SECURE DATA TRANSMISSION WITH LIFI TECHNOLOGY USING ARDUINO

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INTRODUCTION/ABSTRACT

- Growing Need for Secure Data: Highlight the increasing importance of secure data transmission in various applications.
- Limitations of Traditional RF: Briefly mention the vulnerabilities of radio frequency (RF) communication (eavesdropping, EMI).
- Li-Fi as an Alternative: Introduce Li-Fi (Light Fidelity) as a promising, secure alternative using light for data transfer.
- Physical Layer Security: Emphasize Li-Fi's inherent security due to light's confined propagation.
- Our Project Focus: State that your project explores secure data transmission using Li-Fi with Arduino and infrared (IR) light for short-range communication and control.

PROBLEM STATEMENT

- RF Vulnerabilities: Traditional wireless (RF) is susceptible to eavesdropping and interference.
- Need for Secure Alternatives: Demand exists for more secure data transmission methods.
- Secure Control Challenge: Demonstrating secure remote control using Li-Fi remains a key area.
- To construct a reliable image classification system utilizing neural networks, on improving the accuracy and latency of the model by training a variety of networks for different image datasets.

OBJECTIVE

- Secure Data via Light: Explores a secure, short-range data transmission system using Li-Fi (IR light).
- Demonstrates Secure Control: Successfully controls a relay, showcasing potential for secure switching applications.
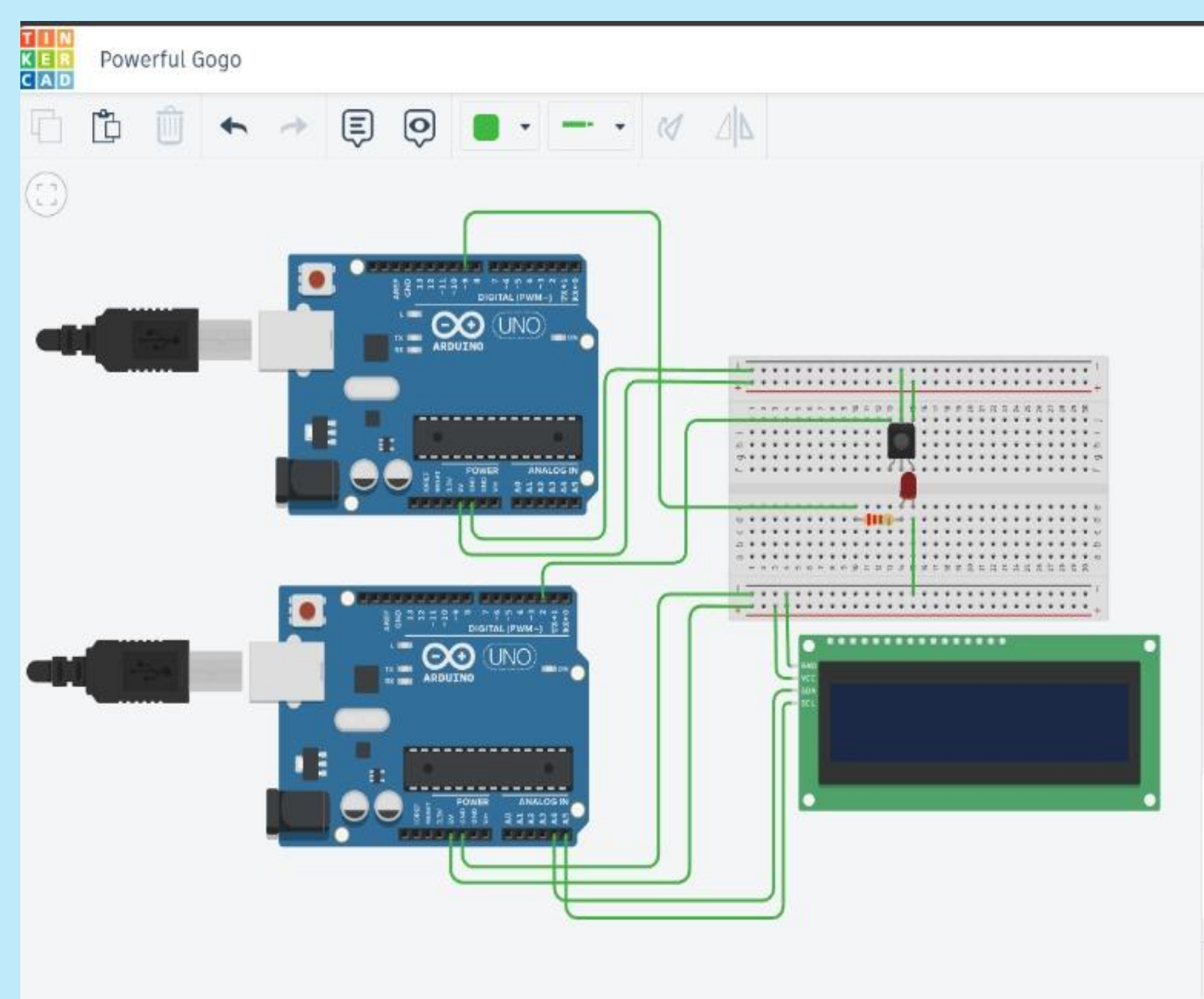
METHODOLOGY
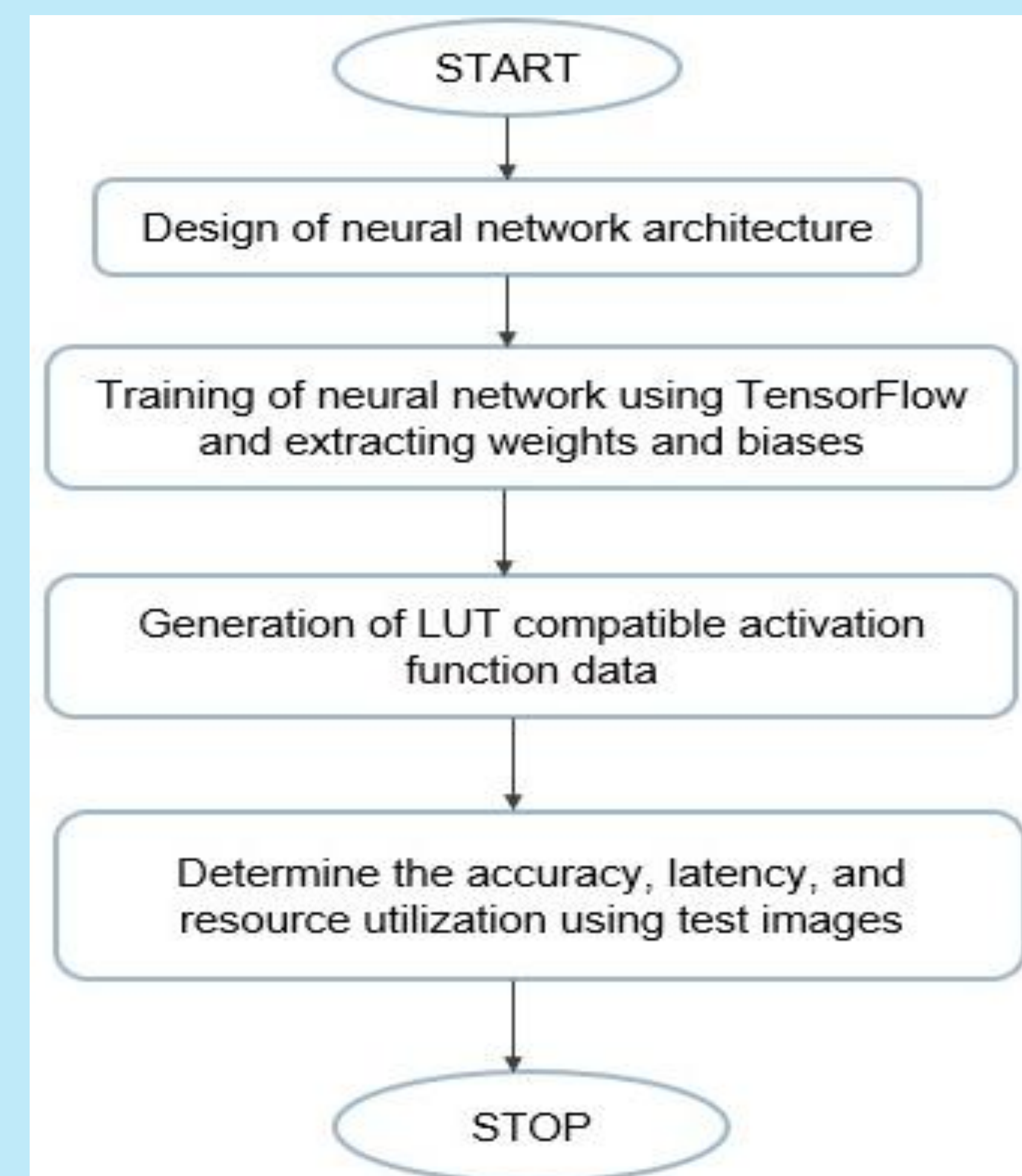
DESIGN

