

# UCD Performance Engineering Laboratory

## Software Engineering / Telecommunications Systems

**Funded PhD Scholarships available:** A tax-free stipend between €16,500 and €19,000 a year is available, as well as fully paid tuition, equipment and conference expenses. The studentships will involve the candidates working closely with the industry partners to address realistic problems and develop appropriate solutions. The ability to integrate the candidate's research with the relevant industrial research and development teams will be an important element in the successful delivery of this research. Your application should consist of a CV with a list of subjects (with marks and averages) - email to Prof. John Murphy ([j.murphy@ucd.ie](mailto:j.murphy@ucd.ie)).

### **Smart Routing and Data Management Systems** (<http://www.lero.ie/project/traffic>)

Existing intelligent infrastructure management solutions provide limited information to update central controllers and end-users about the current status of their environment. Typically all users in the same geographical area receive the same information and hence make the same decisions resulting in non-optimal operation, and potentially some of the information could be dated. A key aspect is the design of the communications infrastructure and protocols to allow reliable communication between end-users and the core system for data collection and delivery.

### **Robust Testing of Cloud Infrastructures** (<http://www.lero.ie/project/rte>)

Currently much time is spent in setting up system tests, trying to understand exactly what is being tested, understanding errors that occur during tests, and verifying the test results. These issues can be especially difficult for distributed enterprise applications made up of a large number of software components that run on a collection of heterogeneous servers or cloud environments. Load generation for accurate simulation of complex user behaviour is a growing challenge when testing large-scale critical systems.

### **Energy Efficiency in Large Environments** (<http://www.lero.ie/project/mule>)

Understanding organization-wide hardware utilization is currently a difficult challenge for industry. Current monitoring tools tend to focus on monitoring critical servers and databases and have not been designed to scale to manage entire IT infrastructures including desktops, laptops, servers, routers etc. This is an issue for many different domains (e.g. organizations with large IT infrastructures, cloud computing providers) where an understanding of how computer hardware is being utilized is essential for understanding business costs and future investment requirements. This research proposes to investigate, develop and deliver a solution to track utilization and efficiency of assets in heterogeneous environments.

### **Expert Tools for Root Cause Analysis** (<http://www.lero.ie/project/rca>)

Enterprise applications typically can contain millions of objects and thousands of different types. A major issue in relation to these systems is that very often performance issues can occur during development and/or when the system is in production. These issues can lead to increased cost during the application development cycle and lost revenue in production. The aim of this research is to improve on current software tools that assist with monitoring, analysing and improving system performance.

### **Mobile Femtocell Handover in Public Transport Networks**

Femtocells are currently being deployed by a large number of mobile telecom operators in order to improve network coverage and increase network capacity. These deployments are primarily limited to customer's homes and connect to the operator's core network via fixed broadband links. However, as the popularity of femtocells increases, operators will seek new use cases in which femtocells can be used to further enhance user experience while minimising network load. This research would focus on developing new use cases and mechanisms to enhance and support the realization of multi-radio femtocells potentially using heterogeneous radio access networks.

### **Scalable Video on Demand Service Provisioning System: A Peer-to-Peer Approach**

The objective of this research is to investigate a solution that leverages the tremendous uplink bandwidth/storage capacities available at STBs (Set-Top-Boxes) operated by a broadband provider in order to build a cost-effective VOD architecture. It will target the improvement of the process of allocating contributing STBs for each incoming VOD request and therefore help determine the best strategy in picking the most appropriate contributing STBs and it will improve the reliability of the multi-source streaming system to make it a viable alternative to conventional point-to-point streaming usually employed by video services provider.

### **Wireless Mesh Network for Performance Assurance in Traffic Information Systems**

Future Traffic Management Systems will investigate a global vehicular traffic information management that further bridges the gap between intelligent vehicular on-board units and the increasingly sophisticated stand-alone metropolitan traffic control systems. Enabling performance assurance by such systems in terms of cleaner, environmentally friendlier, safer and smarter mobility is the target. The objective of this research is to investigate how Wireless Mesh Networks can be used as a basis for the scalable distribution and consumption of vehicular traffic information to enable such performance assurance.