



Info-package 3

Bike sharing and Apps for multi-modality



Mobility



Introduction

ELECTRIC BIKE SHARING SYSTEM

Bike sharing has emerged as an innovative form of public transport to provide urban short-distance transportation services that are often underserved by other forms of public transportation. Bike sharing couples the benefits of shared ownership and expense with personal and demand responsive transportation. Battery charging is the primary difference between electric and non-electric (traditional) bike sharing stations. Electric bike sharing models require careful consideration to manage battery charging. The essential of an electric bike sharing system and the most costly component is the electric bike. There are many challenges and opportunities associated with including electric bikes into a bike sharing model. The most important of those are range limitations and recharging protocol.

Electric bikes are in effect hybrid vehicles (i.e. if the battery dies, the rider can still pedal the bike to his/her destination). Still, an effective electric bike sharing scheme should ensure that the user of the scheme has a maximum amount of range available. Pedal assisted electric bikes require the rider to pedal and on-board control technology assists the rider by supplementing the rider's effort with electromechanical power. This effectively increases the range of the bike and reduces fatigue barriers, particularly in hilly terrain. These benefits make electric bikes more attractive to casual riders, who might otherwise avoid traditional bikes.

The following figures show that, Tepebaşı's electric bike sharing system called **ESPEDAL** consists of 30 electric bikes, 3 pay stations, and 45 charging terminals. There are 3 electric bike stations in total; each electric bike station has 10 electric bikes, 1 pay station, and 15 charging terminals. The electric bike stations are located in Anadolu University, Yunus Emre Sport Complex, and Life Village (demo site).

The tracking device on each electric bike enables the collection of data like the position of the e-bike, as well as other aspects such as speed, dynamo-charging information, etc., if desired, zone limitations can be made with the tracking device. Reliably recharging electric bikes requires a sound connection to a source of power, which precludes some of the features of deployable bike sharing stations.

Electric bike sharing combines emerging technologies that can improve the reach of traditional bike sharing systems to a new group of users by overcoming some barriers to traditional bicycling. Shared electric bikes may find a significant niche in the transportation system improving sustainability of transportation services and accessibility that reduces energy usage and emissions while moving more individuals toward active transport modes.

