

**Provide Your Research Title Here which is Suitable
for Your Work**

A Synopsis Report

**Submitted in Partial Fulfillment of the Requirements for the Degree
of**

DOCTOR OF PHILOSOPHY

by

Your Name

Under the Supervision of

Prof. Supervisor 1, IIT Roorkee

Prof. Supervisor 2, IIT Roorkee

Prof. Supervisor 3, UiT Norway



**DEPARTMENT OF ELECTRICAL ENGINEERING
INDIAN INSTITUTE OF TECHNOLOGY ROORKEE
ROORKEE - 247667 INDIA**

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Synopsis

This first paragraph extensively reviews the existing literature, examines the selected research problem, establishes its theoretical foundations, and highlights its relevance across various contexts. Prior studies have contributed valuable insights through diverse approaches and methodologies, thereby advancing understanding within the field. However, a critical review of this literature reveals several limitations, including fragmented findings, methodological inconsistencies, limited contextual focus, and insufficient empirical validation. These gaps indicate the need for further systematic investigation to integrate existing knowledge, address unresolved issues, and provide a more comprehensive and context-specific understanding of the problem. Followed by the research gaps as:

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3. *Research Gap 3:* Lorem ipsum dolor sit amet, consectetur adipiscing elit, sed do eiusmod tempor incididunt ut labore et dolore magna aliqua. Ut enim ad minim veniam, quis nostrud exercitation ullamco laboris nisi ut aliquip ex ea commodo consequat. Duis aute irure dolor in reprehenderit in voluptate velit esse cillum dolore eu fugiat nulla pariatur. Excepteur sint occaecat cupidatat non proident, sunt in culpa qui officia deserunt mollit anim id est laborum..

Further, to fulfill these objectives, the following thesis chapter/topics have been covered as follows:

1. *Chapter One Name:* Lorem ipsum dolor sit amet, consectetur adipiscing elit, sed do eiusmod tempor incididunt ut labore et dolore magna aliqua. Ut enim ad minim veniam, quis nostrud exercitation ullamco laboris nisi ut aliquip ex ea commodo consequat. Duis aute irure dolor in reprehenderit in voluptate velit esse cillum dolore eu fugiat nulla pariatur. Excepteur sint occaecat cupidatat non proident, sunt in culpa qui officia deserunt mollit anim id est laborum.
 2. *Chapter Two Name:* Lorem ipsum dolor sit amet, consectetur adipiscing elit, sed do eiusmod tempor incididunt ut labore et dolore magna aliqua. Ut enim ad minim veniam, quis nostrud exercitation ullamco laboris nisi ut aliquip ex ea commodo consequat. Duis aute irure dolor in reprehenderit in voluptate velit esse cillum dolore eu fugiat nulla pariatur. Excepteur sint occaecat cupidatat non proident, sunt in culpa qui officia deserunt mollit anim id est laborum.
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 5. *Chapter Five Name:* Lorem ipsum dolor sit amet, consectetur adipiscing elit, sed do eiusmod tempor incididunt ut labore et dolore magna aliqua. Ut enim ad minim veniam, quis nostrud exercitation ullamco laboris nisi ut aliquip ex ea commodo consequat. Duis aute irure dolor in reprehenderit in voluptate velit esse cillum dolore eu
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The major contributions of this research work can be summarized as follows:

- Define your contribution 1.
 - Define your contribution 2.
 - Define your contribution 3.
 - Define your contribution 4.
 - Define your contribution 5.
 - Define your contribution 6.
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Publications

