ITN-5VC

Integrated Telematics for Next Generation 5G Vehicular Communications

ITN-5VC D4.8

Year 2 Project Popular-Science Workshop

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[1] CO = Confidential, only members of the consortium (including the Commission Services)

PU = Public

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Executive summary

The commitment to a better world is one of the fundamental pillars on which scientific research is based. Therefore, one of the objectives of this project is to develop skills in students that will turn them not only into leaders of scientific activities but also into agents that bring scientific advances closer to society. For this purpose, popular-science workshops are organized annually within the Project. This document will give details of the popular-science workshops corresponding to Year 2 of the Project.

Disclaimer: This work has been performed in the framework of the H2020 project ITN-5VC co-funded by the EU. This information reflects the consortium's view, but the consortium is not liable for any use that may be made of any of the information contained therein. This deliverable has been submitted to the EU commission, but it has not been reviewed and it has not been accepted by the EU commission yet.

1 Introduction

Within ITN-5VC project there are several dissemination and outreach activities that are scheduled in advanced. This is the case of the popular-science workshops, that are intended to bring the research carried out within the project closer to the community. This not only represents a benefit for society, but also for the researchers who can improve their work based on the comments they receive from the general public.

Taking advantage of the Training School held in Technische Universität Ilmenau and the fact that all ESRs were together, the first talk corresponding to the Popular-Science Workshop was done. With an audience consisting mainly of teachers, researchers, and members of the automotive industry, the focus was on the description of the ESRs' research objectives and the progress made so far. However, a discussion about the ESRs' experience was also included.

The attendants, especially the ones who have relations with institutions of the ITN-5VC project, agreed to help with the dissemination of the work being done by the ESRs. It is expected that two lectures will follow, one at the Technische Universität Ilmenau and another at Universiteit Twente, with mainly undergrad and Master students as audience.

