

## SALVATORE TEDESCO

### RESEARCH PROFILE

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- Forward-thinking **researcher** with a strong background in novel **wearable technology** for healthcare and well-being applications integrating data science and machine learning resulting in > 70 peer-reviewed scientific publications and > 25 research projects.
- Excellent **team leader, manager, mentor**, team player and strong builder of prolific collaborations in different aspects of basic and applied research to industrial and research-oriented projects, which lead to > € 1.1 million in grant funding as PI and co-PI.
- Creative and self-motivated individual with the ability to work in a multi-disciplinary, multicultural environment with a unique combination of a **detail-oriented mindset, driven personality, analytical skills** and the proven ability to meet tight deadlines by working in a fast-paced work environment leading to original contributions in the wireless wearable sensors research area.

### EMPLOYMENT

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Since 04/2012    Senior Research Engineer – Team Leader of Wearable-AI Lab (since 04/2019)  
 Research Engineer (09/2012 – 04/2019)  
 Assistant (04/2012 – 08/2012)  
**TYNDALL NATIONAL INSTITUTE, UNIVERSITY COLLEGE CORK, CORK, IRELAND**

- **Managed** and led to a successful outcome several industrial and research-oriented projects collaborative focused on wearable technologies and machine learning, specifically in the area of healthcare and well-being
- Responsible for **leading a research team** of up to 8 people in the wearable and data analytics area
- Responsible for building the Human Motion Lab at the Tyndall National Institute, with lab equipment worth > 100k including sport equipment, inertial-based motion capture systems, pressure insoles, surface electromyography, pressure mat, force platform, video cameras, 10-camera full-body optoelectronics motion capture system, acoustic emission sensors, and various wearable physiological and physical activity sensors
- **Supervision** of junior researchers, **mentored** postgraduate/PhD students, supervised students thesis, managed and supervised research staff
- Experienced in **grant writing** and **development of national and international proposals for research funding** as a PI/technical coordinator/Co-PI
- Demonstrated research methodologies including planning, scheduling, resourcing, organization, conduction, and delivery of **research projects**, from specification design to final demonstration
- Supported senior management in the design and development of a research programme **strategy development**
- Close interaction with industry, research partners, and relevant stakeholders, as well as with Operations departments in Tyndall and UCC for supporting the work related to the programme of research, and with colleagues, students, and senior management

- Continuously engaged in training and professional development opportunities, as well as in **dissemination activities**, networking and outreach events addressing different audiences
- Engaged with the European research community to develop collaborative research, including coordinating, writing and submission of European research project proposals

09/2011-04/2012 Research Assistant  
**ELECTROMAGNETIC LAB LECCE (EML<sup>2</sup>), UNIVERSITY OF SALENTO, LECCE, ITALY**

## EDUCATION

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09/2017-02/2022 PhD in Electrical and Electronic Engineering  
**UNIVERSITY COLLEGE CORK, CORK, IRELAND**

Thesis: *"Smart Wearable Systems for Health and Wellness in Sports, Ageing, and Rehabilitation"*

Supervisor: Dr. Brendan O'Flynn, Co-Supervisor: Dr. Michael Walsh

Examiners: Dr. Benny Lo (Imperial College London), Prof. Tomas Ward (Dublin City University), Dr. Gordon Lightbody (University College Cork)

10/2008-07/2011 MSc in Telecommunications Engineering. Grade: 110/110 cum laude  
**UNIVERSITY OF SALENTO, LECCE, ITALY**

Thesis: *"Customized Ultra High Frequency Radio Frequency Identification Tags and Reader Antennas Enabling Reliable Mobile Robot Navigation"*

Supervisors: Prof. Luca Catarinucci, Prof. Luciano Tarricone

09/2005-10/2008 BSc in Information Technology Engineering. Grade: 110/110 cum laude  
**UNIVERSITY OF SALENTO, LECCE, ITALY**

Thesis: *"A Ternary Detection Test for Adaptive Radar Detectors in Presence of Steering Vector Mismatch"*

Supervisors: Prof. Francesco Bandiera, Prof. Giuseppe Ricci, Co-Supervisor: Prof. Danilo Orlando

## GRANTS

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### As PI:

1. Title: New Connections Research Grant Award (2022-2023)  
Source: College of Science, Engineering, and Food Science, UCC  
Amount: € 3,600
2. Title: Wearable Sensors for Determining Ground Reaction Forces (2017-2019)  
Source: Innovation Partnership Enterprise Ireland (IP 2017 0606)  
Amount: € 166,410
3. Title: Wearable Sensors for Determining Ground Reaction Forces (2017-2019)  
Source: Setanta College, Ltd (IP 2017 0606)  
Amount: € 32,694
4. Title: SKYRE - Smart Knee System for at Home Rehabilitation (2017-2019)  
Source: Commercialisation Fund Enterprise Ireland (CF-2017-0685-P)

