culmination of years of dedication, perseverance, and learning. It also serves as an essential step toward the successful completion of their diploma studies. The projects featured this year are centered on the theme *Engineering Excellence: Bridging Technology and Life*, reflecting current trends and innovations in the engineering field.

This extended abstract book highlights not only the students' technical expertise but also their creativity, problem-solving skills, and ability to engage meaningfully with peers and industry professionals. Within these pages, you will find a diverse range of projects that embody a unique blend of knowledge, innovation, and practical application.

We warmly invite you to explore this collection, which celebrates the achievements of our aspiring engineers. Welcome once again to the Electrical, Electronics, and Systems Engineering Exhibition 2025. May the insights shared here inspire and pave the way for the next generation of innovative engineers.

Warm regards,

Dr. Fatimah Khairiah binti Abd Hamid

Dr. Atiqah Hamizah binti Mohd Nordin

Program Chairs

Electrical, Electronics, and Systems Engineering Exhibition 2025 (EESEE 2025)



Fault Calculation in Power System with GUI Interface

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ABSTRACT

Detecting faults in power systems is crucial for maintaining system stability and ensuring the proper operation of protective devices such as switchgear and relays. This project presents a user-friendly Graphical User Interface (GUI) toolbox developed using MATLAB. The toolbox to accurately classify and analyse both balanced and unbalanced faults. The design to enhance educational outcomes, it simplifies fault detection processes while providing hands-on learning opportunities for students. The project demonstrates the tool's effectiveness in identifying fault currents using various network configurations, such as 3-bus and 11-bus systems.

KEYWORDS: Fault Analysis, Power Systems, MATLAB, GUI, Symmetrical Components, Educational Tool

PRODUCT DESCRIPTION

The developed GUI toolbox facilitates efficient fault calculation in power systems by combining precision and usability with an interactive design. It enables users to input system parameters, faulty bus details, and impedance values through a user-friendly interface. The toolbox features visualisation tools for displaying positive, negative, and zero sequence networks, which are critical for understanding fault behaviour. Output values such as fault current calculations and voltage magnitudes at each bus are presented in a clear and structured format. Additionally, the interactive design allows users to add or remove data entries, analyse different fault scenarios—including single-line-to-ground, line-to-line, and double-line-to-ground faults—and visualize results effectively. This innovative tool ensures accessibility for both professionals and students, making fault analysis processes more efficient and educational.

