

ASSO - Ambiguity and Architectural Questions

Homework 3

Team 33

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Masters in Informatics and Computing Engineering

23/02/2024

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1 Introduction

Traffic congestion is a pervasive issue in urban areas, leading to wasted time, increased fuel consumption, and environmental pollution. To mitigate these problems, traffic signal control systems play a crucial role in optimizing traffic flow. However, the successful design and implementation of such systems require a comprehensive understanding of the requirements and potential ambiguities involved.

This report addresses the ambiguity and architectural questions surrounding a proposed traffic signal control system. By clarifying the requirements and identifying key considerations, we aim to lay the groundwork for an effective and efficient system design.

2 Homework Assignment Questions

2.1 List of Clarification Questions

1. Is there any due date for the project?
2. Are there any budget constraints?
3. What are the deliverables?
4. How many people are going to be needed in order to implement this system (e.g. civil engineers, computer scientists, electrical engineers, etc.)
5. What methodology is going to be used?
6. Can the system differentiate between various types of vehicles to tailor signal timings accordingly? Should it do so?
7. How do we calculate when to change signals so that flow is optimized?
8. What's the estimated annual downtime of the system?
9. What strategies will be implemented to minimize disruptions during system maintenance or upgrades, ensuring continuous operation of traffic signals?
10. Which redundancy measures will be in place to ensure the system's reliability in case of sensor failures or other technical issues?
11. How will the system handle intersections with limited visibility due to environmental factors such as fog, heavy rain, or snow?
12. How will the system handle intersections with high pedestrian traffic, ensuring their safety and efficient crossing?
13. How will the system address potential security threats, such as cyber-attacks targeting traffic signal operations?
14. Are there any regulatory requirements or standards that must be fulfilled by the system?
15. How will the system address privacy concerns related to traffic data collection?
16. What level/depth of user interface or control will be provided to local authorities or traffic management personnel to override or adjust system settings manually? Is it viable to have any?
17. Will the system provide real-time feedback or status updates to users or authorities?
18. Will the information be displayed to the user and if so how will it be displayed (in this case a driver or a pedestrian)?

19. Are there any preferences regarding the technological stack we should use?
20. What technologies will be used for detecting oncoming traffic, and how will they be integrated into the system?
21. Should we provide an API for external applications such as Google Maps.
22. Will the system integrate with existing traffic management systems or require entirely new infrastructure?
23. In case we need to implement this system on top of a brand new infrastructure, are we required to do the research and prototyping of that infrastructure or will that be outsourced?
24. What's the estimated cost of the new infrastructure, if it is required?

2.2 Logical Grouping and Time Analysis



Figure 1: Spiderweb diagram of our solution.

To remove some of the ambiguity, since the diagram was manually drawn on a whiteboard, the questions from section 2.1 are also divided into logical groups in Figure 2 and ordered from higher to lower priority.

3 Designated Important Questions

From the previously formulated questions, five questions were selected, those which we considered to be the most important.

3.1 Question 1: Will the system **integrate with existing traffic management systems or will it require entirely new infrastructure?**

This question is important to ensure that the new system is compatible with the existing infrastructure. It directly impacts architects and developers responsible for designing and implementing the system and should be addressed during the early analysis phase of the project life cycle. The answer to this question may influence architectural decisions by potentially restricting the solution.

3.2 Question 2: Are there any **regulatory requirements or standards that the system must comply with?**

This question holds importance in ensuring legal compliance and maintaining public safety. Developers are primarily impacted and addressing this concern should be done during the early analysis phase. The answer to this question may influence technology choices, as well as design decisions and operational protocols.

3.3 Question 3: What **technologies will be used for detecting oncoming traffic?**

This question directly impacts developers and is crucial for informing them about the technologies required for detecting oncoming traffic. Addressing this query during the early analysis phase provides developers time to familiarize themselves with the necessary technology. The answer to this question dictates the technological components and infrastructure required for traffic detection and, consequently, the project setup.

3.4 Question 4: How will emergency vehicles affect traffic signal prioritization?

This question is essential for considering the impact of emergency vehicles on traffic signal prioritization. Developers are directly affected and addressing this concern during the early analysis phase allows for strategic planning. The answer to this question may need the development of a special case within the system, requiring careful consideration during solution development.

3.5 Question 5: Are there any **budget constraints or cost considerations?**

This question is of extreme importance for understanding budget constraints and cost considerations throughout the project. It impacts architects, developers, and finance professionals involved in decision-making. Addressing this query is essential at every stage of the project. The available budget can significantly influence the technology selection and architectural decisions. Thus, continuous monitoring of the budget is crucial for guiding project development.

4 Conclusion

In conclusion, the analysis of ambiguity and architectural questions surrounding the traffic signal control system underscores the complexity and multidimensionality of the task at hand. Through systematic addressing of these questions, we have gained insights into the critical aspects of system design, integration, and operation.

Moving forward, it is essential to further refine our understanding of the requirements and collaborate with stakeholders to ensure the successful implementation of the system. By leveraging emerging technologies and best practices in traffic management, we have the opportunity to create a more sustainable and efficient urban transportation infrastructure.

A Appendix

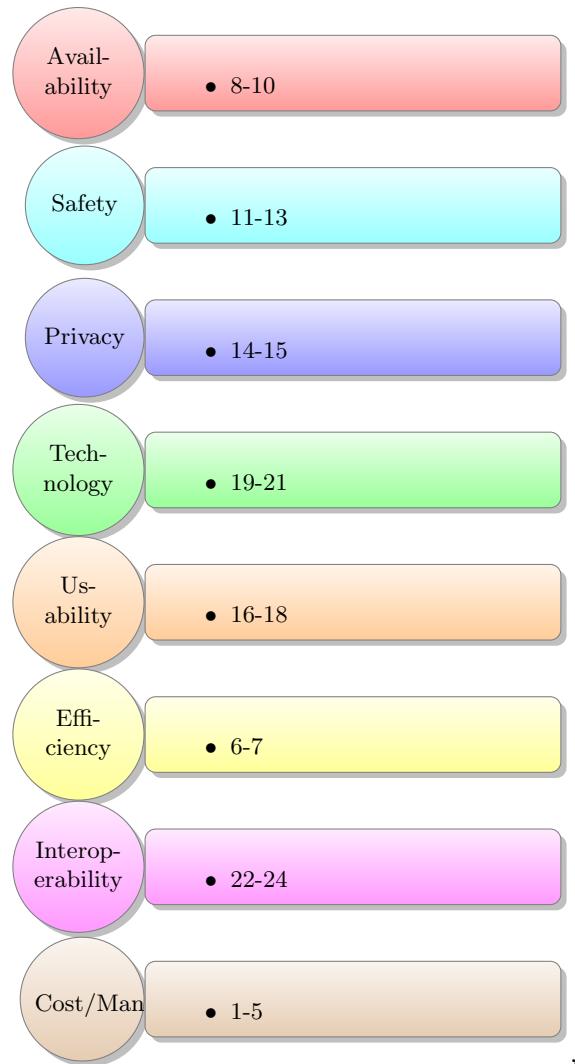


Figure 2: Logical division of the questions from Section 2.1.