Amount: € 380,593

5. Title: Kneehabilitation - Low Cost Wearable System for Physio Post Knee Surgery (2015-2016)  
Source: Feasibility Study Enterprise Ireland (CF-2015-0383-Y)  
Amount: € 15,000

**As Co-PI:**

6. Title: New Connections Research Grant Award (2022-2023)  
Source: College of Science, Engineering, and Food Science, UCC  
Amount: € 3,500
7. Title: DemenPred – AI-based Dementia Prediction (2022-2023)  
Source: INSIGHT – SFI Research Centre for Data Analytics  
Amount: € 31,894 (overall budget € 50,000)
8. Title: Implementation of a Frailty Care Bundle for Older Adults in Acute Care (2019-2021)  
Source: Health Research Board  
Amount: € 13,220 (overall budget € 244,964.89)
9. Title: HOLISTIC - Holistic Human Sensing for Health and Wellness (2019-2022)  
Source: Disruptive Technologies Innovation Fund Enterprise Ireland  
Amount: € 486,477 (overall budget € 9,968,293)

**As Consultant:**

10. Title: Biomechanical Assessment of Ostomy Bags (2021-2022)  
Source: TG Eakin Ltd  
Amount: € 14,058
11. Title: AI Models for Carers' Health Prediction (2021-2022)  
Source: University of Limerick  
Amount: € 15,000

**As Grant Contributor / Collaborator:**

12. Title: ICEEED – Insightful Movement for Climate Change Education: Engaging and Empowering through Dance (2023 - 2024)  
Source: INSIGHT – SFI Research Centre for Data Analytics  
Amount: € 20,000
13. Title: Precision Diagnosis and Dosing via Wearable Motion Detection Sensors (2020 - 2022)  
Source: Innovation Partnership Enterprise Ireland and Abbvie, Inc.  
Amount: € 576,329
14. Title: IMPAQT – Intelligent Management System for Integrated Multi-trophic Aquaculture (2018 - 2021)  
Source: H2020  
Amount: € 412,925
15. Title: 3D Hand Tracking via Lensless Smart Sensors (2016 - 2017)  
Source: Science Foundation Ireland and Rambus, Inc.  
Amount: € 200,000

**Travelling Grants:**

16. Event: H2020 "FENASTRA" Project Coordination Meeting (2018)  
Source: Enterprise Ireland (FP 2018 0149)  
Amount: € 550
17. Event: ICT Proposers' Day 2017 (2017)  
Source: Enterprise Ireland

Amount: € 1,100

## RESEARCH EXPERIENCE

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- 1. Wearable Sensors for Mental Health, 2023 - ongoing**

This project explored the adoption of wearable sensors in the psychiatry domain for the evaluation of physical activity in subjects with mental health conditions undergoing interventions. The project was completed in collaboration with the Department of Psychiatry at the University of Limerick, the Department of Psychiatry at the University College Cork, the Cork University Business School, and the APC Microbiome Ireland SFI Research Centre.
- 2. ICEEED – Insightful Movement for Climate Change Education: Engaging and Empowering through Dance, 2023 - ongoing**

This project investigated how to seamlessly integrate dance movement, storytelling, wearable technology sensors and data analytics in a format that the public can find engaging, and which is transportable to public events as part of INSIGHT Education & Public Engagement activity. The project was funded by the SFI Research Centre for Data Analytics.
- 3. Optimization of Process Flows, 2023 - ongoing**

This project investigated the development of asset tracking tools on production floors in industrial settings. The project was funded by Boston Scientific and the SFI Research Centre for Smart Manufacturing.
- 4. Cuff-less Blood Pressure Monitoring across Cognitive States, 2023 - ongoing**

This project investigated the cuff-less estimation of blood pressure across multiple cognitive states via a wearable prototype system developed at the Tyndall National Institute.
- 5. CONFIRM – SFI Research Centre for Smart Manufacturing, 2023 - ongoing**

The research funded by the SFI Research Centre for Smart Manufacturing culminated in a series of projects exploring the adoption of wearable sensors and machine learning models for fatigue detection in workers involved in industry 4.0 settings.
- 6. New Connections Research Grant Award, 2022 - ongoing**

This project investigated the adoption of motion capture technologies (an optoelectronic system and a sensing-based smart glove) to acquire and preserve fine motor movements associated with handwriting practices. The project was funded by University College Cork and was completed in collaboration with the School of Computer Science and Information Technology.
- 7. New Connections Research Grant Award, 2022 - ongoing**

