

BANGALORE TECHNOLOGY CENTRE (D&IS)

Tech Forum - Quarterly Newsletter

• July 2022 •

ALSTOM
mobility by nature.



Technology
Innovation



System
Engineering



Cyber
Security



Application
Software



Verification
& Validation



Program
Management



Embedded
Software

FOREWORD



"The Technology Forum in Bangalore has been operational for more than six months, greatly helping increase communication and collaboration among all technical areas involving a significant number of people. Today, the forum provides a platform for peer learning, sharing of experiences, new technical approaches, good practices, and lessons learned in order to accelerate the implementation that will solve key technical problems. Furthermore, the forum is making significant contributions in the areas of technical problem solving, increased engagement, and overall branding through its various initiatives. Hence, it is requested that everyone participates and contributes towards the larger goals of the forum."

- **Sujan BABU**

EDITORIAL



"The Technology Forum is taking huge leaps in gearing up TC Bangalore to meet the challenges of the future. An important step is to arm our developers with cutting-edge tools for modern software development. This Forum is seriously evangelising the spread of Microservices, Cyber Security, and even Nanoservices philosophies into the minds of the developers right at the design phase itself. Let us not miss even a byte of an opportunity to learn from the techies."

- **Dr. Sai SESHA**

LEADERS VIEW



"The operationalisation of the Technology Forum at the Bangalore facility is a positive move. Since the Bangalore team is well connected with Alstom global sites and contributing to Alstom products and platforms, it is the right time to start periodic talks by respective DCs to the Bangalore team on various initiatives, key topics, and challenges to scale up the collaboration, competency and team maturity for further growth and efficiency."

- **Alessandro D'ALCIDE**

KEY PRIORITIES



Setting up
focus groups to
drive initiatives



Innovation and
competency building as
round the year activities



Agile and
Shift Left Way
of Working



Software Test
Automation
platform



Create cyber
awareness
and culture

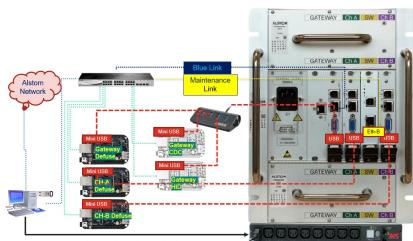
HIGHLIGHTS

HARDWARE AS SERVICE

To perform functional tests of the MooN (M-Out-Of-N) platform without any manual intervention from a remote location such as home, or a different Alstom office.

BUSINESS IMPACT

- No manual intervention in Software deployment on Target
- Engineers with less/no knowledge about the platform can perform Application Validation activities on the platform
- Ensure 24/7 accessibility/usage of the platform
- Hardware can be shared across the teams and centres



STATUS



- CIXL Bangalore - operational
- RBC Bangalore - under deployment
- RBC Belgium - under deployment
- U500 - under deployment

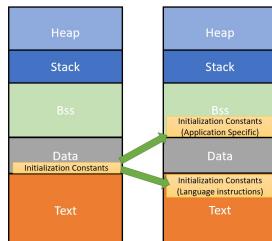
Reach out to **Rakesh KUMAR**, V&V Architect, WCE Senior Expert, for more details.

COMPACTING EXECUTABLE BINARY FOR AN EMBEDDED SYSTEM

Embedded systems require executables with a small memory footprint. The solution optimizes the need for application memory during run-time and compacts the executable file. Reducing the size of the application leads to quick boot-up time and reduces RAM storage space utilisation.

BUSINESS IMPACT

- Quicker start-up time
- Release memory for future development
- 40% reduction in RAM usage for interlocking application
- Performance improvement



STATUS



- PoC demonstrated on interlocking (CIXL-M)
- Approach approved by all stakeholders
- Implemented the solution on interlocking
- To be deployed on other embedded applications



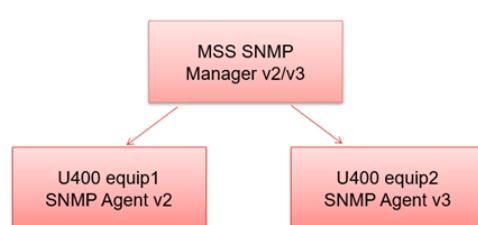
Reach out to **Naveen PANATI**, Software Architect, or **Satish KARI**, Product Design Engineer, for more details.