List of Journals/Transactions

1. S. Agrawal, B. Tyagi, V. Kumar and P. Sharma, "Enhancing Transient Response of Grid Connected DFIG-WT through Adaptive Inertia and Damping Control with Virtual Synchronous," in IEEE Transactions on Industry Applications, doi: 10.1109/TIA.2025.3584037. (Impact Factor = 4.5) - **Published**
2. S. Agrawal, B. Tyagi, V. Kumar and P. Sharma, "Operation and Control of Parallel-Operated Interlinking Converter in Hybrid Microgrid," in IEEE Transactions on Industry Applications, vol. 61, no. 4, pp. 5660-5669, July-Aug. 2025, doi: 10.1109/TIA.2025.3546205. (Impact Factor = 4.5) - **Published**
3. S. Agrawal, B. Tyagi, V. Kumar and P. Sharma, "Digital Controller Design and Implementation for AC and DC Side of 3ph qZSI," in IEEE Transactions on Industry Applications, vol. 60, no. 1, pp. 672-683, Jan.-Feb. 2024, doi: 10.1109/TIA.2023.3320120. (Impact Factor = 4.5) - **Published**

List of Conferences

1. S. Agrawal, B. Tyagi, V. Kumar and P. Sharma, "Dual Virtual Inertia Control of Interlinking Converter in Hybrid Microgrid," 2024 IEEE International Conference on Power Electronics, Drives and Energy Systems (PEDES), Mangalore, India, 2024, pp. 1-5, doi: 10.1109/PEDES61459.2024.10960845. - **Published**
2. S. Agrawal, B. Tyagi, V. Kumar and P. Sharma, "Interlinking Converter Operation with Enhanced Hybrid and Inverse Q-V Droop," 2024 IEEE PES Innovative Smart Grid Technologies Europe (ISGT EUROPE), Dubrovnik, Croatia, 2024, pp. 1-5, doi: 10.1109/ISGTEUROPE62998.2024.10863266. - **Published**

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3. S. Agrawal, B. Tyagi, V. Kumar and P. Sharma, "Enhancing Frequency Regulation in DFIG-Based Wind Turbines with FO-VSG," 2024 IEEE Power & Energy Society General Meeting (PESGM), Seattle, WA, USA, 2024, pp. 1-5, doi: 10.1109/PESGM51994.2024.10689033. - **Published**
 4. S. Agrawal, B. Tyagi, V. Kumar and P. Sharma, "Enhancing Grid Stability through Adaptive Damping and Inertia Control in DFIG-Based Wind Turbines with VSync," 2023 IEEE International Conference on Energy Technologies for Future Grids (ETFG), Wollongong, Australia, 2023, pp. 1-5, doi: 10.1109/ETFG55873.2023.10407858. - **Published**
 5. S. Agrawal, U. Malik, Y. Tripathy, B. Tyagi, V. Kumar and P. Sharma, "Distributed Multi-objective Control of Hybrid Microgrid in Autonomous Mode," 2023 IEEE Power & Energy Society General Meeting (PESGM), Orlando, FL, USA, 2023, pp. 1-5, doi: 10.1109/PESGM52003.2023.10252681. - **Published**
 6. S. Agrawal, B. Tyagi, V. Kumar and P. Sharma, "Interlinking Converter Operation in Hybrid Microgrid As a Tie-line," 2022 IEEE International Conference on Power Electronics, Drives and Energy Systems (PEDES), Jaipur, India, 2022, pp. 1-6, doi: 10.1109/PEDES56012.2022.10080482. - **Published**
 7. S. Agrawal, B. Tyagi, V. Kumar and P. Sharma, "3ph qZSI Controller Design using PI for DC side and PR for AC side Controller including Droop Characteristic in standalone mode," 2022 IEEE International Conference on Power Electronics, Smart Grid, and Renewable Energy (PESGRE), Trivandrum, India, 2022, pp. 1-6, doi: 10.1109/PESGRE52268.2022.9715796. - **Published**
 8. S. Agrawal, B. Tyagi, V. Kumar, P. Agarwal and P. Sharma, "A Simplified and Effective GMPP Tracking Algorithm for Solar Photovoltaic System," 2019 North American Power Symposium (NAPS), Wichita, KS, USA, 2019, pp. 1-6, doi: 10.1109/NAPS46351.2019.9000295. - **Published**
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