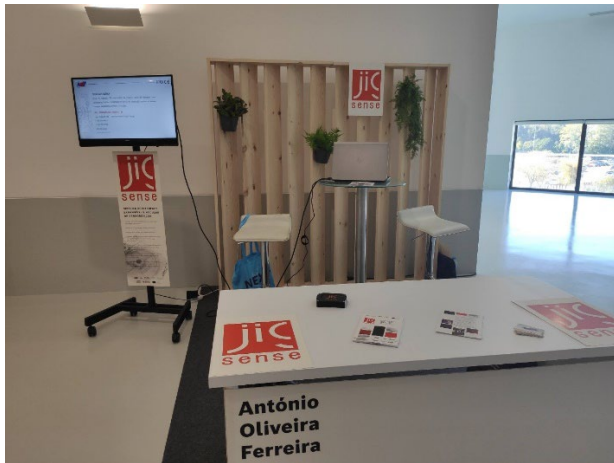


## AÇÕES DE DIVULGAÇÃO

<b>Ação de divulgação</b>	Innovation Meeting da Bosch
<b>Local e Data</b>	Portugal (Braga), 28 de abril de 2021
<b>Formas de divulgação</b>	- <i>Apresentação oral</i>
<b>Evidências</b>	

<b>Ação de divulgação</b>	NEXT – Driving Tomorrow da Bosch
<b>Local e Data</b>	Portugal (Braga), 9 e 10 de novembro de 2021
<b>Formas de divulgação</b>	- <i>Stand</i>
<b>Evidências</b>	

<b>Ação de divulgação</b>	<b>EPoSS Annual Forum 2022</b>
<b>Local e Data</b>	<b>Itália (Turim), 4 e 7 de outubro de 2022</b>
<b>Formas de divulgação</b>	<b>- Pitch + poster</b>
<b>Evidências</b>	<p>The image shows two pieces of evidence from the EPoSS Annual Forum 2022. The top part is a photograph of a presentation slide titled 'Objectives'. The slide lists several goals, including: 'Develop an innovative system for energy (e.g. hydrogen) delivery systems which can be used in the industrial sector to reduce CO2 emissions', 'To demonstrate using hydrogen power', and 'To demonstrate using hydrogen power transfer system'. The bottom part is a photograph of a poster titled 'EPoSS Annual Forum 2022' with the subtitle 'Innovative Big Damming for Production Lines'. The poster contains text and images related to the project.</p>

# MATERIAL GRÁFICO

## Flyer

**SENSORIZAÇÃO INOVADORA DE GABARITOS PARA LINHAS DE PRODUÇÃO**

O projeto JigSense, pretende desenvolver soluções de sensorização para um dispositivo de apoio à montagem de componentes em linhas de produção (gabaritos), tendo como principais objetivos:

- Reduzir de forma significativa o volume de cablagem associado.
- Melhorar a fiabilidade das comunicações.
- Aumentar o tempo de vida dos sensores.
- Reduzir de forma significativa as necessidades de manutenção, quer preventiva, quer corretiva.

## Poster

**SISTEMA DE INTERFACE EXPANSÍVEL E MODULAR DE SENSORIZAÇÃO**

Reduzir de forma significativa o volume de cablagem associado.

Melhorar a fiabilidade das comunicações.

Aumentar o tempo de vida dos sensores.

Reduzir de forma significativa as necessidades de manutenção, quer preventiva, quer corretiva.

Desenvolver módulo de interface de sensores com barramento de comunicação de baixo consumo e baixo peso.

Desenvolver módulo de comunicação sem fios entre barramentos da estrutura móvel e estrutura fixa.

Desenvolver um módulo de carregamento sem fios ou de contacto intermitente e armazenamento temporário de energia.

*Cartaz Explicativo*

GABARITOS PARA LINHAS DE PRODUÇÃO COM SENSORIZAÇÃO INOVADORA



SISTEMA DE INTERFACE EXPANSIVEL E MODULAR DE SENSORIZAÇÃO

O projeto *igSense*, pretende desenvolver soluções de sensorização para um dispositivo de apoio à montagem de componentes em linhas de produção (gabaritos), sendo como principais objetivos:

- Reduzir de forma significativa o volume de cablagem associado.
- Melhorar a fiabilidade das comunicações.
- Aumentar o tempo de vida dos sensores.
- Reduzir de forma significativa as necessidades de manutenção, quer preventivas, quer corretivas.
- Desenvolvimento de módulo de interface, de baixo consumo e baixo peso para aquisição e processamento de dados de diferentes tipos de sensores presentes no IIG.
- Desenvolvimento de módulo de interface entre o sistema de aquisição dados dos sensores e o software presente no workstation.
- Desenvolvimento de módulos de comunicação Bluetooth e transferência de energia sem fios entre a estrutura móvel e a estrutura fixa.



