SUCCESS STORY

Platform Software Driver Development and System Validation

FOR AN AUTOMOTIVE SoC

INTRODUCTION

Ignitarium was approached by a US-based automotive chip startup to develop platform software for their new SoC and to architect a solution to ease production issues while manufacturing these complex boards. In order to streamline the production process and to resolve issues during bring-up, Ignitarium engineers architected a versatile controller firmware along with a cost-effective system validation environment. This addressed board bring-ups and QA checks easing the back pressure on the production line.

Service in Focus

PLATFORM SOFTWARE DEVELOPMENT

Industry

Automotive - ADAS

Challenges

- Power controller Firmware Architecture to be versatile enough to control, regulate and manage power rails of multicore SoC
- Streamline manufacturing process of sensor board having multiple sensors, MCU and multicore SoC

Scope

- Power control MCU Firmware Architecture
- Process automation framework architecture
- OpenOCD debug support for multicore SoC

THE CHALLENGE

While designing the solutions, Ignitarium was required to address the following challenges:

- Architecting the power microcontroller firmware, with the flexibility to be run on any ARM Cortex M based controller, making it silicon vendor-agnostic.

- Development of a single automated test framework by capturing individual developer test cases across digital, analog & hardware teams while ensuring minimal modification and maximum reuse for production QA. The reports generated by the framework were intended to be used as a precursor to the quality of the sensor board being churned out, and additionally to derive analytics to gauge the production efficiency and enable data-driven decisions.
- Implement a low-cost JTAG based debug framework which is tailored and scalable to dynamically changing features of the SoC, with capability to validate multiple SoCs in parallel.

IGNITARIUM'S APPROACH

Standard API

APIs were designed to be generic as possible, to have minimal controller dependency. A custom bootloader was architected to have the firmware update capability via multiple interfaces (UART / I2C / TCP). A command response scheme was implemented to have flexibility to run commands individually and manually as required during production testing. In addition, a scheme to run a set of commands in sequence on boot up was also developed. This command sequence can be changed and updated as part of firmware updates or individually.

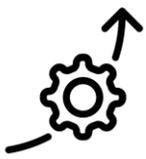
Modular Architecture

While building the automated test framework, the team adopted modular architecture which was scalable, new tests could be added, deleted, modified and / or evaluated in a scalable fashion. The team ensured zero disruption of the current production line using a well-thought-out architecture that helped in quick turnaround and roll out of the automated system while slowly transitioning out of existing manual testing.

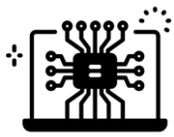
Choice of OpenOCD

OpenOCD was chosen after careful consideration, for enabling the SoC JTAG Test / Debug Framework using Boundary-Scan Architecture. OpenOCD was customized extensively to support multicore debug along with parallel multiple SoC validation for SLT - a paradigm shift from traditional structural and functional testing, which leveraged the full potential of all TAPs (Test Access Port).

BUSINESS IMPACT



25x improvement in production churn



MCU firmware was made agnostic to the microcontroller vendor hence enabling faster consecutive board bring ups

Eliminated existing inefficiencies of manual testing and validation

Looking to transform your product engineering?

Drop us a line to get in touch with our experts.

Contact Ignitarium at info@ignitarium.com