Simulated IoT Light Intensity Monitoring System

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1 Introduction

The Internet of Things (IoT) enables data collection from sensors and remote monitoring through networked systems. This project demonstrates a simulated IoT-based light intensity monitoring system using software tools without physical hardware. The objective is to show the complete IoT data pipeline including data generation, communication, storage, and visualization.

2 System Overview

The system emulates a light sensor (LDR) using a Python program that generates realistic light intensity values. These values represent sensor readings and are processed as IoT data. The simulated sensor publishes data conceptually using the MQTT communication model. The received data is stored in a local database and later visualized.

3 Technologies Used

- Python (data simulation and processing)
- MQTT communication model (conceptual)
- SQLite database (data storage)
- Google Colab (execution environment)
- Matplotlib (data visualization)

4 Data Collection and Storage

Light intensity values were generated randomly within a realistic range to emulate real sensor behavior. Each data point was stored with a timestamp in an SQLite database. This approach demonstrates how IoT data can be collected and stored for further analysis.

```
2026-01-08 21:50:56 1533
2026-01-08 21:50:57 1757
2026-01-08 21:50:58 2037
2026-01-08 21:50:59 1558
2026-01-08 21:51:00 3002
2026-01-08 21:51:01 946
2026-01-08 21:51:02 1867
2026-01-08 21:51:03 2966
2026-01-08 21:51:04 1424
```

Figure 1: Sensor Output

	time	value
0	2026-01-08 21:50:56	1533
1	2026-01-08 21:50:57	1757
2	2026-01-08 21:50:58	2037
3	2026-01-08 21:50:59	1558
4	2026-01-08 21:51:00	3002

Figure 2: Data stored in the CSV

5 Visualization

The collected data was visualized using line plots showing light intensity variation over time. The visualization serves as a dashboard alternative and provides a clear representation of real-time sensor behavior.

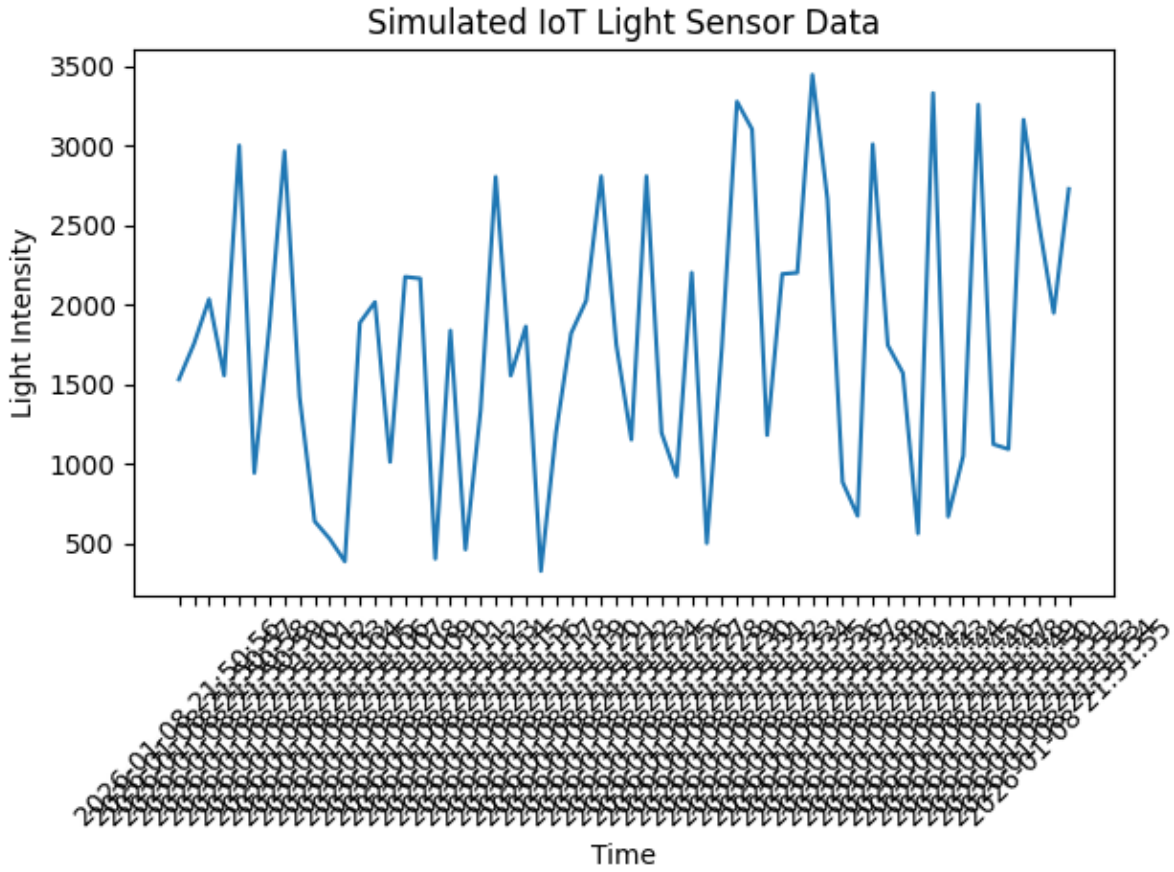

Figure 3: Visualization of collected data

6 GitHub Repository

All source code, data files, dashboard screenshots, and the project report are available in a public GitHub repository at the following link:

`https://github.com/meirrt/LDR_Sensor_visualization.git`

7 Results and Conclusion

The simulated system successfully demonstrates an IoT monitoring workflow without physical hardware. Data generation, storage, and visualization were achieved effectively. This project confirms that software-based simulation can be used to understand and demonstrate IoT concepts when hardware is unavailable.