This project explored the adoption of wearable sensors in two clinical domains: psychology (e.g., during the provision of a Cognitive Behaviour Therapy intervention for service users with a diagnosis of First Episode Psychosis) and oncology (e.g., cancer-cachexia). The project was funded by University College Cork and was completed in collaboration with the School of Food & Nutritional Sciences and the School of Applied Psychology and the Department of Psychiatry.
- 8. DemenPred – AI-based Dementia Prediction, 2022 - ongoing**

This project explored the development of AI models for the prediction of dementia in the ageing population. The project was completed in collaboration with Dundalk Institute of Technology (DKIT) and funded by the SFI Research Centre for Data Analytics.

9. **VistaMilk – SFI Research Centre for Agri-Food and Dairy Production, 2021 - ongoing**  
The research funded by VistaMilk culminated in a project investigating the adoption of machine learning and deep learning for accurate and robust identification of chipless RFID tags to be used in agri-tech applications.
10. **Machine Learning-based Canine Posture Estimation, 2021 - ongoing**  
This project investigated the adoption of inertial sensors for canine posture recognition tasks involving static postures (standing, sitting, lying down) and dynamic activities (walking, body shake). The project was supported by the Irish Guide Dogs for the Blind.
11. **Biomechanical Assessment of Ostomy Bags, 2021 - 2022**  
This project investigated the kinematics of ostomy pouches during activities of daily living that will enable the development of a bench test rig to accurately replicate torso movements and skin deformation in absence of human participants. The project was funded by TG Eakin Ltd.
12. **CRT AI – SFI Centre for Research Training in Artificial Intelligence, 2021 - ongoing**  
The research funded by the SFI Centre for Research Training in Artificial Intelligence culminated in a project investigating the adoption of wearable sensors and AI for the management of chronic migraine.
13. **AI Models for Carers' Health Prediction, 2021 - ongoing**  
This project explored the adoption of machine learning models for health status prediction in carers. The project was funded by the University of Limerick.
14. **Precision Diagnosis and Dosing via Wearable Motion Detection Sensors, 2020 - 2022**  
This project investigated the development of a wearable system for the objective assessment of Parkinsonians' symptoms and physiological monitoring via wearable sensors and machine learning models. The project was funded by Abbvie Inc. under the Enterprise Ireland Innovation Partnership.
15. **Implementation of a Frailty Care Bundle for Older Adults in Acute Care, 2020 - 2022**  
This project explored the use of an ankle-worn accelerometer for the accurate estimation of steps with the aim to evaluate the effects of a specific intervention on a cohort of older adults in acute care. The project was completed in collaboration with University College Cork (School of Nursing & Midwifery) and was funded by the HRB.
16. **HOLISTIC - Holistic Human Sensing for Health and Wellness, 2019 - 2022**  
This project investigated the development of a holistic solution for the remote evaluation of hamstring injuries in sport athletes via wearable EMG-based smart garments. The project is part of the Disruptive Technologies Innovation Fund and was funded by Setanta College Ltd., Enterprise Ireland and DBEI.
17. **Insight – SFI Research Centre for Data Analytics, 2019 - ongoing**  
The research funded by the SFI Research Centre for Data Analytics culminated in a series of projects exploring the adoption of wearable sensors and machine learning models for rehabilitation, orthopedics, and biomechanics.

