

École Polytechnique Fédérale de Lausanne

Master Thesis

A Scala-to-FPGA abstraction for drone motion planning in real time

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1 Abstract

Harnessing the power of abstraction without compromise for drone applications: Developing a new Scala end-to-end development platform to write autonomous drone applications accelerated by FPGAs. The development platform is built on top of Spatial, a runtime code generator for DSL. The drone application consists in choosing the optimal trajectory to avoid colliding with moving objects by calculating all trajectories and predicting future positions in parallel and real-time while minimizing a cost function.

2 Annex

2.1 Proposal: An separation between backend and frontend for Argon/LMS respecting a common specification

Currently, Argon/LMS is a monolithic project. There is no separation between backend and frontend but merely a dedicated package for “Staged types”. This architecture has been sufficient so far but it hinders the growth potential of Argon/LMS as a general purpose platform for runtime code generation from DSL.