



TEC

Tecnológico de Costa Rica

ESCUELA DE INGENIERÍA EN COMPUTACIÓN

PROGRAMA DE MAESTRÍA EN COMPUTACIÓN

Software Architecture to Integrate Hardware Accelerated Algorithms on GStreamer for Embedded Systems

Thesis Proposal

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AUTHOR:

Diego Dompe

ADVISOR:

Ph.D. Francisco J. Torres-Rojas

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Resumen

Resumen en español

Abstract

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INTRODUCTION AND BACKGROUND

1.1. Introduction

Should be 1-2 pages write it so it captures the reader's interest in this overview. It does not have to be perfect. You can write this section last. Your best overview of you project most likely will come after you have written the other sections of your proposal.

1.2. Background

Key ideas

Embedded Systems are everywhere

Embedded Systems change quickly and evolve faster than previous technologies, thanks to technologies like System on a Chip (SoC), which revolutionize the way the technology industry works[1]. For example on Digital Signal Processors (DSPs)

Tradeoff between custom hardware vrs software. DSPs are good solution (why?). Advantage of heterogenous mixed environments on the operating system level.

Software complexity for DSP programming on heterogenous architecture. Hardware complexity interfering with the software.

Software re-use for the ARM side with a framework like gstreamer.

Get into details for the target platforms. Mention at least the platforms where the accelerators are not general propose DSPs.

1.3. Problem statement

Integrating custom DSP algorithms on higher-level frameworks in order to gain time-to-market is a difficult tasks and requires detailed knowledge of the intrinsics of the platform to get it right. Not all the knowledge about the challenges of integration are documented or measured.

1.4. Previous work

1.4.1. Literature review

Locate and briefly describe those studies and theories that support and oppose your approach to the problem. In other words, place the proposed study in context through a critical analysis of selected research reports. Be sure to include alternative methodological approaches that have been used by others who studied your problem.

1.4.2. Previous solutions

Describe previous attempts and similar solutions: - gst-ti plugin - gst-ti 2.x plugin
- gst-openmax - gst-ducati

1.5. Purpose

The purpose of this study is to create a software architecture to integrate existing and new DSP algorithms into the higher level multimedia framework. This framework

should be efficient from the perspective of hardware constraints and leverage existing knowledge from previous experiences.

1.6. Long-Range Consequences

Will improve time to market for products based on the platforms supported by the target framework. It will provide reference code for optimized software architecture for resource-constrained systems.

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OBJECTIVES AND CONTRIBUTIONS

2.1. General Objective

- Design a software architecture to integrate algorithms based on the CodecEngine framework into the GStreamer multimedia framework, taking in consideration existing knowledge regarding efficient implementation and software maintainability.

2.2. Specific Objectives

- Specific Objective 1
- Specific Objective 2

2.3. Contributions to the subject

This work will provide documentation regarding the details of the specific tradeoffs for the implementation approaches of multimedia software on the target platforms, and will serve as basics for future work regarding improving performance (power consumption).

2.4. Scope and Limitations

We will provide a reference implementation working on at least two different platforms. The reference implementation may lack features compared with existing solutions, but focused on providing a more maintainable design and performance equal or better.

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METHODOLOGY AND SCHEDULE

3.1. Methodology

Describe in technical language your research perspective and your past, present, or possible future points of view. List three research methodologies you could use, and describe why each might be appropriate and feasible. Select the most viable method.

3.2. Assumptions

Describe untested and un-testable positions, basic values, world views, or beliefs that are assumed in your study. Your examination should extend to your methodological assumptions, such as the attitude you have toward different analytic approaches and data-gathering methods. Make the reader aware of your own biases.

3.3. Procedure

Describe in detail all the steps you will carry out to choose subjects, construct variables, develop hypotheses, gather and present data, such that another researcher

could replicate your work. Remember the presentation of data never speaks for itself, it must be interpreted.

3.4. List of Deliveries

1. Reference implementation of the overall general architecture implementing at least one audio and video format on two different hardware architectures.

3.5. Schedule and Work Breakdown

BIBLIOGRAPHY

- [1] Deepak Somaya and Greg Linden. System-on-a-Chip Integration in the Semiconductor Industry: Industry Structure and Firm Strategies. *SSRN eLibrary*, 2000.

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ACRONYMS

SoC System on a Chip System on a Chip is a technology that consist on integrating several functional blocks of re-usable electronics logic (even from different vendors) into single die.

DSP Digital Signal Processor is a special type of micro processor.