SYSTEM FOR VEHICLE-INFRASTRUCTURE INTERACTION ASSETS HEALTH STATUS MONITORING

Newsletter

September 2019

Foreword

The SIA project started on March 1st, 2018 with a duration of 36 months. This project, led by CEIT-IK4, in collaboration with 9 partners from five countries, aims at developing four ready-to-use services providing prognostic information on the health status of the railway's most demanding assets in terms of maintenance costs (wheel, rail pantograph and catenary).

A flyer to present the project has been created at an early stage of the project and can be found at: bit.ly/2KC9AnV. The project website (https://siaproject.eu/) is updated frequently so please visit us regularly to be kept informed of the latest news and progress in the project. You can also follow the project on twitter (@SIAGalileo).

This first issue of the SIA newsletter presents some of the achievements made within the first period.

For further information on the project, please contact :

Mr. Unai Alvarado, coordinator of the project at CEIT-IK4 at: ualvarado@ceit.es, or

Ms. Christine Hassoun, dissemination Senior advisor at UIC (International Union of Railways) at: hassoun@uic.org.

QUESTIONNAIRE FOR RAIL EXPERTS

We are collecting feedback from potential end-users regarding measurements and diagnosis in order to adapt the functionality of the new services to the market needs. Please help us by filling in our questionnaire at: bit.ly/2FMIrRq.

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Horizon 2020 European Union Funding for Research & Innovation

European Global Navigation Satellite Systems Agency

FACTS AND FIGURES

EU Contribution:
€2.9 million

Duration:
36 months

Project start date:
01/03/2018

Project end date:
28/02/2021

Project coordinator:
CEIT-IK4

Partners:
9 from 5 countries

EU H2020 GSA Project

Grant agreement:
n°776402

Website:
https://siaproject.eu/

WP NUMBER	WP TITLE	LEAD BENEFICIARY
WP1	Project Management	CEIT
WP2	End-user functionality and SIA architecture definition	NSL
WP3	EGNOS and Galileo based on-board low-cost receiver and algorithms for railway specific domain	NSL
WP4	Integration of sensors, communications and energy supply for on-board sensing nodes	CEIT
WP5	Component degradation predictive algorithms	DLR
WP6	Visualisation environment for railway specific maintenance applications	INGECONTROL
WP7	Integration with end-user specific application layer	INGECONTROL
WP8	Test setup development and validation	FGC
WP9	Dissemination, communication and result exploitation	UIC

Project organisation

Preliminary Results

All the technical developments within SIA's different Work Packages are running at full steam. After the mid-term of the project and coinciding with the end of the summer, the integration phase of the different components will start. Up to now, these have been the main results that have been achieved through the different (technical) WPs:

WP2 is dedicated to the **definition of end-user-driven functionality and the system-level architecture**. This WP has been successfully concluded with the achievement of the first milestone of the project (MS1: End-user requirements and SIA architecture meet market needs), thanks to the consolidation of a set of high-level requirements and the design of the high-level architecture. The participation of the end-users present in the consortium has been key to establish the functionality and interfaces of the four services to be developed within the project. Apart from that, and in order to have a wider approach to such definition, the consortium has prepared a living questionnaire. The goal is to obtain, during the lifespan of the project, feedback from potential end-users of SIA not only about desired features and benefits, but also to gather information about similar systems they might be using currently, in order to facilitate future system exploitation. This questionnaire can be found at: bit.ly/2FMIrRq.

WP3 deals with **EGNOS and Galileo based on-board low-cost receiver and algorithms for railway specific domain**. After a preliminary selection of the EGNOS and Galileo based GNSS receiver Hardware platform, the design of the positioning algorithms have started using already available datasets. Preliminary analysis have shown promising results concerning the suitability of using a combination of EGNSS systems and Precise Point Positioning strategies in terms of better availability and accuracy. Another important development of this WP has been the development of a verification framework for the positioning algorithms (RANSS)

WP4 includes the **integration of sensors, communications and energy supply for on-board sensing nodes**. A preliminary set of prototypes have been developed in this WP. On the one hand, the sensors for the onboard systems and T2G communication subsystem have already been used for several testing campaigns (both on track and in workshop). On the other hand, the promising design of a power harvesting device to be (non-invasively) mounted on the axle of the wheelset has led to a patent application. The prototype of the harvester is also currently under development.

