Actor-Network Theory Applied to Internet of Things (IoT) Devices: A Possible Data Privacy and Security Threat

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On my honor as a University Student, I have neither given nor received unauthorized aid on this assignment as defined by the Honor Guidelines for Thesis-Related Assignments

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Integrating IoT Innovation and Societal Dynamics: A Sociotechnical Approach

The convergence of technical innovation and societal dynamics forms the core of my thesis project, bridging the realms of advanced technological development and sociotechnical analysis. The technical segment focuses on enhancing Internet of Things (IoT) systems, introducing novel functionalities and security enhancements. Concurrently, my STS research adopts Actor-Network Theory (ANT) to dissect the societal implications of IoT, addressing the critical need for a balanced perspective in engineering practices. This synthesis stems from a recognition that technological advancements, particularly in IoT, carry profound societal implications that extend beyond mere functionality – impacting privacy, security, and human behavior.

My technical endeavor aimed to revolutionize IoT systems by improving interconnectivity and data processing capabilities. The hallmark of this project was the integration of advanced machine learning algorithms, which enable predictive analytics, enhancing both efficiency and user experience. This framework's distinctive feature is its emphasis on robust security protocols, addressing one of the most pressing challenges in IoT development. Designed to be versatile, the framework finds potential applications in diverse sectors such as smart infrastructure, healthcare monitoring, and automated home systems. This project represents a significant stride in IoT development, showcasing a prototype that not only optimizes performance but also prioritizes user privacy and system integrity.

In my STS research, I explored the multifaceted interactions within IoT networks through Actor-Network Theory, offering a comprehensive analysis of both human and non-human actors. This research illuminated the diverse roles and influences of various stakeholders, including engineers, policymakers, consumers, and the IoT devices themselves. A pivotal finding was the dynamic interaction between user interface designs and consumer behavior, revealing how technological choices subtly influence user practices and societal norms. Additionally, the research delved into the ethical dimensions of IoT, particularly in regards to data governance, privacy issues, and the societal impact of ubiquitous surveillance technologies. This sociotechnical investigation highlighted the need for inclusive, ethical considerations in the design and implementation of IoT systems, advocating for a paradigm that equally values technological advancement and societal well-being.

The simultaneous consideration of technical, organizational, and cultural aspects in this project highlights the richness of a sociotechnical perspective. It is clear from this synthesis that engineering is not just a technical endeavor but a societal one, requiring careful contemplation of the implications of our creations. The application of ANT in my STS research underscored the importance of recognizing the agency of both human and non-human actors in technological ecosystems. It brought to light the ethical responsibilities that engineers and policymakers hold in shaping technology that aligns with societal values and norms. This integrative approach has not only provided valuable insights for the responsible development of IoT but also offered a model for addressing complex sociotechnical challenges in future engineering endeavors.