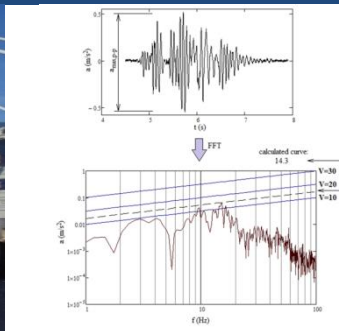




TRUSS
www.trussitn.eu

TRUSS (Training in **R**educing **U**ncertainty in **S**tructural **S**afety) is a Marie Skłodowska-Curie Innovative Training Network funded by the European Union under the Horizon 2020 Programme. TRUSS is structured into taught modules combined with original and impactful research supported by secondments that will give the successful candidates significant insights and exposure to research and innovation in both academia and industry.

EARLY STAGE RESEARCHER VACANCY:
ESR 10



Project Title:
**ASSESSMENT OF BRIDGE
CONDITION AND SAFETY BASED
ON MEASURED VIBRATION
LEVEL**

Host

Universitat Politècnica de Catalunya (UPC)

Address

School of Civil Engineering; c/Jordi Girona 1-3. Campus Nord. Modul C1; 08034 Barcelona

Country

Spain

Main Supervisor

Prof. Joan Ramon Casas

Background

Bridge condition is commonly related to the dynamic parameters of the bridge (natural frequencies, mode shapes and damping). However, environmental conditions and concrete age have been identified as main drawbacks of using dynamic parameters for bridge inspection and health monitoring. In addition, *as the changes in natural frequency and modal amplitude are related to changes in the stiffness and mass, the changes of these parameters can give only information on the condition of the structures, but not on the actual safety.* Some authors have correlated the degree of damage in actual buildings with the vibration intensities deduced from accelerations measured close to the damaged regions. **TRUSS will extend this research by relating the level of vibration due to normal traffic action to the condition index and safety of the tested bridges.** For the group of bridges selected, a visual inspection will be carried out to obtain a condition index based on standard methods. Also, based on the available information of the bridges (dimensions, materials, etc) the safety to Ultimate Limit States (bending and fatigue) will be computed



and measured in terms of the reliability index. Afterwards, a dynamic test will be performed aiming to obtain the vibration intensity for different vehicles at different speeds and also for the normal traffic in the bridge. Several definitions of vibration level (vibrars, peak-to-peak acceleration, etc) will be checked and compared to the condition and reliability indices and the correlation between them will be obtained. Finally, a set of plots relating the measured vibration level with the condition and reliability index will be proposed for several types of bridges (simply supported, continuous).

In addition, the use of existing data-bases with available dynamic records for tested bridges will be investigated in order to obtain a large group of bridges for the study.

Objectives

Based on promising results obtained in buildings, this project seeks the feasibility of using, not dynamic parameters (natural frequencies, damping, modal amplitudes), but actual vibration level to assess both the condition state and safety of existing bridges and other structures. This works aims to find such relations for different bridge types, mainly in the range of short to medium span-length. As a first step, a group of bridges will be identified as the most representative of the overall population of bridges in a highway or railway network.

Expected Results

Tools to assess bridge safety based on **the correlation between the level of vibration** due to normal traffic action **and the condition index and safety** of the investigated bridges.

Secondment

This position involves a secondment of some months to *COMSA*. Proficient engineers with in-depth knowledge of bridge design, construction and management will provide the basic knowledge of normal inspection and maintenance of bridges. Also, thanks to the background of some of the partners in the Action, training on equipment, signal conditioning, signal analysis and interpretation will be provided. Therefore, the ESR will have access to the whole process of design, testing and operation of a monitoring system on a real structure, including data analysis for the project.

Specific Requirements

- At the date of closure of appointments, candidates must have obtained, or finalize within 3 months, a Master's degree in Engineering, with a strong background in Structures.
- Knowledge of the basics on bridge design, construction and dynamic performance will be also desirable
- Prior knowledge and skills in programming for structural analysis are desirable but not mandatory.
- We are looking for candidates with a strong motivation to pursue a career in engineering and an open mind for new approaches and a lot of team spirit. Creativity and level of independence will be considered.
- Solid written and oral communication skills in English are prerequisites of any successful

application.

Eligibility Criteria

- Researchers can be of any nationality and age.
- All recruited researchers **must be Early-Stage Researchers (ESRs)**. A ESR shall, at the time of recruitment by the host organisation, **be in the first four years of their research careers** and not yet have been awarded a doctoral degree. The four years start to count **from the date when a researcher obtained the degree which would formally entitle him/her to embark on a doctorate**.
- Researchers are required to undertake transnational **mobility** (i.e. move from one country to another) when taking up their appointment. One general rule applies to the appointment of researchers: **At the time of recruitment by the host beneficiary, researchers must not have resided or carried out their main activity (work, studies, etc.) in the country of their host beneficiary for more than 12 months in the 3 years immediately prior to the reference date. Note that the *mobility* rule applies to the beneficiary where the researcher is recruited, and not to beneficiaries to which the researcher is sent or seconded.**
- For all recruitments, the eligibility and mobility of the researcher will be determined at the time of their (first) recruitment in the project. The status of the researcher will not evolve over the life-time of a contract.

Salary and Working Conditions

- Each position is for a period of 36 months. These positions will be available from August/September, 2015. The Marie Skłodowska-Curie programme offers highly competitive and attractive salary and working conditions. Exact salary will be confirmed upon appointment. It consists of a living allowance (= 37320 euro/year [the Marie Skłodowska-Curie rules apply a correction factor to this amount to allow for the cost of living in different countries]) + a monthly mobility allowance (= 600 to 1100 euro/month depending on the family situation).
- Furthermore, PhD tuition fees for the ESR are covered and the research project is aimed at defending a thesis and obtaining a PhD degree. In addition to their individual scientific projects, all positions will benefit from further continuing training, which includes internships and secondments (All ESRs will be seconded at least once during this period at another partner site), a variety of training modules as well as transferable skills courses, active participation in workshops and conferences, and exposure to large enterprises, SMEs and Universities from different European countries involved in TRUSS.

Application Procedure

- (1) Check you meet **Eligibility criteria** and **Specific requirements for the ESR position** project/s you are applying for.
- (2) Prepare the following **application documents** (in English):
 - a. **A curriculum vitae**, including contact details, education (at University level and other), work experience, prizes/awards, language skills, etc... (max. 2 pages). The



CV should reflect a representative array of achievements and qualifications appropriate to the post for which application is being made.

- b. **Official academic record** of undertaken courses & grades for Bachelor (and Master if required in specific criteria) degree.
 - c. **A motivational letter** in which the applicant describes his or her motivation to pursue postgraduate studies and to conduct the research project/s applied for. Mention the ESR project number or numbers (in the latter indicate order of preference if any) on your motivational letter and the subject of the email.
 - d. **A reference letter.**
- (3) Email your application documents as attached files to: trussitn@ucd.ie **before the 1st May 2015 deadline** and mention the ESR project number/s you are applying for in the subject line.
- (4) The documents provided will be used to select the best candidates. Successful candidates will be informed **before 29th May 2015**.

For more information on a position with TRUSS, please check www.trussitn.eu/vacancies or email trussitn@ucd.ie