Description



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Mobility

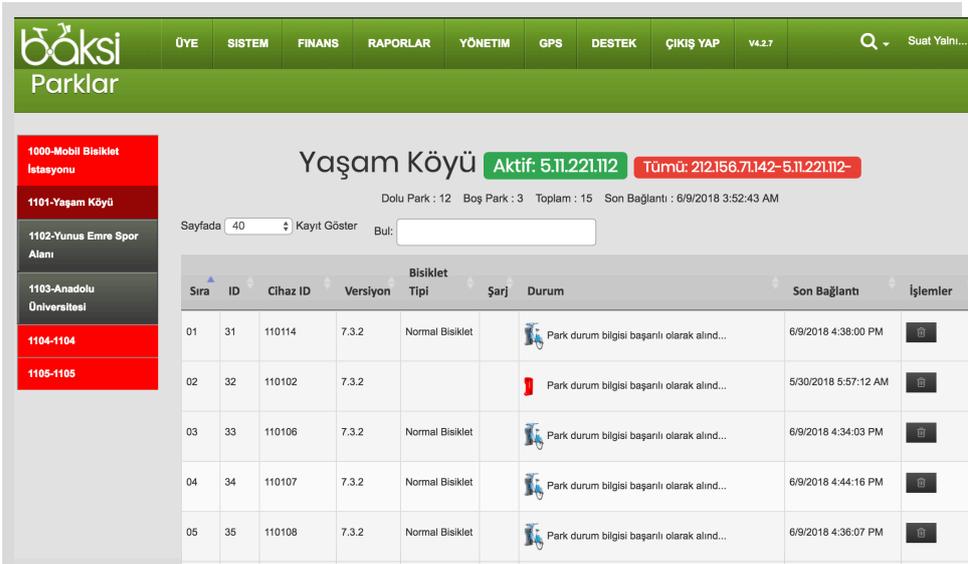


Figure-1

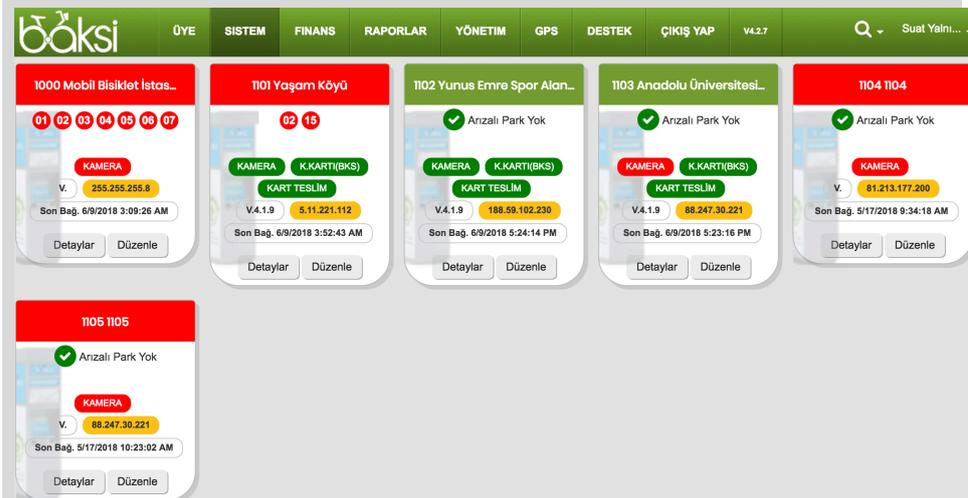


Figure-2

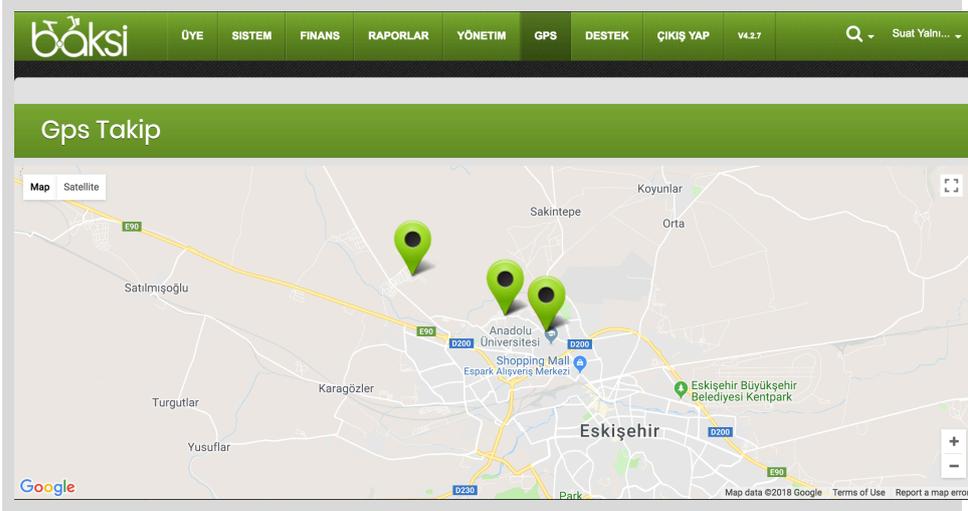


Figure-3



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement N° 646511





Goals

- Include attracting casual bike riders; those who do not own bikes, commute by car, or use transit.
- Be an environmentally friendly alternative transportation system and provide a solution to traffic problems experienced in Tepebaşı.
- Develop a robust and replicable electric bike sharing model that can be integrated with other bike sharing or multimodal systems.
- Cope with some barriers to bicycling for viable, expanded market of commuters.
- Overcome price barriers by spreading the cost over many users. Including electric bikes in a shared environment also casually introduces the technology to users without the pressure or commitment of a purchase.





Progress

Tepebaşı's electric bike sharing system called **ESPEDAL** consists of 30 electric bikes, 3 pay stations, and 45 charging terminals. The electric bike stations are already installed in Anadolu University, Yunus Emre Sport Complex, and Life Village (demo site). The integration of the ESPEDAL system to the city information platform "City on Cloud" is ongoing. Once the integration is completed, the benefits of the e-bike system can be calculated based on how much it is used and how much it replaces regular personal commute by cars or public transport.



Lessons learnt

- 01** Electric bikes are generally significantly more expensive than similar quality non-electric bicycles. As such, the electric bike market has not grown as rapidly in Turkey as compared to other countries.
- 02** Battery charging is the primary difference between electric and non-electric bicycle sharing stations. The need to charge batteries requires access to a reliable source of energy.
- 03** Charging the battery on the bike simplifies the bicycle check-out process and hardware, but has the major disadvantage of taking the bicycle out of service while charging.
- 04** Under a traditional bike sharing system, the range of shared electric bikes would be insufficient to meet the average daily demand of the system unless trip durations were short and bikes are being recharged more than they are checked-out.
- 05** Shared bikes require 20 km range availability per day on average. Since there is little empirical evidence of electric bike demand characteristics in a shared system, it is difficult to estimate the range requirements.



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