Special theme:

Towards Green ICT

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Route Optimization: How Efficient will the Proposed North Dublin Metro Be?

by John R. Walsh

In November 2005, the Irish government presented its ‘Transport 21’ plan for the future of transport infrastructure in Ireland. The largest prospective capital investment to date in Ireland and occurring under the auspices of the National Development Plan, the work was anticipated to occur over the period 2006 to 2015.

The single largest element, the construction of a metro system for the greater Dublin area, is yet to commence. The plan comprises two metro lines: Metro North linking the city centre with the airport and continuing to north county Dublin, and Metro West, linking outer Dublin centres Tallaght, Clondalkin, Liffey Valley and Blanchardstown, with connections through the city centre, to the Metro North and existing rapid transit (Luas Red line). Metro West is presently at the stage of designing lines and stops, whilst Metro North is reported to be at the ‘permission to build and operate’ stage.

The Metro North line presents interesting features: consisting of underground, surface and elevated tracks over a total length of 18 kilometres, 15 initial stops are planned, with some future additions anticipated. In the current economic climate, cost estimates ranging from €3-6 billion are inevitably a serious concern (for commercial reasons, the Rail Procurement Agency has not disclosed expected costs in full). A framework for modelling impact scenarios is essential.

In earlier stages of the project, route options and the effect on properties in the vicinity of the line were identified, both during and after construction. This was supported by work of the Dublin Transport Office (DTO), using SATURN models of optimal flow across the road traffic network. SATURN (Simulation and Assignment of Traffic in Urban Road Networks) is...
Energy-Optimized Electrical Systems for Land Transport Using Batteries and Supercapacitors: TRANS-SUPERCAP

by Paul Borza, Ana Maria Puscas and Marius Carp

The ‘TRANS-SUPERCAP’ project plans to optimize the energy use, operation, reliability and availability of locomotives and automobiles by redesigning the electric starting systems of the internal combustion engine. This is done using combinations of batteries and ‘stacked’-type supercapacitors provided by new nanotechnology.

It is known that energy storage and mobile energy sources are critical elements for powered systems. Existing energy storage devices do not satisfy all modern requirements, especially when a device must demonstrate high performance and be energy efficient. The TRANS-SUPERCAP national research project, currently under development at the ‘Transilvania’ University of Brasov, will demonstrate that a satisfactory compromise can be reached by combining energy sources (batteries), rapid-release storage devices (high voltage [9F/110V]), aqueous stacked supercapacitors) and an intelligent control system.

This project proposes the research and development of an, energy-efficient electric starting systems with a long lifespan. These will use a combination of battery and supercapacitors, adjusted according to the load, using power-switching devices controlled by an embedded system. This latter system will control the power flow transfer between the source and the load by monitoring and anticipating the demand from the load side, in order to optimize the energy efficiency of the whole system. This implementation allows not only energy and material consumption but also environmental pollution to be reduced.

The project will work toward a deeper understanding of the transient phenomena occurring into the whole system, in energy and power sources, ICE (internal combustion engine), and also the DC starter motors. The project...