PICTURES/ SCHEMATIC DIAGRAMS/ FLOW CHARTS/SCREENSHOTS/ GRAPHS AND OTHER RELATED VISUALS

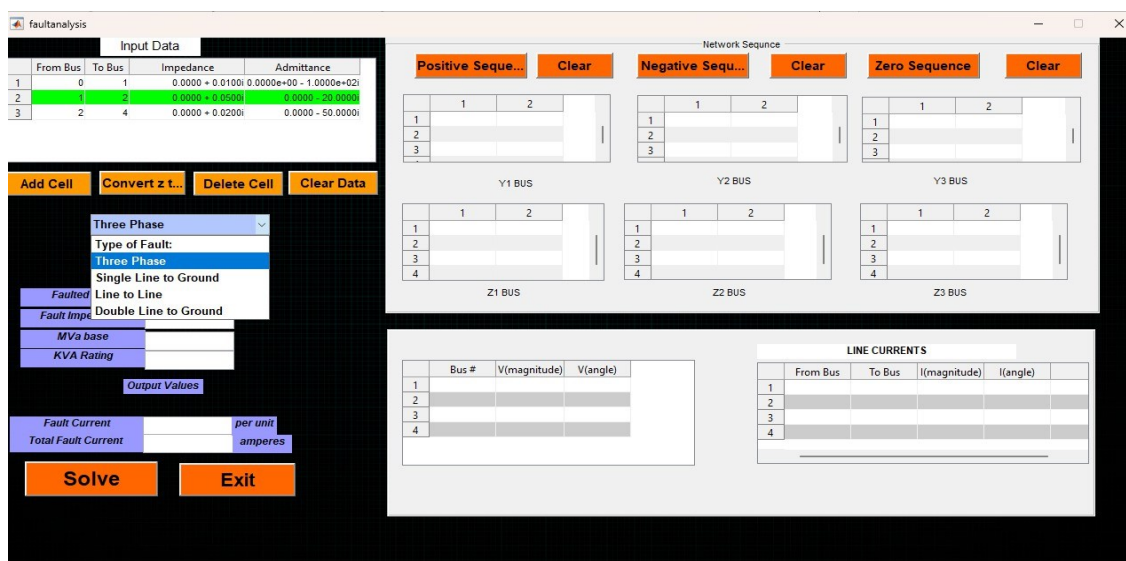


Figure 3.2: Flow Chart of the GUI interface

This graphical user interface (GUI) for a fault calculation tool, is designed to help users analyze faults in electrical networks. The interface allows users to input various parameters required for fault analysis. The main section, labeled "INPUT DATA," includes a table where users can specify the connections between buses by entering the "From Bus" and "To Bus" numbers, as well as the corresponding impedance and admittance values. There are buttons to add new cells, convert data, delete cells, and clear all data, making it flexible for different scenarios and easy to manage data entries. The GUI also has a dropdown menu to select the type of fault being analyzed, such as a three-phase fault. Users can input specific values for the faulted bus number, fault impedance, MVA base, and KVA rating in the "Input Values" section. These inputs are essential for accurately modeling the fault conditions in the network. Above the input values, there are buttons for visualizing the positive, negative, and zero sequence networks, which are critical for understanding the behavior of the system under fault conditions. The results of the fault analysis, such as fault current and total fault current, are displayed in the "Output Values" section, with measurements in per unit and amperes.

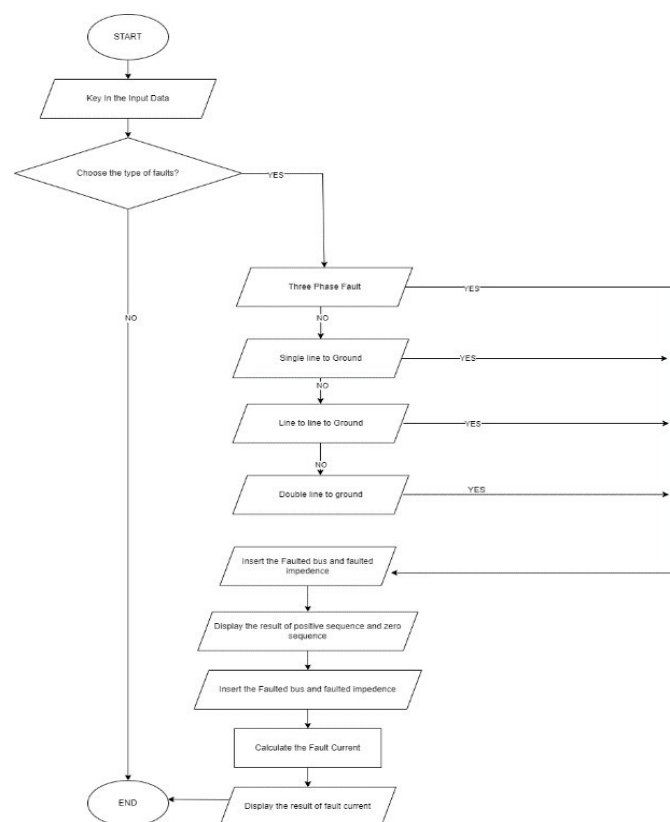


Figure 3.2: Flow Chart of the GUI interface

The flow chart in Figure 3.2 shows the operational flows begins with the user entering all the necessary input data, such as system parameters and voltage levels, into the interface. Following this, the user selects the specific type of fault they wish to analyze, such as single line-to-ground (SLG), line-to-line (LL), or double line-to-ground (DLG) faults. Next, the user inputs the faulted bus location and the faulted impedance, which is the resistance at the point of fault. The toolbox then processes this information and displays the results of the positive sequence and zero sequence components. This intermediate result helps in understanding the initial impact of the fault. The user then re-enters or confirms the faulted bus and impedance details to refine the analysis. The system proceeds to calculate the fault current based on the provided data. Finally, the toolbox displays the fault current results, offering a comprehensive view of the fault's impact on the power system. This structured approach ensures an accurate and thorough fault analysis, facilitating both practical applications and educational purposes.

NOVELTY AND UNIQUENESS

The toolbox stands out due to its integration of MATLAB's computational power with a user-friendly GUI. Unlike traditional manual fault calculation methods, this tool reduces complexity and the likelihood of errors. The educational design promotes a better understanding of power systems for students, bridging the gap between theory and practice.

BENEFIT TO HUMANKIND

Fault calculator using GUI approach helps students by providing a practical learning platform to better understand power systems. It enhances the stability and reliability of power networks through accurate fault analysis. Additionally, it simplifies complex calculations, saving time and enabling engineers to focus on critical decision-making tasks.

COMMERCIALIZATION POTENTIAL

the toolbox could be marketed as an educational and professional tool for universities, training institutions, and power system engineers. It has potential expansions such as integrating real-time data acquisition systems and incorporating power flow and economic dispatch analysis, which would significantly enhance its value and practicality in both academic and professional settings.

CONCLUSION

Fault analysis using a MATLAB-based GUI toolbox offers both educational and practical benefits by streamlining the process of analyzing balanced and unbalanced faults in power systems. This toolbox not only provides accurate results but also helps users gain a deeper understanding of fault behavior in electrical systems. Future enhancements could expand its functionality to cover additional types of power system analyses, making it even more versatile and valuable for both academic and professional use.

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