PROJECT

MODUM

Models for Optimising Dynamic Urban Mobility

Funding: European (7th RTD Framework Programme)

Duration: Oct 2011 - Dec 2014

Status: Complete with results

Total project cost: €3,106,267

EU contribution: €2,350,000

Call for proposal: FP7-ICT-2011-7

CORDIS RCN : 100037

Background & policy context:

Transport congestion problems contribute 70% of pollutants to urban environments. The transport sector alone consumes up to 30% of the total energy in the EU. These figures suggest that if Europe is to reduce its CO2 emissions by making efficient use of energy while improving the quality of life in European cities, novel approaches for the optimal management of urban transport complexity must be developed and adopted in the transport sector.

Objectives:

MODUM addresses the environmental footprint in the transport sector by aiming to develop a new approach for pro-active demand-responsive management of traffic to enable energy-efficient multimodal transport choices accommodating dynamic variations, minimising environmental impact and improving quality of life in urban environments. Moreover, MODUM will consider commuters, in combinations of both private and public transport, facing dynamic conditions such as unexpected disturbances typical of urban environments.

Expected results

MODUM aims to improve efficiency of energy consumption and to reduce CO2 emissions in the transport sector by building a 'clean mobility', only achievable by an appropriate combination of scientific, technical and social objectives in the area of ICT for the transport sector.

In MODUM scientific objectives push the state-of-the-art in the area of pro-active traffic control and deliver new knowledge in the area in terms of models and requirements (demand and supply side).

The technical objectives take the scientific results and convert them in prototype systems, demonstrating the feasibility and exploring technical challenges arising when the models are to be implemented in technology.

Prototype devices will be prepared for a number of vehicles for the MODUM test sites in Nottingham in UK and Sofia in Bulgaria.

The societal objectives align the technological and scientific results with the society and its people.

The results of achieving all objectives come together to support work towards the long-term impact goals, enabled by the project but not to be achieved within the project time frame. The different types of objectives motivate different ways in which success against each objective can be measured.

Methodology:

MODUM focuses on the comparison and the potential synthesis of two approaches:

1. A traffic flow self-organising mechanism based on ant-like agent technology.
2. Route planning based on software agent technology; using real-time data and declared destinations.

Both mechanisms have proven successful in other application domains and have the potential of utilising vehicles' computational power and networking capabilities for achieving their active participation in the demand-response management of urban traffic.

The metrics for the comparison of the two will be extracted from real needs of traffic control centres and from transport users in selected cities. Once the metrics are defined, a series of simulation experiments of realistic complexity will be constructed using real-time data feeds available from transport sensing infrastructure. Results from these will profile the two approaches against certain scenarios of traffic disturbances causing rapid changes in conditions. A synthesis of the two approaches will then be developed by the academic partners.

Software implementation of the synthesised approach will then be embarked upon, focusing on the telecommunication challenges of a realistic demonstrator. The developed prototype will be validated on the initial scenarios by staging real-life experiments, which the relevant traffic management structures within the traffic control centres will evaluate. Such experiments will include historical data and simulations in combination with real-time data feeds from existing infrastructure and vehicles going through a section of a city in a number of congestion profiles. Analogous experiments will include people moving in a city by different means of transport.

The prototype will provide an implementation of an optimisation approach to traffic management, which is capable of dynamically adapting the overall flows of traffic to unexpected disturbances in order to minimise carbon emissions within an urban complex environment. To ensure practical efficiency an implementation strategy will be devised including the likely reactions of commuters to the suggestions of the system, and thus its practical efficiency. All this will produce a consequent reduction in both pollution levels and energy consumption in the transport sector.

Parent Programmes:

FP7-ICT - Information and Communication Technologies

Institute type: Public institution

Institute name: European Commission

Funding type: Public (EU)

Lead Organisation:

Transport & Mobility Leuven

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EU Contribution: €388,059

Partner Organisations:

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EU Contribution: €0

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EU Contribution: €514,060

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EU Contribution: €35,736

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EU Contribution: €401,004

The European Association Of Aerospace Industries

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EU Contribution: €407,433

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EU Contribution: €86,448

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EU Contribution: €388,492

Technologies:

Information systems
Sustainable urban mobility planning

Development phase: Research/Invention

Key Results:

The study does not demonstrate any final results yet as it is still ongoing. However, current project activities and intermediate results were released.

Current project activities and intermediate results

From the start until Autumn 2012 the project has undertaken three qualitative studies in order to identify the requirements for low-carbon and efficient mobility. For each study a different research technique was used, namely:

- A survey for collecting critical incidents
- A two-round Delphi study
- A series of focus group interviews at different locations (Nottingham and Sofia).

The results of these studies have provided an in-depth understanding of current commuting behaviour and practices in addition to the factors that influence such behaviour.

MODUM is currently in the process of combining two approaches: a traffic flow self-organising mechanism based on ant-like agent technology and a 'reverse' route planning based on software agent technology; using real-time data and declared destinations. The combined approach will be implemented in software, focusing on the telecommunication challenges of a realistic demonstrator. The prototype will provide an implementation of an optimisation approach to traffic management, capable of dynamically adapting the overall flows of traffic to unexpected disturbances. This is done with the aim of minimising carbon emissions within a complex urban environment in Manchester and Sofia. It is expected that the implementation and application of this technology will produce a consequent reduction in both pollution levels and energy consumption in the transport sector.

Strategy targets

Innovating for the future: technology and behaviour:

- Promoting more sustainable development
- Integrated urban mobility

Documents:
Modum Brochure 2012.pdf (Other project deliverable)

STRIA Roadmaps: Network and traffic management systems, Smart mobility and services

Transport mode: Road transport

Transport sectors: Passenger transport

Transport policies: Decarbonisation

Geo-spatial type: Urban