The conventional railway line between Aulnay and Bondy has been transformed into a tram line with a reduced impact on the urban landscape in collaboration with the councils of the department and communes involved. Changing the old level crossings into crossroads improves safety and the relieves constraints on traffic flows, while the layout and design benefit pedestrians and cyclists. Where the train-train is the only vehicle to use its lane, the surface material used is ballast. In the same way, all the railway furniture along the line is the same as that used by the SNCF. 

This new light rail service is therefore a compromise between a tram and train.

The development of tramways is continuing in France. Marseille, Angers and Le Mans are the furthest ahead with plans to build their first tram lines. Most towns and cities which already have tram services are looking into possibilities to extend their networks. Nevertheless, the development of new tram projects may stop in future because the French State has decided to stop financing local public transport initiatives, which means that these towns would probably choose to develop less expensive transport systems. Busway systems, such as the fourth major line in Nantes, are likely to attract increasing attention because they combine the advantages of tramways for upgrading of the urban fabric with the cheap cost of a segregated bus lane.

References


Web sites

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- [Bondy tramway: www.tramway-bondy.com](http://www.tramway-bondy.com)
- [St-Man : www.tramway-montpellier.com](http://www.tramway-montpellier.com)
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Notes

1. SNCF is the French train operator.

Reactions to: ladoun@nova-terra.net

Small autonomous electric vehicles could provide an alternative to the motor car in an emerging new approach to mobility that tries to offer the same flexibility as the private car, but with much less nuisance and environmental impact. Their potential has been investigated in the European CyberCars and CyberMove projects.

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In many urban environments the use of private cars causes severe problems of traffic congestion, energy consumption (dependency on oil resources) and noise pollution and safety, leading to a general reduction in quality of life and making historic city centres less attractive to both tourists and residents. Moreover, the problems of many city centres are compounded by a movement of businesses to the periphery. Although public transport systems have recently undergone many improvements (mostly due to information technologies), in many cases the private car still offers a much better service for the individual. As a consequence, car use is constantly increasing. All this amounts to a non-sustainable development of urban transportation.
Cyber cars could complement mass transit and non-motorised transportation.

**Cybernetic Transportation Systems**

Cybercars use technologies which have the potential to contribute to a sustainable development of cities. These vehicles have fully autonomous driving capabilities and are specifically designed for public use in cities to provide on-demand door-to-door services.

The European project CyberCars was an opportunity to test and exchange best practices for the development of a new platform for urban mobility. A major part of the work carried out during this project was the development of several key technologies to improve the existing systems: better guidance, collision avoidance, energy and fleet management, and the development of simple user interfaces. The work was carried out on a cooperative basis in order to reach a consensus on the certification techniques for these systems, which currently suffer from a very imprecise regulatory framework.

The Cybermove project attempted to demonstrate that cybercars have enough potential to make an essential contribution to the sustainable development of the cities of tomorrow. The ultimate aim is to create an alternative transport system that can make city centres more attractive and sustainable.

The advantages of cybernetic transport systems (CTS) include the reduction of congestion, better air quality and energy conservation, increased safety when compared with manual driving and no need for a driving licence. Moreover, cybernetic cars are easy to move from one location to another and, when not needed, they can drive themselves autonomously to a remote parking area. The concept and associated technologies may be appropriate for delivery of goods and even for refuse collection. The flexible design of CTS makes it possible to optimise overall system performance. CTS technology has already reached suitable levels of reliability, safety and user friendliness that they can be useful to solve some mobility problems in cities.

Although the first Cybercar was introduced in the 1990s, the first operational project started at the end of 1995 at Schiphol Airport: the Parking Hopper (Frog). Other examples of automatic guided vehicles in the Netherlands are the ECS container terminal in the harbour of Rotterdam and the Park Shuttle 11 in Capelle (Frog). During the Floriade in 2002 Yamaha provided a large number of cybercars based on an adapted chassis of a golf car offering transport up the hill. These cars were later donated to and used in the CyberCar and CyberMove research projects. This meant research could focus on technical issues only, such as improving guidance, navigation, collision avoidance, energy management and the user interface. The design of the vehicle itself was less significant at that stage.

