

A REPORT
ON
**Firmware verification for Automotive
Wireless Battery Monitoring Systems**

BY
SAI KARTIK **2020A3PS0435P**

AT
Analog Devices India
A Practice School – II Station of



**BIRLA INSTITUTE OF TECHNOLOGY AND SCIENCE
PILANI, PILANI CAMPUS**

December 2023

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Prepared in partial fulfilment of
the Practice School-II Course BITS F412

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Abstract Sheet
BIRLA INSTITUTE OF TECHNOLOGY AND SCIENCE,
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Title: Firmware verification for Automotive Wireless Battery Monitoring Systems

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Abstract

The goal of this project is to thoroughly assess the configuration of a Wireless Battery Management System (wBMS) that is meant to be used in automotive settings.

Of the various wBMS solutions ADI offers, the specific wBMS solution under consideration, which the author has thoroughly evaluated, is designed to comply with criteria that hold high regard for functional safety. This study provides an examination of the techniques used to verify the firmware against said functional safety standards which govern microcontroller operations at the embedded level.

Signature of Student

Signature of PS Faculty

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Abbreviations

API	A pplication P rogram I nterface
OEM	O riginal E quipment M anufacturer
wBMS	w ireless B attery M onitoring S ystem

Chapter 1

About the project

1.1 Problem statement

Use automation concepts to test the software present on the embedded devices of a wBMS system and deliver it to customers quickly and efficiently without bugs.

1.2 Motive

There is a growing demand for advanced cockpit electronic systems as a result of the automotive industry's ongoing shift towards electric mobility. These technologies are essential for enabling comprehensive vehicle component monitoring and for providing the occupants with a clear, comprehensive overview of the current state and overall health of the vehicle.

The battery of the car is by far the most important of the crucial factors that need constant monitoring. This is particularly important for battery packs made mostly of Li-ion substrates because of the potential for severe, potentially dangerous consequences if their health and charge states are not strictly monitored.

Given these factors, Analog Devices Inc. provides a wBMS solution that is simple to integrate into the automotive setting with certain OEMs.

1.3 Main objectives

The main objectives of this project are as follows:

1. To identify the testcases to be executed on the software of the wBMS system
2. To write scripts to perform manual testing of all the tests
3. To automate the running of the test suite created and generation of a test report

Chapter 2

Methodology

2.1 Solution Outline

- ensure a method in place to send the software to the devices to be tested
- create an interface that allows us to send and receive data from the wireless network formed
- run the data through a created test framework
- analyse the data and generate a bug report to be used by the development team

2.2 Architecture

2.2.1 Hardware architecture

2.2.2 Software architecture

- Minor description on the architecture of the wBMS with a diagram: Multiple gateways to multiple nodes
- insert reference to Jlinks
- Software architecture: Open source software used: Python/Pytest (insert refs to python/pytest docs)

2.3 Workflow

2.3.1 Testing ideologies

2.3.2 Test execution with the framework

- Explain the whole process of testing: planning, development, environment, execution (include all relevant refs)
- include the pytest ss in the test execution with the framework subsection

2.4 Automation of the workflow

- Explain how testing manually for each test case even with the framework developed is hard to manage
- Jenkins: automate testing triggers (insert ref for jenkins)

Chapter 3

Technology used

3.1 Hardware

- Proprietary hardware along with v71, ADBMS6817

3.2 Software

- python, pytest, bitbucket, jira, confluence (and why they were used)

Chapter 4

Conclusion

4.1 Learning outcomes

- apart from learning about software and embedded technology present out there, learnt team work, team building etc etc

4.2 Closure of the project

- All the achievements unlocked