Fig1: Circuit Design in Tinkercad
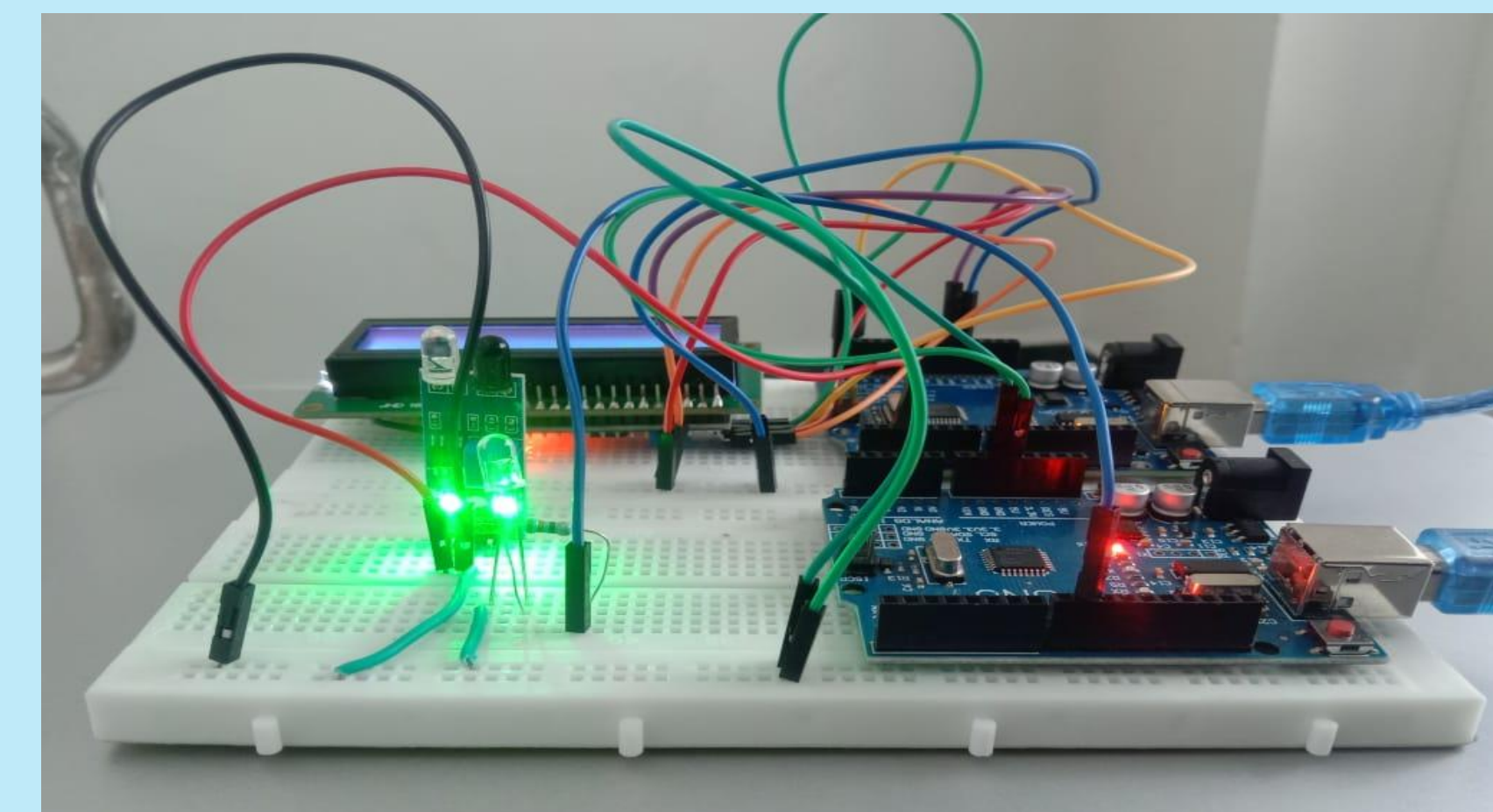
RESULTS & INFERENCE

