

Smart BUS Project Handbook

Smart City Concept (Case of Smart Sfax City)

Sfax is Tunisia's second-largest city after Tunis, and its commercial epicenter. For decades, its thriving manufacturing industry and large Mediterranean port made Sfax an attractive investment destination. In 2003, elected officials of the seven municipalities that make up the Greater Sfax as metropolitan area.

This city has seen an impressive dynamic urban expansion by the rhythm of the evolution giving rise to a continuous urban fabric (in suburban dominant) in the Greater Sfax sheltering a half million inhabitants, or around 87% of the urban population of the governorate giving rise to lose densities.

The "surprising" urban boost, even beyond the limits prescribed by the planning documents and town planning took a speed the effort in transport infrastructure explaining, hence the mismatch between the supply of the transport services and the transport demand, giving rise to a dislocated market unable to meet actual and potential needs of the economic agents. Indeed, this very rich terrain makes the management of the city of Sfax, especially in transportation, is a tedious task.

The city of Sfax, like many cities, is facing many problems, such as aging infrastructure, populations, increasing congestion and climate change. To solve the problems, we must turn to smart technology.

Indeed, the issues regarding the future of a truly smart city can be concentrated on two points. Number one is that the city of Sfax still working in silos, is isolated projects where duplication of efforts. The second is that the city of Sfax does not know what she wants becoming-she does not know how to apply chip technology and innovation, as it does not know where she is trying to go.

One of the challenges, In the future Sfax smart city, is to integrate different modes of transport rail, automobile, cycle and walking in a single system that is both efficient, easily accessible, affordable, safe and environmentally friendly.

Another challenge is to create an intelligent environment in which buildings need to be smarter in order to facilitate and improve the energy management or to reduce consumption. So, we need to control meet green building standards, construction of passive houses or even positive energy, installation of photovoltaic panels on roofs, installation of a biomass based cogeneration plant supplies the heating network combined with solar power to cover nearly two thirds of the electricity consumption of a neighborhood.

In addition to the challenge of reducing consumption of drinking water by collecting rainwater and use for daily use (toilet, washing machine, watering, etc.)

Smart Bus Concept (Case of Sm@rtCityZen Platform)

A smart bus is a bus equipped with a combination of modern electronics that allows the bus to send, receive and broadcast digital information. With the addition of enhanced information and communication technology, information can be provided to customers in real-time to make the service even more reliable.

Smart Bus improves public transportation reliability and predictability. With a fleet of buses, it's no longer possible to manage incidents such as service delays and disruption. New technology is needed to keep riders informed about the status of their bus in real-time.

Moreover, Smart Bus improves public transportation accessibility and safety. It lets passengers know which stop is coming up and provide assistance to persons with disabilities so they can function even more independently. Enhanced security features such as automatic vehicle location allows workers in the transportation service to respond to emergency issues quickly and effectively.

Sm@rtCityZen platform is a mobile application developed with Ionic Framework and AngularJS in the first place. When running the application, the page of the authentication is the first to show (figure 1). Login via a social network such as Facebook and Google + in our case ensure the total security of the application's authentication.



Figure 1. The login interface



Figure 2. The list of smart applications

The figure 2 shows the list of the smart applications developed or to be developed in Sm@rtCityZen platform. We are interested in the smart bus application. After selecting the smart bus, the map starts to load, showing after that the bus markers and get centered on the user location as showing in the figure 3.

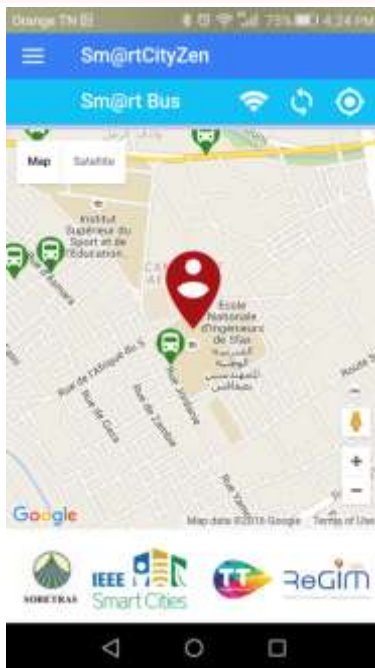


Figure 3. The bus and the user markers



Figure 4. Bus stop locations

Figure 4 shows the bus stop locations. When the user zooms in, the bus stop markers are shown. When the user zooms out, the markers disappear. This feature helps the user to read the map easily. Finally, the user selects a bus stop then selects a bus. The path in between is drawn and a toast appears given the distance and the duration information as showing in figure 5.

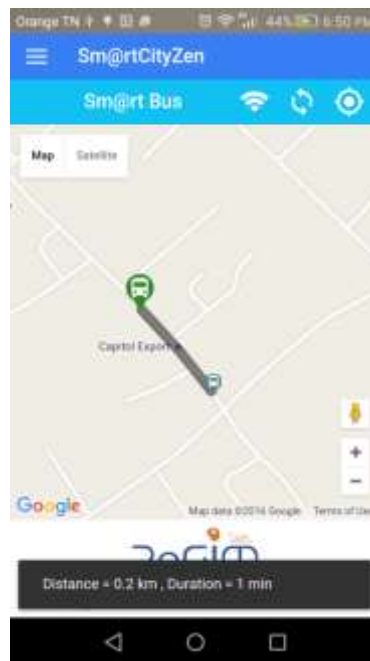


Figure 2. Distance and duration between a bus and a bus stop

Partnerships

This project can achieve all its objectives without establishing national cooperation. We detailed below all information about Tunisian and Hungarian partners included in our project.

	<p>European Network of Living Labs Website: http://openlivinglabs.eu/ E-mail: info@enoll.org</p>
	<p>Sfax Smart City Living Lab Website: http://smart-sfax.org/ E-mail: info@smart-sfax.org</p>
	<p>Research Groups in Intelligent Machines, University of Sfax, Tunisia Website: www.regim.org E-mail: info@regim.org</p>
	<p>University of Sfax, Tunisia Website: www.regim.org E-mail: universite.sfax@usf.tn</p>
	<p>Sfax Techno-Park Website: http://www.sfax-icttechnopark.tn/ E-mail: contact@sfax-icttechnopark.tn</p>
	<p>Sfax Radio Website: www.radiosfax.tn</p>
	<p>Institute of Electrical and Electronics Engineers (IEEE) Tunisia Section Website: www.ieee.tn E-mail: tunisia-officers@ieee.org</p>
	<p>IEEE - Special Interest Group on Humanitarian Technology (SIGHT) Website: http://www.ieee.org/special_interest_group_on_humanitarian_technology.html E-mail: sight@ieee.org</p>

Project Valorization

To ensure the success of this project, several dissemination activities developed products may be conducted as done in the case of the smart Bus developed in the city of Sfax.

- The inauguration of the first Bus connected by 3G WIFI and Located with GPS in favor of Sfax citizens to track the position of bus and to estimate the duration to come near to the closet station to the citizen.
 - o Location: Sfax
 - o Date: June 2nd, 2016



Inauguration of The first Smart Bus in Tunisia within the City of Sfax

- The evaluation process of the Smart Bus Concept in Tunisia within the Cities of Sfax and Nabeul.



Evaluation of the smart Bus application in the City of Sfax



Evaluation of the Camera Implementation and the Smart Bus application in the City of Nabeul