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DESIGN AN IMPLEMENTATION OF IRS FOR SMALL MIMO WIRELESS NETWORK

A PROJECT REPORT

***Submitted* by**

D. MAHESWARAN	**821121106025**
M. MOHAMED YASEEN	**821121106030**
M. MUKILVANNAN	**821121106032**
P. SUDHARSAN	**821121106055**

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ANNA UNIVERSITY: CHENNAI – 600 025

BONAFIDE CERTIFICATE

Certified that this report titled **"DESIGN AN IMPLEMENTATION OF IRS FOR SMALL MIMO WIRELESS NETWORK" is** the Bonafide work of "**D. MAHESWARAN (821121106025), M. MOHAMED YASEEN (821121106030), M. MUKILVANNAN (821121106032), P. SUDHARSAN (821121106055)"** who carried out the project work under my supervision.

SIGNATURE

Mrs. N. MANGAIYARKARASI, M.E.,

HEAD OF THE DEPARTMENT,

Department of ECE,

Kings College of Engineering,

Punalkulam,

Pudukkottai – 613 303.

SIGNATURE

Mr. K. SUDARSANAN, M.E.,

SUPERVISOR,

Assistant Professor,

Department of ECE,

Kings College of Engineering,

Punalkulam,

Pudukkottai – 613 303.

Submitted for the university viva voce held on ……

INTERNAL EXAMINER **EXTERNAL EXAMINER**

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(D. MAHESWARAN)

(M. MOHAMED YESEEN)

(M. MUKILVANNAN)

(P. SUDHARSAN)

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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

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