Fig 2: Transmission of Data

Fig 3: Reception of Data

- Secure Short-Range Data Achieved: Our Arduino-Li-Fi system with relay successfully transmitted data securely up to 5cm, demonstrating potential for localized secure communication.
- Proof-of-Concept for Specific Secure Applications: This project validates Li-Fi for secure data transfer in controlled, short-range scenarios.

REALISTIC CONSTRAINTS

- Secure Data Transmission: Clearly emphasize the security aspect of your Li-Fi implementation as the core value proposition.
- Arduino-Based Proof-of-Concept: Highlight that you've successfully built and demonstrated a working model using accessible Arduino technology.

- Potential for Interference-Resistant Communication: Underscore the inherent advantage of Li-Fi in environments prone to radio frequency interference.

CONCLUSION

Harnessing the power of light, our project demonstrates a secure and efficient data transmission method using Li-Fi technology. By modulating an infrared LED and employing an Arduino Uno for control, we've established a proof-of-concept for short-range, interference-resistant communication. This innovative approach, utilizing readily available components like an IR sensor and relay module, highlights the potential of Li-Fi as a viable alternative for secure data transfer in specific applications.

REFERENCES

[1] T. Adiono et al., "*Design of Centralized Oxygen Saturation and Heart Rate Patient Monitoring System using Li-Fi*," 2021 International Conference on Electrical Engineering and Informatics (ICEEI), Kuala Terengganu, Malaysia, 2021

[2] P. Srinithi, S. Kalpanadevi, P. Rekha, N. Divya, M. Rajkumar and D. Aathiba, "*A Novel Paradigm of Indoor Navigation System using Li-Fi Technology*," 2023 2nd International Conference on Automation, Computing and Renewable Systems (ICACRS), Pudukkottai, India, 2023

[3] L. Chithra, S. Padma, F. I, L. Saravanan and S. Krishnakumari, "*LiFiData: A Secured Data Communication over Defense Fields by using Intelligent Visible Light Assisted Transmissions*," 2023 International Conference on Innovative Computing, Intelligent Communication and Smart Electrical Systems (ICSES), Chennai, India, 2023

[4] H. Sharma, R. Gusain, R. Prakash, R. Gupta, A. Vidyarthi and R. Gowri, "*An Approach for Secure Communication using LiFi Technology with Laser in Border Areas*," 2024 International Conference on Advances in Computing, Communication and Applied Informatics (ACCAI), Chennai, India, 2024