Missile Defence System - ADLAS

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# Abstract

The Main aspect of this paper is to create, develop and test a missile defence system that will target incoming projectiles. Systems of this nature are often complex and perform high levels of algorithms to calculate correct values for ensuring absolute best performance. Moreover, designing a system of this nature will allow a certain level of understanding on how to map a system to requirements and ensure the re-usability.

The end goal of this project will enhance the understanding of how the system will cope with unexpected scenario’s and will affect the performance, once the system has been tested and then each possible scenario compared such as distance, altitude and angle of trajectory. All quality and event variables will have collected to be up and hence analysed to find a measure of performance that is useful in assessing the validity of the system tested and also to seek a final evaluation of what is happening.

**Keywords = Ada, Requirements, Traceability, V software lifecycle**

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# List of Abbreviations

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BS = Base Station

HLD = High-Level Design

LLD = Low-Level Design

SDLC = Software Development Life Cycle

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# 1 Introduction

## 1.1 Background

For this project, it was the idea to focus on an idea that has become very important in today's defense society. It has become apparent that missiles can be fired from any point of the earth and with the speed capabilities and high probability of not being able to destroy the object before it hits its intended target. I wanted to focus on something I found fascinating and to really look at how complex of a system of this nature would be and if it was capable of being miniaturized onto a STM32F4 board and coded in Ada 2012 which is a strongly typed language.

This system needs to calculate what values bout the other object is necessary to calculate the probability of nullifying the object and whether it would be possible within the timeframe of detecting to endpoint. Throughout this project, I will look at various software techniques used to work out the most efficient way of software development and if it’s possible to ensure that software quality can be maintained throughout the project.

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## 1.2 Aim

The overall focus of this project is to set requirements, design, implement and code a complex missile defense system.

## 1.3 Objectives

* Review theoretical aspects of software development
* Review components of missiles and counter measures
* Review ADA software
* Set requirements for the system
* Design and code the system
* Provide verification of software meeting requirements
* Perform system and unit testing
* Produce conclusions on the project

## 1.4 Design Points of Objectives

This section is to explain each objective and how it will be reached, it will then be reviewed in the last chapter Conclusion to see if it was completed.

* Review theoretical aspects of software development – Look at different SDLC models and which will fit this project suitably, understand how each one has its advantages and disadvantages.
* Review components of missiles and counter measures – Further review into physical aspects of missiles and how they operate, what measures can be used to counter and how current systems calculate choices.
* Review ADA software – Researching how Ada can be used to be safety and mission critical and aid the user to falling into similar coding pitfalls.
* Set requirements for the system –Create requirements for what the system should operate to and ensure that traceability of requirements to code is followed throughout.
* Design and code the system – Create the system required for main functionality to match the specification
* Provide verification of software meeting requirements – Ensuring that the code is fulfilling what it was designed to do.
* Perform system and unit testing – Ensuring the values and system performs the expected results
* Produce Conclusions for the project – Explain the positives and negatives for the project and whether the end product matched the design set out.

## 1.5 System Overview

A circuit board

Description generated with high confidence

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The ADLAS and other related platform equipment function together to:

* Control and monitor the release and system critical information
* Identify, locate and quantify the target
* Report to the Mission System (MS) the simulated time of impact and overall coverage affectability
* Preparing ADLAS for Release
* Prepare suspension and release equipment for release of secondary payload
* Perform Emergency detonation

## 1.6 Dependencies

GD will provide an AdaCore Target Build environment. This will enable Resource Group to compile their code against the target minimal Ada run-time we are using.

An AdaCore Native Build environment will enable this system to be compiled and allow the code to be used for testing purposes such as Unit Testing.

In order to continue to maintain the signal to register bit mapping in a single place, it is expected that the Release DevBase packages should use the Signal\_To\_Register package to determine the correct register and bit associated with each signal.

## Appendix

## References

1 – Software Development Life Cycles - <https://melsatar.blog/2012/03/15/software-development-life-cycle-models-and-methodologies/>

2 – Waterfall SDLC - <https://www.tutorialspoint.com/sdlc/sdlc_waterfall_model.htm>

3 – V-Shaped SDLC - http://er.yuvayana.org/sdlc-v-shaped-model-design-phase-applications-advantages-and-disadvantages/

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