18. **Smart sENsor Devices fOr rehabilitation and Connected health (SENDoc), 2018 - 2021**  
This project investigated the use of wearable sensor systems in ageing communities living in sparsely populated areas. Targeted use cases included Parkinson's disease monitoring, fall prediction, mortality prediction, and home rehabilitation. The project was completed in collaboration with Ulster University, Umea University, Karelia University of Applied Sciences, and University College Cork (Centre for Gerontology and Rehabilitation) and funded under the NPA INTERREG Programme.
19. **Estimation of Ground Reaction Forces in Athletes via Wearable Systems, 2018 - 2019**  
This project explored the development of a wearable solution for the accurate estimation of ground reaction forces in athletes during running via machine learning and biomechanics models. The project was funded by Setanta College Ltd. under the Enterprise Ireland Innovation Partnership.
20. **Smart Knee System for at-Home Rehabilitation (SKYRE), 2017 - 2019**  
This project explored the development of a multi-sensor wearable solution for the real-time motor assessment of lower-limbs during rehabilitation in subjects following ACL reconstruction, leveraging a mobile application for enhancing patients' compliance and motivation. The project was funded under the Enterprise Ireland Commercialisation Fund.
21. **Integrated Technology Systems for ProACTIVE Patient Centred Care (ProACT), 2016 - 2019**  
This project investigated the adoption of consumer-level activity trackers in an older adults cohort, and the quantitative evaluation of mainstream trackers in young and older adults cohorts both in lab-controlled and home environments. The project was completed in collaboration with 11 partners and funded under the EU H2020 Programme.
22. **3D Hand Tracking via Lensless Smart Sensors, 2016 - 2017**  
This project investigated the implementation of a real-time 3D hand tracking system for gesture recognition through machine learning approaches via lensless smart sensors. The project was funded by Rambus, Inc. under the SFI CONNECT Centre.
23. **VR Glove, 2015 - 2017**  
This project had a twofold aim: the development of accurate real-time inertial and magnetic sensors-based algorithms for the 3D assessment of hand joint kinematics through glove-like devices for gaming and VR applications, and the implementation of a mathematically efficient embedded magnetic calibration routine implemented on the device's microcontroller. The project was completed in collaboration with the Telecommunications Software & Systems Group (now Walton Institute) at the Waterford Institute of Technology and was funded under the Enterprise Ireland Commercialisation Fund.
24. **Smart Ring, 2015 - 2015**  
This project aimed at developing an inertial sensors-based ring-sized wearable system for health and well-being applications.
25. **Kneemetrics - Smart Knee, 2014 - 2017**  
This project was a combination of smaller sub-projects which aimed at developing an inertial sensors-based system for monitoring knee joint angles and spatio-temporal parameters in patients involved in rehabilitation procedures during walking and specific rehabilitation tasks.

The project culminated in the engagement with German-Serbian software SME Nissatech Innovation Centre as part of an EU H2020 Gateone project for the implementation of a demonstrator presented at IoT Planet 2016, Grenoble, France.

**26. Sensor Technologies for Enhanced Safety and Security of Buildings and its Occupants (SAFESENS), 2014 - 2017**

This project had a twofold aim: the development of a real-time 3D indoor tracking system solution for first responders involved in search & rescue operations based on UWB and inertial sensing data, and the development of inertial sensors/barometer-based machine learning models for first responders'-oriented human activity recognition. The project was completed in collaboration with United Technologies Research Centre and funded under the ENIAC Joint Undertaking Programme and by Enterprise Ireland

**27. Grasp Wearable Technologies, 2013 - 2014**

This project explored the development of an accurate real-time embedded inertial sensors-based system for monitoring runners' technique and performance (via spatio-temporal gait parameters) in open field. The project was funded under the Enterprise Ireland Commercialisation Fund and resulted in a start-up built around the developed system.

**28. Fully-Coupled Hybrid UWB/IMU System, 2012 - 2014**

This project investigated the use of Decawave UWB boards as a means for the transmission of inertial sensing data, and the design of a fully-coupled hybrid UWB/IMU system for 2D indoor positioning

**29. Dementia Ambient Care: Multi-Sensing Monitoring for Intelligent Remote Management and Decision Support (Dem@Care), 2012 - 2013**

This project explored the development of an inertial sensors-based personal health system consisting of three body-worn motion sensors for monitoring daily activities (activity/inactivity periods, steps detection, body posture) in subjects with dementia. The project was completed in collaboration with Dublin City University as part of the FP7 EU Programme and SFI CLARITY Centre

## **HONORS AND AWARDS**

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1. Winner of the Tyndall Annual Recognition Award (TARA) for Early-Career Researcher of the Year 2022
2. Finalist to the AI Awards Ireland 2022 (Category: "Best Application of AI in an Academic Research Body") in collaboration with Ulster University
3. Finalist to the AI Awards Ireland 2021 (Category: "Best Application of AI in an Academic Research Body") for Wearable AI
4. Winner of the "Excellent Paper Presentation" Award for the paper "Real-Time 3D Magnetometer Calibration for Embedded Systems Based on Ellipsoid Fitting" (Authors S. Tedesco, J. Torres-Sanchez, B. O'Flynn) presented at the IEEE International Conference on Sensing Technology (ICST) 2018, December 4-6, 2018, Limerick, Ireland
5. Winner of the "Best Business Idea" at Start-Up Lab at UCC - Spring 2018
6. Winner of the "Technology Ireland Software Industry Awards 2017 - Outstanding Academic Achievement of the Year" for the work developed in the project "VR Glove". The winning system was then showcased at CES 2018 - the Consumer Electronics Show - in Las Vegas on 9-12 January 2018
7. Winner of the "UCC Bridge Network Invention of the Year Award 2017 - Category Engineering, ICT & Physical Sciences" for the work developed in the project "Kneemetrics"