## ROLE PROFILE

**Job Title:** Marie Skłodowska-Curie Fellow – Early Stage Researcher 5 (ESR) “SmartEcoTRACK” in SMARTI ETN  
**School/Department:** Nottingham Engineering Transportation Centre/Civil Engineering  
**Job Family and Level:** Research and Teaching Off scale  
**Contract Status:** This post will be offered on a fixed-term contract until the 28th February 2021.  
**Hours of Work:** Full time – 36.25 per week  
**Location:** Pavement Engineering Building, University Park, University of Nottingham  
**Reporting to:** Davide Lo Presti and Andrew Dawson

### Purpose of the New Role
The role is to conduct research and data analysis and to participate in a European network and training programme. The project is entitled: “SmartEcoTRACK” - Smart and Sustainable solutions for Railway trackbeds”. As part of a research team, the successful candidate will plan and carry out research in this area, as well as undertaking appropriate training and development, which may include preparing a PhD. These efforts will be pursued in the framework of the Marie Skłodowska-Curie European Training Network “SMARTI” (Sustainable Multi-functional Automated Resilient Transport Infrastructures). SMARTI ETN brings together a stimulating platform where the stakeholders of the transport infrastructure sector will work alongside world-wide experts in smartening of systems (developers of high-tech sensors, advanced monitoring equipment, automated structures, etc..) with direct support from the roads, railways and airports managers. As a result, SMARTI ETN will create a new generation of highly-skilled and appealing PhD professionals that will be in great demand in this rapidly expanding field and will benefit Europe and developing countries.

### Background
The world’s transport network has developed over thousands of years; emerging from the need of allowing more comfortable trips to roman soldiers to the modern smooth roads enabling modern vehicles to travel at high speed and to allow heavy airplanes to take off and land safely. However, in the last two decades the world is changing very fast in terms of population growth, mobility and business trades creating greater traffic volumes and demand for minimal disruption to users, but also challenges such as climate change and more extreme weather events. At the same time, developments in Intelligent Transport Systems, vehicle design, mobile and wireless communications and sensor technologies continue apace1. It is within this environment and in close consultation with key stakeholders, that this consortium developed the vision to achieve the paradigm shift to SMARTI: Sustainable Multi-Functional Automated and Resilient Transport Infrastructures.

### Summary/Objectives
The overall goal is to develop a technique for harvesting energy from trains to be used for Structural Health Monitoring (SHM). The ESR5 project (SmartEcoTRACK) will be developed alongside the ESR7 project (SmartEcoPAVE) which is looking at harvesting energy from road asphalt pavements with the purpose of using this power to perform SHM of road pavements. The ESR7 is now in the development phase of the concept and will start working on a prototype for this instrumented asphalt layer in the second part of 2019. Railways can use asphalt in a layer underneath the sub-structure (sub-ballast layer) and having the chance to equip this layer with SHM capabilities will be of great help for infrastructure managers. The research will focus on developing this technology with the aim of improving design practices as well as improving railway asset management.

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Training context
The research is carried out within the framework of the Marie Curie European Training Network ‘SMARTI’ with opportunities to join network wide training events and international collaboration. The candidate will work within the SMARTI Prototypes work package that will investigate innovative transport infrastructure prototypes for roads, pavements and airports. Furthermore, the candidate will benefit from collaborative research with 14 similar research positions in the network.

The project will be developed through planned international collaborations with international partners. The University of Nottingham will provide their expertise with railway trackbeds design, sustainable engineering, energy harvesting concepts and materials. IFSTTAR and EIFFAGE, AECOM will be available to provide their expertise on monitoring of railway track-beds, site visits, constraints on engineering. PIEZONIX and AI3P will provide support with sensing technologies. Secondments are an integral part of the training programme, and will take place at industrial or academic partner institutions within the UK and EU.

The successful applicant will be recruited as staff member at The University of Nottingham with the probable option of also register for a 3 year PhD at the same institution. The total funding available for the position is in line with the Marie Curie ETN Scheme, and comes to €37320 per year for 21 months. This amount will be multiplied by a country factor and on top an extra allowance will be available to cover mobility expenses. It is the intention to assist the successful applicant in applying for a scholarship to allow him/her to complete PhD studies from month 22 until month 36, but (if successful) the funding would almost certainly be at a lower, but tax-free, rate.

Requirements
Applicants will be considered on an equal basis, subject to the relevant permission to work in the UK as defined by the requirements set out by the UK Border and Immigration Agency. Please visit http://www.ukba.homeoffice.gov.uk/ for more information.

The successful applicant will be required to satisfy the eligibility criteria for Marie Curie Early Stage Researchers, i.e:
- Must not already hold a PhD;
- Must be within the first four years (full-time equivalent) of their research career;
- Must not have resided or carried out their main activity (work, studies, etc.) within the UK for more than 12 months in the three years immediately prior to their recruitment.

