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**DESIGN AN IMPLEMENTATION OF IRS FOR SMALL MIMO WIRELESS NETWORK**

**A PROJECT REPORT**

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***in partial fulfillment for the award of the degree***

***of***

**BACHELOR OF ENGINEERING**

**IN**

**ELECTRONICS AND COMMUNICATION ENGINEERING**

**KINGS COLLEGE OF ENGINEERING, PUNALKULAM**

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**ACKNOWLEDGEMENT**

We wholeheartedly offer our great thanks to the Almighty for his showers of blessings and his divine help, which enabled us to complete the project successfully.

We extend our sincere gratitude to our **Chief Financial Officer, Mrs. Sharmila Rajaa, B.E.,** for her kind inspiration and encouragement towards our project.

We would like to express our thanks to **Dr. R. Rajendran, Secretary,** for his support and encouragement.

We wish to express our deep sense of gratitude and respect **to Dr. J. Arputha Vijaya Selvi, Principal,** Kings College of Engineering, Punalkulam, for giving permission to undertake the project work successfully.

We express our sincere thanks to **Mrs. N. Mangaiyarkarasi, Head of the Department,** Electronics and Communication Engineering, and **Mr. W. Newton David Raj, Project Coordinator,** who endorsed us with constant encouragement and extended full support.

With immense pleasure, we extend our sincere and heartfelt thanks to **Mr. K. Sudarsanan, Supervisor.** We also extend our sincere thanks to all the staff members of the ECE Department.

We extend our sincere and heartfelt thanks to the non-teaching staff members of the ECE Department. Our deepest thanks go to our parents for supporting our professional education, for their constant prayers, and for their financial support, which gave us the strength to successfully complete this project.

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**ABSTRACT**

The exponential growth of wireless data demand and the limitations of conventional communication infrastructure have necessitated the development of innovative technologies to improve signal quality and energy efficiency. Intelligent Reflecting Surfaces (IRS) have emerged as a promising solution in next-generation wireless networks.

This project explores the design and implementation of an IRS-assisted wireless communication system, where a programmable meta surface is used to dynamically control the reflection of incident signals toward the receiver, thereby enhancing the overall communication performance.

The IRS is modelled using discrete phase shifts and is integrated into a simulation environment to analyse its impact on system parameters such as signal-to-noise ratio (SNR), bit error rate (BER), and achievable data rate. Optimization algorithms are employed to configure the IRS elements in real-time, maximizing signal strength at the receiver while minimizing interference.

The project demonstrates that IRS can significantly improve wireless coverage, reliability, and spectral efficiency, especially in non-line-of-sight (NLoS) scenarios.

This work contributes toward the practical realization of IRS in 6G networks, highlighting its potential in future smart radio environments.

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**ABBREVIATIONS**

|  |  |  |
| --- | --- | --- |
| **S. NO.** | **ABBREVIATION** | **EXPANSION** |
|  |  |  |