

HiLCoE

**HiLCoE, School of Computer Science and Technology**

**Graduate Program Research Office**

Programme (please tick):  MSCS  MSSE

Synopsis – Spring 2023

Title: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Type of Work: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

*(thesis Type A or Thesis Type B)*

Name of Student:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

July 2023

1. **Introduction**

<a b*rief description of your motivation and background of the research in general terms, refer (cite) literature, which give an overview of the field and/or defines the basic concepts that needs to be addressed.>*

*<Describe the motivational scenario where the research idea is inspired>*

(two or three paragraphs – not more than a page)

Real-time Linux operating systems play a crucial role in safety-critical applications such as Medical Devices, Automotive systems, and Aviation. These applications require a deterministic and reliable platform, and Linux has been widely used in non-safety Aviation applications like In-Flight Entertainment (IFE) systems. However, to qualify Linux for safety-critical applications, the Linux community initiated the ELISA project, also known as Enabling Linux in Safety Applications. The objective of the ELISA project is to enable Linux to meet the rigorous standards set by DO-178B/178C, which are essential for safety-critical environments.

One of the key requirements for safety-critical applications is the use of a real-time operating system (RTOS) with temporal partitioning. Temporal partitioning refers to the ability of the operating system to allocate fixed and predictable time slots to different applications running on the same hardware, ensuring that they execute independently without interfering with each other. This capability is defined in the ARINC 653 specification, which provides a standardized interface for avionics application software in safety-critical RTOS. ARINC 653 ensures that applications, even with different criticality levels, can execute on the same hardware without exerting undue influence on each other spatially or temporally. By implementing temporal partitioning and adhering to the requirements of ARINC 653, real-time Linux operating systems can avoid temporal faults and provide a reliable computational resource for multiple applications in integrated real-time systems.

In summary, the ELISA project aims to enable Linux to meet safety standards, allowing its usage in safety-critical applications. Real-time Linux operating systems with temporal partitioning, as specified by ARINC 653, play a vital role in ensuring the deterministic and reliable execution of multiple applications in industries like Aviation. By providing a dependable platform for safety-critical tasks, real-time Linux OS contributes to the overall safety and effectiveness of medical devices, automotive systems, and avionics applications.

1. **Statement of the Problem**

*<Provide a clear and concise description of the central problem to be investigated>*

(One paragraph)

Group Scheduling has been used as a way of allocating CPU time among tasks to be executed in Linux System. A mechanism called Control Groups is implemented allowing tasks and their future children to be organized into hierarchical groups dynamically. Within a group, tasks share a portion of the overall CPU time, or bandwidth. However, this approach does not enforce strict constraints on the timing jitters of the tasks' execution instances. As a result, it may not be suitable for certain types of real-time applications that require precise and deterministic timing behavior.

1. **Objective**

*< the general objective statement of the research comes here and it should describe the output of the work>*

(one or two statements)

1. **Related Work**

*< a brief review of the related work, which give summary of similar works and this research’s position;* include appropriate citations>

(at least a page)

**References**

*<Bibliographic information of the documents (books, articles, websites) cited in the synopsis - use the standard template of the College*.>