2 Year 2 Project popular-science workshop

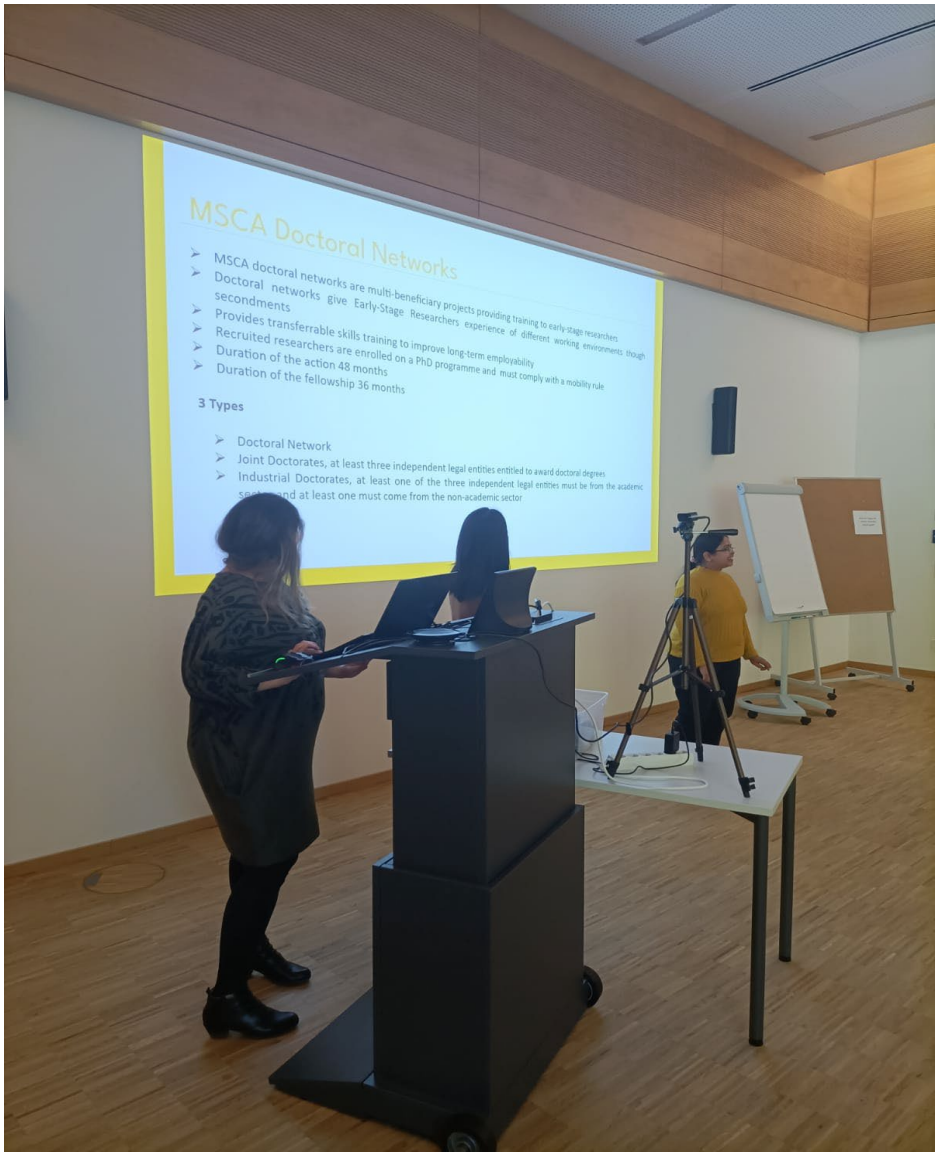
Brief overview

- Host: Technische Universität Ilmenau
- Venue: TUIL
- Time: October 2022

ESR participation

Name	Participation
ESR1 Reza Gheybi Zarnagh	YES
ESR2 Alejandro Antón Ruiz	YES
ESR3 Coen van de Ven	YES
ESR4 Aamir Ullah Khan	YES
ESR5 Sayed Najaf Haider Shah	YES
ESR6 Yanet Estrada González	YES
ESR7 Nandan Dutta Chaudhury	YES
ESR8 Vishakha Shukla	YES
ESR9 Rubén Darío Riaño Álvarez	YES
ESR10 Yang Fu	YES
ESR11 Carlos Ravelo Pérez	YES

Pictures taken during the presentation



Presentation material

ITN 5VC

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Popular Science Workshop

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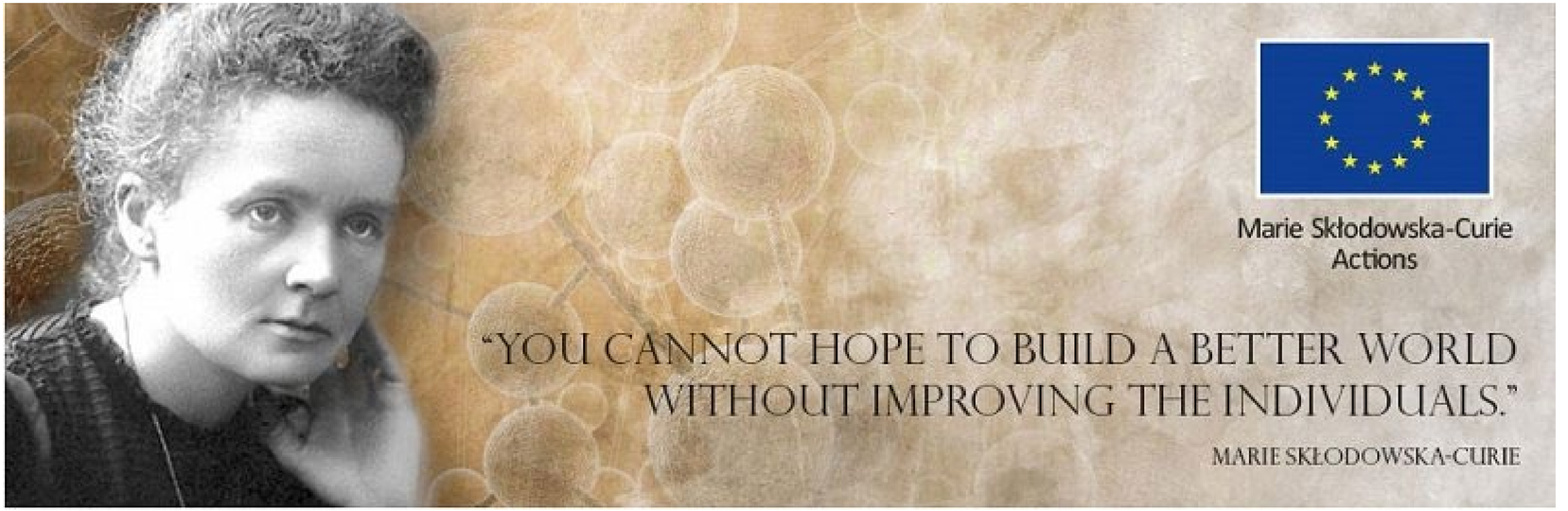
MARIE CURIE ACTIONS