MAINTENANCE SUPPORT SYSTEM (MSS) - ADAPT TO SIMPLE NETWORK MANAGEMENT PROTOCOL (SNMP) V3

To receive maintenance information from equipment using SNMP V3 by authenticating and encrypting data packets over the network.

BUSINESS IMPACT

- Communicate with only authenticated U400 equipment
- Encryption provides privacy to data in transit
- MSS also supports the older SNMP versions to communicate with the legacy U400 equipment



STATUS



- MSS is the first subsystem in Alstom to provide an interface using SNMP V3
- SNMP interfaces for NMS, ATC Datalogger and TAUMI simulator are developed already
- MSS SNMP V3 interface is deployed in Lyon project, and in progress for Tel Aviv project

Reach out to **Hitesh MANGLA**, Solution Architect, for more details.

APR 22 NEWSLETTER QUIZ WINNERS



Apeksha-Nikhil MAHALE
Software Designer



Gobikannan MANOHARAN
System Design Lead



Akshay KHOKHAR
ATS Integration Engineer

Requesting all the readers to participate in this **quiz**.

The quiz answers are implicit in this newsletter. Those who answer correctly will be rewarded.
The quiz is open for responses till 20th Aug 2022.

TECH FORUM INDICATOR

BUILD & STRENGTHEN

- Product/Solution/Platform Engagement
- Tech PoCs for Growth
- Lab Infrastructure
- Innovation & Patents

COLLABORATE AND CONNECT

- Tech Talk Series
- Competency and WCE Expertise
- Technical Referent
- Connects with People

EXPERTISE & KNOWLEDGE SHARING

- Collaboration – CCN, TCs, DCs, Solutions
- Collaboration – Academia, Partners
- Global Reach Out - LinkedIn, Publications, Events

Actions &
Initiatives

86

Progress

24%

KNOW YOUR WCE EXPERTS



Ravindran RAMRAJ
Senior Expert – ICC (Integrated Control Centre)

Expertise Summary

- Senior product architect in ICONIS mainline solutions, BLR
- Business Development Manager for TMS in APAC
- Playing PrSAA role for NCRTC (First Indian project with ERTMS L2 hybrid)
- One of the core mentor for TMS aspirants

Key Achievements

- Contributed to winning two TMS projects (NCRTC and KiwiRail)
- Filed patent related to timetable optimisation-based solutions
- Part of the future product lines of Wayside Control Centre initiatives (Gateway)

Future Vision

To leverage the technology to handle the demanding market needs (National level control centre solutions).



BV VISHWANATH
Senior Expert - Software/ICC/Product design

Expertise Summary

- Part of ATS Urban Design Authority
- Technical referent for ATS Programs/Projects
- Mentor for WCE expertise aspirants

Key Achievements

- Lead Control Centre Framework Infrastructure activities
- Redesigned/Refactored existing ATS architecture to manage 180 trains
- Supported/Reviewed critical GAPS of TEL, Marseille, Telavi and Mumbai projects

Future Vision

Upgrade/Modernize ICC products.



Suraj KAMAT-DHAKANKAR
Senior Expert – Integrated Control Centre

Expertise Summary

- Support several ATS projects such as Lusail, GTCS, TELAviv, U500
- Technical leader of one of the WCC R&D Project
- Mentor for WCE expertise aspirants

Key Achievements

- Design of Dynamic Timetable for Fork Management that is re-used across multiple projects
- S2K Database comparator tool currently used worldwide by the users of S2K
- S2K Configuration Visual Explorer tool is used by ATS architects and integrators for understanding configuration

Future Vision

To make Alstom ICC product known worldwide for their quality and on-time deliverability.

SUCCESS STORIES - PROJECTS/PROGRAMS



Alstom wins order to supply metro trains and CBTC signalling for Bhopal & Indore metro rail projects

Alstom has been awarded the contract by Madhya Pradesh Metro Rail Corporation Limited (MPMRCL) to deliver 156 Mavia metro cars with 15 years of comprehensive maintenance for the Bhopal and Indore metro projects.