Yamaha’s cybercar, or Automated Guided Vehicle (AGV), is compatible with Yamaha’s Parking Hopper. Another example of this type of People Mover or Personal Rapid Transit (PRT) is Robosoft’s CyCab. All are small vehicles for two to four people potentially offering individual door-to-door transportation and are capable of driving in a mixed-use urban environment. Another type is the shuttle, the Park Shuttle, for example, uses a dedicated lane with fixed stops, but tests (e.g., Delft, Monaco) show that implementation and application in a mixed urban environment is possible as well. Other examples are the Ulita (Bla), use a specific infrastructure.

**Covilhã Showcase Workshop and Public Cybercar Demonstration**

The Connected Cities conference, steering group meeting and showcase workshops took place in Portugal on 9, 10 and 11 October 2006 in the town of Covilhã. The Showcase Workshop included a public demonstration of the operation and capabilities of cybercars. This public demonstration took place in an area between the Municipal Square and the S. Francisco Church (Rua Direita), with an approximate length of 500 m. In two periods of four hours each, a fleet of three electrical vehicles was available for the community. These vehicles covered the designated area at a speed of 8 km/h, making stops at four predetermined points.

Covilhã is built on the slopes of the highest mountain in continental Portugal. The town is spread out along the hillside and has three natural barriers: two creeks and the difference in altitude between the town and the downtown.
YAMAHA AGV

Each vehicle is an electric autonomous guided vehicle (AGV) for transporting up to four people. It is powered by lead-acid batteries with an operational time of 4.5 minutes in full mode operation. It can travel at a maximum speed of 10 km/h or more and an average speed of 8 km/h. Its range is 30 km. The vehicle was originally designed for transporting people on golf courses and is now adapted for use in urban environments. It has a built-in autonomous way guidance system.

The vehicle has been equipped with important add-ons, such as automatic passenger detection, a human-vehicle interface, and laser-based collision avoidance. The vehicle's navigation capabilities consist of an innovative navigation system, which was developed in the CyberCars project, based on the European research project DGPS (DGPS) and inertial sensing. The system benefits from the complementary characteristics of both sensor modalities. DGPS provides reliable positioning with a bounded error, but with poor precision (a few centimeters). Dead-reckoning based on inertial sensors can provide high precision short-term relative positioning (a few centimeters) but suffers from the accumulation of integration errors.

The gradient of the slope between the downtown and the uptown is about 15%, and between the new city and the uptown about 11%. The town has a population of about 35,000. The residents of the historic center are mainly older people and university students. The population of the downtown and new town, which contain these medium to large commercial areas, is composed mainly of middle class families.

In terms of mobility, the historic centre of Covilhã has very narrow streets. Many of the streets are one-way, only or wide enough for one-way traffic. Most of the residents of the historic centre do not have a legal parking space near their homes. The main issues are traffic congestion and from the old city and the loss of urban functions in the old town centre.

COVILHÃ CYBERMOVING WORKSHOP

In an attempt to bridge the gap between invention and innovation, the workshop's main goal was to develop guidelines for adjusting the specification for cybertons designed specifically for use in towns and cities. Based on the public demonstration of the car and the people's opinion and reactions (e.g., by urban planners, politicians, traffic planners, etc.), the workshop questioned the future applications of cybertons in this specific context. An attempt was made to evaluate the conditions in which cybertons could offer innovative and practical solutions for mobility in cities. The overall objective was to develop a new product based on the existing cybertons.

In the process of transforming the invention into an innovation, the following items were debated:

- Suggest new functions for the system to fit the people needs
- Suggest new applications for the system
- Enumerate conditions for and constraints on the use of cybertons in cities and private sites
- List the potential users of this mobility technology
- Suggest what types of demonstrations are necessary to promote the product to potential users, and what partners should be invited to improve the demonstration

The car could find its own remote parking space and turn up again when we need it

transport. Such as strategy could speed up acceptance of cybertons by the public and adoption of the technology.

The main advantage of AGVs is their flexibility, ease of implementation and cost-effectiveness. Development of these vehicles is already influencing car design and will influence our environment. New techniques developed for cybertons are already available in modern cars (cruise control, adaptive functions and dual mode cars, e.g., fuel and electric) and trucks (e.g., emergency breaking). In future, cybercar technology may give us safer and more sustainable cars. We might not even have to look for our car or search for a parking space: the car could find its own remote parking space and turn up again when we need it.