WP5 deals with the **component degradation predictive algorithms**. In order to leverage good predictions about the future health status of the different assets, physical modelling is under research within the problem. Physical modelling also constitutes a good virtual environment to enable verification of algorithms, as it is easier to replicate damages and failures virtually than observe them in the reality. The algorithms that will link the physical magnitudes obtained from sensors with the health status of components (in terms of relevant KPIs) are also under development.

Furthermore, sensor data were acquired with a preliminary sensor system on-board an ÖBB measurement carriage during a testing campaign in Austria in June 2019. These data will assist in developing and testing the data analysis algorithms.

Finally, **WP6** is dedicated to the **visualisation environment for railway-specific maintenance applications**. The four services of SIA are being implemented in a web app that has been mocked up with the support of end-users. Up to now, the back-end of the application and database architecture have been already defined for the most part of the functionality of SIA (GIS location of assets, management of inspection data and visualisation of historic data about components' health status). The real time functionality of the services (to assess warning/alarm generation) is currently under development.

The SIA website will be updated soon with all available deliverables.
Check our website regularly at: https://siaproject.eu/

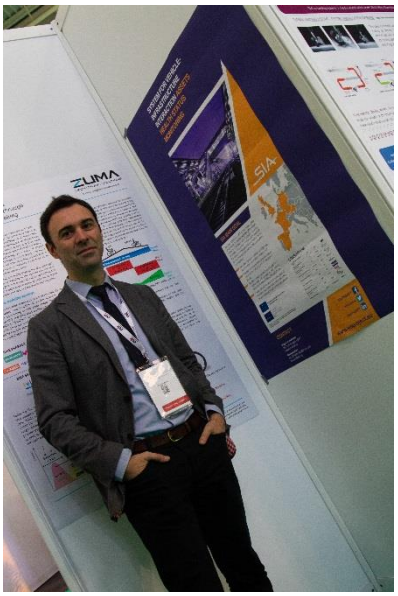
N°	NAME	SHORT NAME	COUNTRY
1	Asociacion Centro Tecnológico CEIT-IK4	CEIT	Spain
2	Union Internationale des Chemins de fer	UIC	France
3	Deutsches Zentrum für Luft- und Raumfahrt e.V.	DLR	Germany
4	Ingeniería y Control Electrónico SA	Ingecontrol	Spain
5	Teléfonos Líneas y Centrales SA	TEL	Spain
6	Vías y Construcciones SA	VIAS	Spain
7	ÖBB-Infrastruktur AG	ÖBB	Austria
8	Ferrocarrils de la Generalitat de Catalunya	FGC	Spain
9	Nottingham Scientific Ltd	NSL	United Kingdom

Partners of the consortium

Kick-off meeting on 7 March 2018
in the European GNSS Agency in Prague

SIA Consortium meeting on 30 October 2018
in ÖBB premises in Vienna

Dissemination of the EU-GNSS SIA project



During the first year of the SIA project, partners of the consortium have presented the project in several major international transportation events, such as:

- Innotrans 2018 – 22-25 September 2018 (Berlin)
- GoMobility Expo – 27-28 November 2018 (Irun)
- EU Space Week – 03 December 2018 (Marseille)
- RailLive – 07-09 March 2019 (Bilbao)
- Space4Rail Innovation Event – 19/03/2018 (Vienna)
- UIC Asset Management Global Conference – 18/04/2019 (Paris)
- SmartRaCon 1st scientific workshop – 25/06/2019 (Lille)

Latest presentation of SIA available for download at: http://bit.ly/2X63bga.

The SIA mid-term event will be organised in Automn 2019.
Date and place will be communicated soon.
Please follow our twitter feed @SIAGalileo for future developments

CONSORTIUM

ceit
IK4 Research Alliance

uic

DLR Deutsches Zentrum für Luft- und Raumfahrt
German Aerospace Center
Institute of Transportation Systems

Ingeniería y Control Electrónico, S.A.

VIAS

ÖBB INFRA

FGC Ferrocarrils de la Generalitat de Catalunya

NSL

telice
TECHNOLOGY IN THE FIELD

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