Valued at €387 million (over INR 3,200 crores), the order includes the installation of the latest generation of Communications Based Train Control (CBTC) signalling system as well as train control and telecommunication systems; each with seven years of comprehensive maintenance. The trains are powered with modern energy-efficient propulsion systems with regenerative braking, making them a sustainable alternative to other modes of transport, thus reducing energy consumption.

Cyber Days 2022 in Bangalore

It was a proud moment when the 'Cyber workshop for Global Alstom' was conducted in Bangalore. Extraordinary sessions on Cybersecurity and Industry trends including key messages from Alstom Leaders, Partners and Customers, as well as an update on critical programs/projects which are building Cyber features.

Nowadays, railway customers are becoming increasingly aware and incorporating strong Cybersecurity requirements in their contracts. The sessions were more focused on how Alstom is strengthening its expertise in Cybersecurity by setting up internal processes and governance, to tackle cybersecurity threats in the rail industry and live up to the customer's expectations.

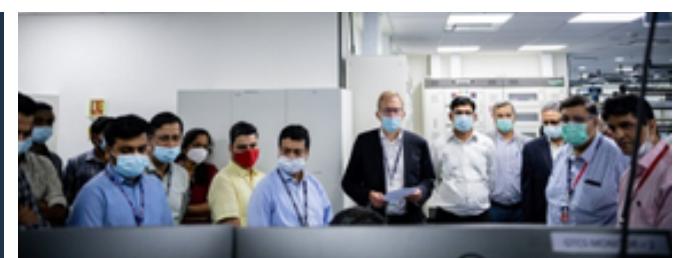
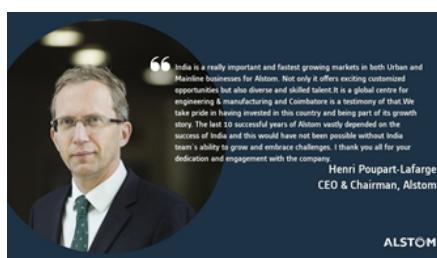
There are many takeaways from this two-day event, a few of them are:

- Cyber Academy, a global learning platform launching soon to further strengthen cyber competency
- Cyber Security Roadmap, an opportunity for many young engineers who would like to frame their careers on Cyber competency
- Cyber presentations from programs and projects, with current strengths and challenges



Team India hosted our CEO & Chairman

Team India hosted our CEO & Chairman, Henri POUPART-LAFARGE and Ling FANG, Region President, APAC at Savli, Maneja, Coimbatore, Delhi & Bangalore.

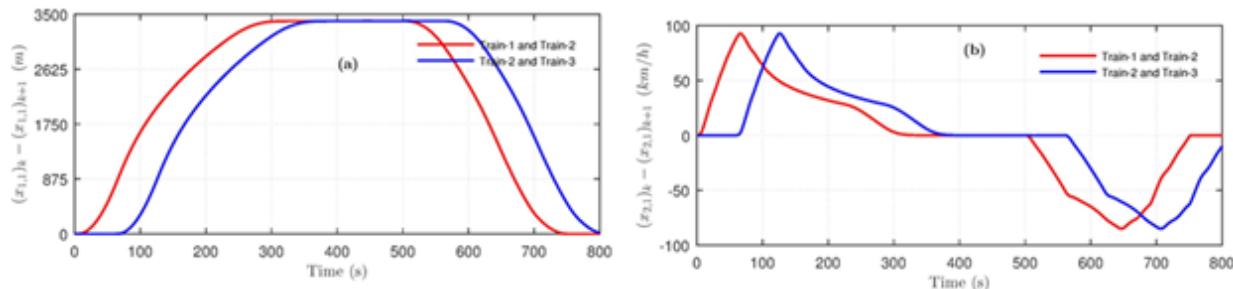




Blockchain-enabled Virtual Coupling for Railway Traffic Conflict Control

Railway traffic conflicts are common in the day-to-day operation of trains. The conventional conflict resolution strategy focuses on delaying the trains, which can solve the problem of railway operators more than the passenger's problem. To solve the problem of railway traffic conflict control with both operator and passenger satisfaction, the combination of Blockchain, virtual coupling (VC), RBC, ATO control algorithms, the heartbeat signal from trains, and 5G using train-to-track/track-to-track communication links in the simulation work [here](#).

