**Decentralized Federated Learning Framework for Traffic Optimization in Smart Cities** Bi-Weekly Update | Tyler Trott Submission Date: February 21, 2025

## **Expanded Literature Review:**

- Sensor Networks for Monitoring Traffic: Reviewed methodologies for real-time traffic monitoring using sensor networks, highlighting their effectiveness in capturing detailed traffic data.
- A Survey on Urban Traffic Management System Using Wireless Sensor Networks: Examined the challenges of centralized traffic control and the benefits of decentralized, wireless sensor-based systems for urban traffic management.
- Using Sensor Networks for Highway and Traffic Applications: Analyzed scalability and network reliability insights from highway deployments, reinforcing the need for robust IoT networks in smart city applications.
- Open-Source Federated Learning Frameworks for IoT: A Comparative Review and Analysis: Investigated current federated learning frameworks applied to IoT, outlining their strengths and limitations, which directly inform our approach to decentralized learning.

## **Component Identification:**

Confirmed the critical components of the project: designing a secure decentralized IoT network, integrating federated learning for real-time traffic signal optimization, and planning for simulation-based evaluations.

## Next Steps:

Prepare for the development of a detailed decentralized network architecture and initiate work on the mathematical models and simulations that will validate our framework.

## References

Coleri, S., Yiu Cheung, S., & Varaiya, P. (2004, August 5). *Sensor Networks for Monitoring Traffic*. citeseerx.

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Kholod, I., Yanaki, E., Fomichev, D., Shalugin, E., Novikova, E., Filippov, E., & Nordlund, M. (2020, December 29). *Open-source Federated Learning Frameworks for IOT: A Comparative Review and analysis*. MDPI. https://www.mdpi.com/1424-8220/21/1/167

Nellore, K., & Hancke, G. P. (2016, January 27). *A survey on Urban Traffic Management System Using Wireless Sensor Networks*. MDPI. https://www.mdpi.com/1424-8220/16/2/157

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