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| **WRITING A LITERATURE REVIEW**  **Topic: Implementing Cyber Security tools and/or techniques in local transportation system based on London, UK.**  Guiding questions to support planning, revising, and refining of a literature review.  As with other sets of guiding questions, select those questions that are relevant to your context, add others as appropriate, and decide the order in which you will address them to communicate effectively with your audience. |

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|  | **What is the focus and aim of your review? Who is your audience?**   * Audience: Academic / Tutor * Chosen Overarching Topic: Implementing Cyber Security tools and/or techniques in local transportation system based on London, UK. * Focus: Implementing cyber security controls in Intelligent Transportation Systems (ITS) in London, UK * Aim: To explore the use of cyber security controls in road network Intelligent Transportation Systems based on London, UK * Research Questions:  1. What cyber security tools and techniques have been applied to or recommended for road-based ITS? 2. Which road-based ITS use cases are most applicable to London, UK? 3. What requirements should be considered when designing cyber security controls for ITS? E.g. scalability, 24/7 operation, etc. 4. How would a threat actor exploit a road-based ITS system and why? 5. When will the security of road-based ITS become pertinent to London? How can society prepare for this? |
| 2. | **Why is there a need for your review? Why is it significant?**   * There is a need for this review in that connected and autonomous vehicles (CAVs) are already being tested in London and will require protection from attack due to the dependency many have on the road network. * It is significant because research into securing new technology has historically been reactive, resulting in delays in standardisation. This is a proactive identification of key cyber security controls that should be considered to support an ITS in England’s capital city. |
| 3. | **What is the context of the topic or issue? What perspective do you take? What framework do you use to synthesise the literature?**   * Context: Autonomous vehicles and other automated concepts are becoming popular due to their many benefits, including efficiency and cost reduction. This has application to the transport system in the form of ITS. * My perspective: Technological development is increasing in pace year on year so it is inevitable that these challenges will surface in the near future with the concept of smart cities being not only researched but also tested, for example in Colombia. * Literature synthesis framework: Following guidance in the module reading, I have mapped out the following steps:  1. Broad topic research to create good foundation for literature review, including identifying a suitable timeframe, key words to search, and sources to use (below/above). 2. Record and categorise relevant references, looking for more recent citations and linked articles. 3. Define subtopic of interest and choose initial 4-5 research questions 4. Define a literature criteria based on research questions 5. Look for additional relevant articles based on more specific key words from subtopic 6. Filter all literature down based on criteria and record the rationale for any omissions. 7. Use the resulting literature to begin planning and writing the literature review. |
| 4. | **How did you locate and select sources for inclusion in the review?**   * Locate sources: Recommendations (eBook & University) / Previous Research / Linked libraries * Select sources: Reliable academic libraries relevant to the fields of research (cyber security and transportation systems). Used 8 such digital libraries to begin with and then continued with 6 for the more specific reading as I found these to be the most effective. These 6 are as follows:  1. Google Scholar - https://scholar.google.co.uk/ 2. ACM - https://dl.acm.org/ 3. IEEE Xplore - https://ieeexplore.ieee.org/Xplore/home.jsp 4. ScienceDirect - https://www.sciencedirect.com/ 5. Ingenta Connect - https://www.ingentaconnect.com/ 6. Proquest, incl. theses - https://www.proquest.com/ |
| 5. | **How is your review structured?**  Review Structure:   1. Abstract 2. Key Words 3. Introduction 4. Review Methodology 5. Paper Structure 6. Findings 7. Discussion 8. Conclusion 9. Limitations |
| 6. | **What are the main findings in the literature on this topic?**  Main Findings:   * Recent research regarding cyber security in transportation systems predominantly covers intelligence transportation systems (ITS) * The idea of autonomous vehicles is being widely researched and even trialled across the world. * The cyber security of cyber-physical systems, such as digital transport systems, is particularly pertinent due to the opportunity for real-world harm. * Transport is considered as critical national infrastructure in many countries, including the UK. * The lack of standardisation in IoT could have a knock on impact on ITS and there is lots that could be learnt from existing research into wider IoT applications, such as industrial applications. * The majority of research on ITS appears to be on road networks due to the pressing issues they face, such as congestion and pollution. * There appears to be a heavy focus on automated solutions to address cyber security challenges in the heavily automated systems that form ITS. |
| 7. | **What are the main strengths and limitations of this literature?**  Strengths of literature:   * Considers issues relating to intended future technologies, such as 5G, quantum computing and even 6G. * Significant recent research available on ITS with a strong focus on resilience and privacy which have emerged as key cyber security issues in recent years.   Limitations of literature:   * Mainly theoretical with minimal testing on actual large-scale ITS implementations due to ITS being in its infancy and there not being a significant number of real-world use cases to use for testing. * Limited by key words and sources used, as well as the timeframe available to complete research. |
| 8. | **Are there any discrepancies in this literature?**  Discrepancies Identified:  None to date. |
| 9. | **What conclusions do your draw from the review? What do you argue needs to be done as an outcome of the review?**  The literature review is still in its infancy so the following notes are initial assumptions based on literature found.  Conclusions:   * ITS is being tested on a small-scale in London but proactive consideration for security is required to ensure the implementation does not succumb to the same pitfalls as other IoT. * There are many potential use cases for road network ITS in London, including smart motorways, taxis and public transport. These are likely to be applicable to many cities around the world.   Next steps:   * Address any identified research gaps, possibly lack of large-scale case studies, incident response for ITS and proactive standards for ITS security. |

References

Healey, M., Matthews, K., & Cook-Sather, A. (2020) *Writing about learning and teaching in higher education: Creating and contributing to scholarly conversations**across a range of genres*. Center for Engaged Learning Open-Access Books, Elon University. 142-152.