The virtual coupling (VC) aims to enable "virtually coupled trains" to operate much closer to one another within their absolute braking distance and dynamically modify their own composition on the move (VC/uncoupling of train convoys) while ensuring at least the same level of safety as is currently provided. It is possible to "forecast the conflicts" by monitoring "changes in the Equivalent Merkle root hashes" of the Blockchain databases. The Blockchain database maintains "Single-Source-Of-Truth" (SSOT) for Conflict Detection & Mitigation and also ensures "Immutability" and "Integrity" of train/track infrastructure state data. The simulation results demonstrate the possibility to minimise or nullify the overall individual train delay progressively with ~27% time savings at a typical VC.



On behalf of Team Alstom, Dr. M. GANESAN presented this topic at the "[Blockchain Acceleration Event, Italy](#)" which was organized by **DITECFER** and the **ERCI** (European Railway Clusters Initiative) on 20th June 2022.

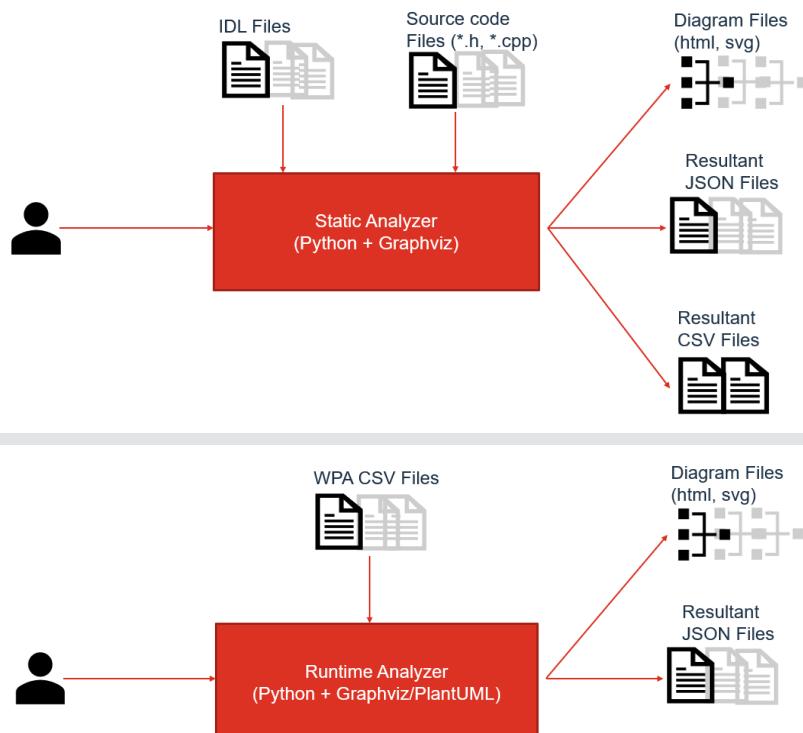
Reach out to [Dr. M. GANESAN](#), WCE Senior Expert, for more details.

ComMBD Tool

The ComMBD Tool is proposed to be used for documenting/generating dependency and sequence diagrams of ATS modules with classes. Since ATS modules use the legacy S2K framework, it is not possible to generate these diagrams with the available static analysis tools.

The advantages of documenting/generating the dependency diagrams are as follows:

- Currently, whenever there is a change in ATS module code or configuration, it is difficult to get the impact and dependencies on other modules/classes. With this proposal, it is possible to find the impacted modules and do targeted validation
- As part of obsolescence management, there is also a plan to migrate the ATS Modules to new generation technologies. These tools help in understanding the existing dependencies and smoothen this migration without regression
- These tools are also useful for building ATS architecture knowledge on all the levels



Please contact [Prasanth KARUTHEDATH](#), WCE Senior Expert, for more details.