European Commission | Horizon 2020 European Union funding for Research & Innovation

HORIZON 2020

Agenda

- About MSCA
- Why MSCA doctoral networks
- MSCA doctoral networks
- What's covered
- Eligibilty
- Recruitment process
- Secondment
- ITN-5VC
- Work Packages
- ESR goals
- ESR experiences


Marie Skłodowska-Curie
Actions
"YOU CANNOT HOPE TO BUILD A BETTER WORLD
WITHOUT IMPROVING THE INDIVIDUALS."
MARIE SKŁODOWSKA-CURIE

About MSCA

- Marie Skłodowska-Curie Actions (MSCA) is a sub-programme of the European Union's research funding framework programme aimed at research staff. It supports researchers at different stages of their careers, regardless of their age, nationality and area of knowledge.

- The MSCA also encourages cooperation between industry and academia and seeks to improve researchers' employability and career development through innovative, interdisciplinary, international and cross-sector training.

Why MSCA Doctoral Networks?

- Train creative, entrepreneurial, innovative and resilient doctoral candidates
- Implement intersectoral and interdisciplinary doctoral programmes
- Raise the attractiveness and excellence of doctoral training in Europe
- Equip researchers with the right combination of research-related and transferable competences and provide them with enhanced career perspectives in both the academic and non-academic sectors.

MSCA Doctoral Networks

- MSCA doctoral networks are multi-beneficiary projects providing training to early-stage researchers
- Doctoral networks give Early-Stage Researchers experience of different working environments though secondments
- Provides transferrable skills training to improve long-term employability
- Recruited researchers are enrolled on a PhD programme and must comply with a mobility rule
- Duration of the action 48 months
- Duration of the fellowship 36 months

3 Types

- Doctoral Network
- Joint Doctorates, at least three independent legal entities entitled to award doctoral degrees
- Industrial Doctorates, at least one of the three independent legal entities must be from the academic sector and at least one must come from the non-academic sector

What's covered

The grant provides an allowance to cover the fellows living, travel and family costs. The grant is awarded to the host organisation, usually a university, research centre or company in Europe. The research costs and overheads of the host organisation(s) are also supported.

Researcher	**Researcher unit cost € / person-month**		
	Living allowance *	Mobility allowance	Family allowance
Doctoral candidate	3000	600	600

*** A country correction coefficient applies to the living allowance**

Eligibility

- The researchers may be a national of a Member State, of an Associated Country or of any other third country
- ESR shall at the date of recruitment by the host organization, be in the first four years* (full-time equivalent research experience) of their research careers and have not been awarded a doctoral degree
- The researcher must not have resided or carried out his/her main activity (work, studies, etc.) in the country of his/her host organization for more than 12 months in the 3 years immediately prior to his/her recruitment
- Short stays, such as holidays, are not considered
- In case the ESRs are enrolled in a doctoral programme leading to the award of a doctoral degree in a country where the duration of PhD study is formally 4 years the participant is strongly encouraged to find additional funding from other sources in order to fund the 4th year of doctoral studies.

Recruitment process

- Vacancies are advertised and published vacancies
- Beneficiaries publish vacancies as widely as possible
- Obligatory publication in the EURAXESS Jobs Portal(euraxess.com)
- Application on the portal of the ITN partner
- Interview

Secondment

- In ETN, recruited researchers can be seconded to other beneficiaries and/or to partner organizations for a duration of up to 30% of their recruitment duration
- For EID and EJD – specific rules apply
- For example, in EID, the ESR should spent 50% of their time at an industry which is the part of the consortium
- In all cases, recruited researchers can only be seconded to beneficiaries or partner organizations or entities with capital/legal link included in the list of participants
- Secondments should be differentiated from short visits

ITN - 5 V C

- Integrated Telematics for Next Generation 5G Vehicular Communications

- Aims to investigate how multi-band multi-antenna communications, including mmWave, could be integrated together with radar heads and other wireless sensors into the same telematics unit, so that transmission chains and radiation systems were reused using the same spectrum in an opportunistic manner

- Aims to investigate the future C-V2X systems based on 5G NR and how to integrate them with autonomous driving sensor systems.