## Vídeo Projeto – versão curta



<https://www.youtube.com/watch?v=5VqKPWrZJE8>

## Poster Científico

### Innovative Jig Sensing for Production Lines

J. Salgado<sup>1</sup>, F. Vieira<sup>2</sup>, R. P. Mendes<sup>3</sup>, A. Ferreira<sup>3</sup>, P. Matos<sup>3</sup>, M. Faraj<sup>4</sup>, D. Aguiar<sup>5</sup>

<sup>1</sup>CeNTI – Centre for Nanotechnology and Smart Materials, V. N. Funchal, Portugal  
<sup>2</sup>ADP – António Oliveira Ferreira, Braga, Portugal  
<sup>3</sup>INL – International Iberian Nanotechnology Laboratory, Braga, Portugal

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#### INTRODUCTION

Nowadays, metallic jigs are used to support production in assembly lines, ensuring the quality of the parts and the control lines of the same assembly process are used. These setups incorporate fixtures and sensors to control the position and movement of components and parts and ensure the product's assembly sequence. The lines are robust and reliable so that the system does not increase the complexity of the process. These members must be secure and have real-time information for the software to control and provide feedback to the worker.

JigSense main goal is to develop a system that fulfils the timing requirements for an industrial-based mechatronic system that eliminates/reduces the risk of component damage due to operation use: cabling and sensors, while increasing the component lifetime and reducing unplanned system stoppages/downtime. This work presents the exploited use case: an assembly jig from an industrial production line that is based on an AS-i network of sensors and actuators connected to a central computer running a proprietary software program. This project proposes the development of a modular sensor interface module and a wireless power transfer module to overcome and mitigate the main issues presented by those jigs and in addition to be aligned with the defined system requirements.

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#### OVERVIEW

Applying wireless techniques and methods of principles it is possible to create a system capable of achieving the objectives of the project.

**Wireless Communication**, data transfer between:

- Sensing Module (jig moving part);
- Actuation Module (workstation) (fixed part).

- Master and slave topology;
- Protocol with unique header and tail for cyclic redundancy check;
- Periodic message to check correct data transfer.

**Wireless Power Transfer**, using:

- Near field or nonradiative technique;
- Magnetic field short distance;
- Custom size and application.

#### CASE STUDY

A jig with critical rotational motion, the main problems are:

- High number and volume of cables, and a large AS-i Hub;
- Breakage points in moving parts, in various parts of the jig;
- Necessity to allocate space in the jig for AS-i slave modules;
- Distance between AS-i slave and sensor greater than necessary;
- Maximum of 8 sensors per AS-i slave module;
- Workstation's control system cannot be changed.

In this way, the main objectives are established by a sensor interface with low-range communication, weight and low consumption of modular data developed by the sensors, coupling of wireless power transfer capacity for the mobile system, maintaining the reliability of the communication and the correct behaviour of sensors, and that is capable of retrofitting to the current workstation.

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#### TESTS AND RESULTS

**Wireless Communication and actuation performance**

- Reading** – correct functioning in all 32 channels;
- Actuation** – it was possible to determine the sensor emulation and which electronic to use to validate and execute its operation;
- Communication protocol** – stable and fast communication has been achieved;
- Modules integration** – it was possible to prove the operation of data acquisition module, communication module and AS-i hub's;
- Communication latency** – the latency of the system did not exceed 100 ms.

Average latency was 19.4 ms, with a standard deviation of 2.1 ms.

Power Consumption	Voltage (V)	Current (mA)	Power (W)
Fixed structure	24	16	0.384
AS-i central module	24	44	1.056
Sensing and actuation module on the jig	24	100	2.400
Consumption of the system working	24	160	3.840

Transmitted power: 30 W (up to 80W);  
 Mobile structure power consumption 2.6 W.

#### FINAL REMARKS

A new wireless modular sensor communication architecture was developed and demonstrated.

- The results obtained were very favorable in alignment with the main goals defined;
- It was proven that the system works, without the need to change its control software;
- The jig was able to complete its work cycle, ensuring the correct communication of its control system with all relevant sensors.

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PROJECT

CONSORTIUM

CO-FUNDED BY

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## ESPECIFICAÇÕES TÉCNICAS PROTÓTIPO / DEMONSTRADOR

### PROTÓTIPO / DEMONSTRADOR