<table>
<thead>
<tr>
<th>Main Responsibilities</th>
<th>% time per year</th>
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<tbody>
<tr>
<td>1. Laboratory work on asphaltic materials, Modelling and data analysis</td>
<td>50%</td>
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<td>2. Research on data acquisition and management</td>
<td>20%</td>
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<td>3. Training as per the Marie Skłodowska-Curie European Training Network “SMARTI” training programme</td>
<td>15%</td>
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<td>4. Presentation of activities to other SMARTI participants and others</td>
<td>5%</td>
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<td>5. Assisting with related research activities and supporting students involved with them</td>
<td>5%</td>
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<tr>
<td>6. Preparing reports and research publications</td>
<td>5%</td>
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Knowledge, Skills, Qualifications & Experience

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<tr>
<th>Qualifications/ Education</th>
<th>Essential</th>
<th>Desirable</th>
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<tr>
<td>• Masters level education in engineering or applied mathematics</td>
<td>• Programming skills</td>
<td></td>
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<tr>
<td>• English native speaker / recent certification in English to IELTS level 6 with minimum 5.5 in any part</td>
<td>• Finite Element modelling</td>
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| Skills/Training | | |
|-----------------|-----------------|
| • Programming skills | • Finite Element modelling |
Experience

- Laboratory experience with asphalt mixes
- Data analysis including statistical approaches
- Practical laboratory / workshop experience / data analyst
- Acquainted with structure monitoring and/or sensing system

Personal Qualities

- Inquisitiveness
- Self-motivation
- Flexibility
- Team player

Statutory/legal

- Eligibility criteria for Early Stage Researchers in Marie Skłodowska-Curie ETN Programmes

Additional Information

**Apply for this position via the following link:** smartietn.eu

Any question on this specific project, contact Dr Davide Lo Presti, Davide.Lopresti@nottingham.ac.uk and Andrew Dawson, Andrew.dawson@nottingham.ac.uk

Please note that applications sent directly to these email addresses will not be accepted.

Further information is available at [http://ec.europa.eu/research/mariecurieactions/](http://ec.europa.eu/research/mariecurieactions/)

**Appendix 1**

**The University of Nottingham**
The University of Nottingham is a global-leading, research-intensive university with campuses in the UK, Malaysia and China. Our reputation for world-class research has yielded major scientific breakthroughs such as Nobel-winning MRI techniques, drug discovery, food technologies and engineering solutions for future economic, social and cultural progress.

Already ranked among the UK’s elite universities and global polls for research excellence, our reputation for world-class research has been further enhanced with the 2014 results of the Research Excellence Framework (REF). In addition to scoring highly in quality rankings covering major disciplines in science, engineering, the social sciences, medicine, business and the arts, it is Nottingham’s research power rankings which demonstrate the impressive volume of excellent research which is carried out. We are now ranked 8th in the UK on a measure of ‘research power’ which takes into account both the quality of research and the number of research-active staff who made REF returns, confirming Nottingham’s place in the top tier of the world’s elite higher education institutions. The main University campus is set beside a lake, in an extensive belt of woodland, parks and playing fields. The 330 acre University Park Campus is the focus of life for more than 32,000 students and houses the majority of the University’s academic schools and many of the central Services. The Jubilee campus is situated 2 miles away from the University Park, and provides extra capacity. The School of Sociology & Social Policy is situated on University Park.

**Nottingham Transportation Engineering Centre**
At the Nottingham Transportation Engineering Centre (NTEC) we evaluate the engineering, environmental and sustainable aspects of elements of road, rail, dock and airfield infrastructure. We perform laboratory assessment of materials that construct pavements, and we are concerned with the sustainability of transportation infrastructure, risks associated with the use of transportation networks (e.g. aircraft safety or road congestion) and the management and maintenance of the infrastructure asset.

Our research in pavement engineering has expanded since its inception in 1954 to embrace all pavement materials, design, evaluation and management. From beginnings in road asphalt, research now extends to:

- Dock, airport and rail pavements
- Wider transportation infrastructure
- Asset management and maintenance
- Risk analysis and reduction in transportation systems
Congestion avoidance

To find out more: http://www.nottingham.ac.uk/research/groups/ntec/index.aspx

Nottingham
Central within the East Midlands, Nottingham is a vibrant and prosperous city with something to offer everyone. It is one of the UK’s leading retail centres and has a huge variety of restaurants, bars and nightclubs which attract people from all over the UK. Culturally, it has good theatres, an arena which attracts both national and international performers and a range of historical interests relating to subjects such as the lace industry, Lord Byron and DH Lawrence. Nottingham is also known for sport, being the home of Trent Bridge Cricket Ground, Nottingham Forest and Notts County Football Clubs, the National Water Sports Centre and the Nottingham Tennis Centre. There is a good network of roads with easy access to the M1 and the A1, a fast frequent rail service to London and other major cities. Nottingham East Midlands Airport is only eighteen miles away. The city is set within a county of outstanding natural beauty which includes Sherwood Forest, Wollaton Park, lively market towns and wonderful historic buildings. Housing is relatively inexpensive and, in addition to the two Universities, there are excellent schools and colleges available.

To find out more about Nottingham, use the following links:
Nottingham County Council – Tourism http://www.experiencenottinghamshire.com/
University of Nottingham http://www.nottingham.ac.uk
Zoopla (Guide to local properties) http://www.zoopla.co.uk/