- Design an optimum multi-antenna deployment for enhanced performance of the new hyper connected car concept

- Integrate Cellular-assisted Vehicular to Anything (C-V2X) protocols, basically NR Release 16 on (Releases 17 and 18 according to 3GPP current time plan), with autonomous driving sensor systems..

Work Package

WP1- Design and testing of mmW phased array MIMO antennas on vehicles

Goals of WP1 are to:

- Design mmW phased array MIMO antennas for 5G V2X communications based on the gap wave technology
- Develop cost-effective over-the-air (OTA) characterization methods and figures of merits reflecting system performance of phased array MIMO antennas at mmW, e.g., based on the spatial throughput coverage
- Devise guidelines on the deployment and OTA characterization of mmW MIMO antennas mounted on cars
- Provide channel models specific of mmW 5G V2X communications for the system characterization

Work Package

WP2: Enabling technologies for advanced data communication and cooperative sensing

Goals of WP2 are to:

- Ensure the interoperability of 5G V2X technology with existing and future cellular mobile communication systems, including seamless handovers (also between different associated/available 5G bands) and delay-tolerant networking among heterogeneous wireless networks

- Enhance the reliability of the 5G V2X network, supported by the interoperability and the design of asynchronous transmission modes operating with driving sensor systems, including necessary aspects like signaling and access protocols. Implications on the increased traffic will be also analyzed.

- Explore new cooperative localization methods and their subsequent resource allocation techniques based on 5G signal and network designs

- Study autonomous driving use cases, first based on system emulation and then on real factory integration.

Work Package

WP3: Hardware and protocol integration into a single telematics unit

Goals of WP3 are to:

- Modify current 5G chipsets for the specific use of IoT and 5G V2X communications, including Light RRC protocol configuration and MAC-specific solutions for opportunistic spectrum access and time synchronization with onboard autonomous driving sensors

- Explore new hardware solutions for radar and SoC integration into a single telematics unit, with hardware ECM check and specific casing

ESRs Goals

ESR1: Design and characterization of phased array for joint 3D Sensing and wireless communications at the mmWs dealing with the prototyping of a multi-antenna system for the hyper-connected car

ESR 2: OTA-aided design and characterization of transmit phased array MIMO solution on vehicles optimizing the performance of on-road operation. ESR 1 and 2 will be complementary to produce the antenna solution

ESR 3: Using the feedback from ESR1-2 deals with the design and fabrication of phased array antennas and packaging for automotive radar applications dealing with packaging and fabrication of the new antenna solution

ESR 4: Multi-band wireless propagation modelling for meshed 5G V2X scenarios in charge of the channel modelling required for the optimization of the 5G V2X communication with the new designed hyper-connected car.ESR4 will take requirements from ESR3 and report to WP2 for the system simulation

ESR 5: 5G NR based cooperative communication and localization needed to develop new sensors data management and fusion techniques for improved object detection

ESR 6: 5G enabling technologies for hybrid and interoperable 5G V2X/cellular networks allowing range extension dealing with the integration of legacy communication technologies. Basic feedback is location designed by ESR5.

ESRs Goals

ESR 7: Over the Air System Testing for Integrated Massive MIMO and Beamforming V2X Communications Systems dealing with the integration of Massive MIMO into real vehicles and the impact on beamforming techniques.

ESR 8: Assessment of the system via simulations under different relevant scenarios. Resource management. System simulator will be harmonized between ESR 5, 6 and 8, whereas ESR 4 channel models will be used.

ESR 9: Integration of sensoring into 5G V2X protocols for the modification of Release 16-18 5G V2X protocols under the condition of its soft integration in the car electronics. WP2 outputs will be considered for the protocols.

ESR 10: 5G chipsets for on-board autonomous driving sensors to produce a new generation of chipsets adapted to sensoring and 5G V2X communications. ESR 10 will use the protocol description coming from ESR 9.

ESR 11: New integrated telematics unit with sensor and communications capabilities for the prototyping of the new telematics unit. ESR 11 will use ESR 10 solution for the chipset.

ESR
Experience

ITN 5VC

Integrated Telematics for Next Generation 5G Vehicular Communications

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