THOUGHTS FROM Young Engineering Graduates (YEG)



Aishwarya V
YEGP 2021

I joined Alstom on 27th September 2021 and since then I have admired every aspect of what I have experienced here. Sustainability and innovation are strategically driving the organisation with greener solutions and focus on minimising carbon footprints. Leadership, teamwork and taking up mobility challenges is what makes this organisation a thriving place to work.

From domain trainings to working on projects, learning has been a constant advantage in addition to enjoyment. As a newbie in the corporate sector, there were things which were overwhelming and a bit difficult to understand, but there was always someone to guide and teach the correct way of doing a task. I received a warm and amiable welcome and after almost 10 months in the organization, I feel that I am in the right place, aligned with my interests.



Makkena MAHESH KUMAR
YEGP 2021

I joined Alstom on 30th August 2021 as a PGET (Post Graduate Engineering Trainee). Currently, I am working in the ICC Mainline Team. It is a great opportunity for me to start my career with the best company.

With a friendly and supportive work environment, Alstom helps me improve my technical skills through the iLearn portal. I also received crucial technical training during my training period. The manager and team leaders I work with have been very supportive. It has given me confidence to work on projects. I am happy to be sharing my experience with Alstom.

GLOBAL TECHNOLOGY TRENDS

ZUGCHAIN (ZC): Blockchain-based Juridical Data Recording in Railway Systems

TU Braunschweig, Germany | Siemens AG, Germany | Siemens Mobility, Germany | DB Systel, Germany | HPI, University of Potsdam, Germany | University of Stavanger, Norway.

Context

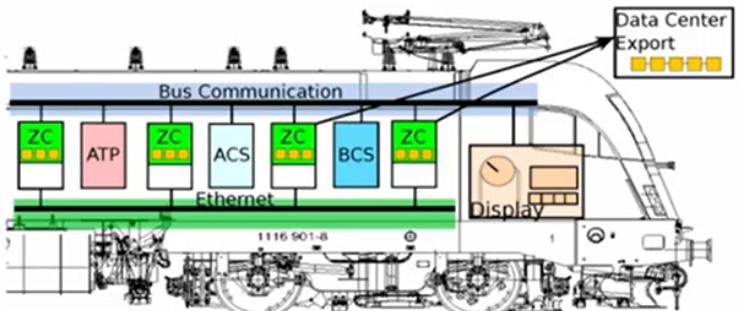
In modern trains, a Juridical Recording Unit (JRU) logs events that occur during operation. This data is used to reconstruct the exact chain of events in case of failures and crashes.

Pain Points

- Single point of failure
- Possible data manipulation during extraction
- No remote connection is possible
- Proprietary device – one company has logging authority

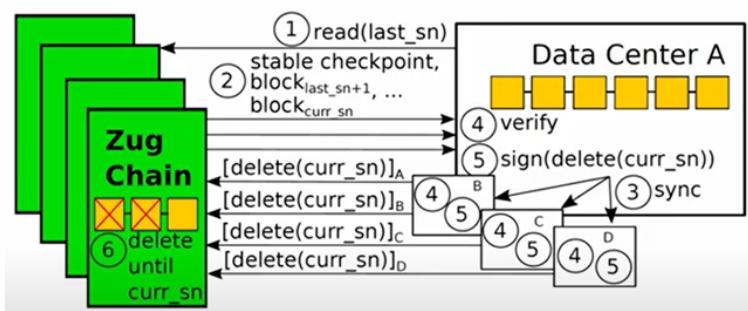
Solution - Distributed Juridical Data Logging

- Nodes can read identical or diverging data from the bus (ACS: Acceleration Control System; BCS: Brake Control System)
- Communication layer ensures no payload duplication
 - Log all juridically relevant data, but filter duplicates
 - Prevent omission of data
- Export to data centres of railway companies (multiple parties sign off on deletion)
- Blockchain verifies integrity from a single response with Practical Byzantine Fault Tolerance



Conclusions

- Further digitalisation in railway operations
- Maintain JRU's reliability & availability
- Allow data integrity verification even after crashes using Blockchain
- Efficient filtering in the communication layer for good performance on real train hardware



Reach out to **Dr. M. GANESAN**, WCE Senior Expert, for more details.

Please refer to the [paper](#) and [video](#).