Smart City Applications in Turkey

Murat DENER
Gazi University

Introduction

Smart cities are cities that increase people's living standards, make their environment more livable, and also provide economic and social benefits. Today, people migrate to big cities because of better living conditions. As a result, the number of people in big cities is increasing and it is increasing in the density of people per square meter. Along with people, there are many properties such as the number of vehicles and the number of goods are increasing. If this is the case, the cost of the city is increasing. More people create more confusion, require more security, and create more environmental pollution.

Cities are smart in order to overcome these negative situations. With the cities becoming smart, both people will be able to live more comfortably and the city economy will be stronger. The main responsibility of smart city applications in our country is T.C. Ministry of Environment and Urbanism. The municipalities also lead to make the cities smart.

First, municipalities have developed a number of information systems that enable citizens to work directly on the Internet instead of coming to institutions. Some of these services offered in electronic environment are: E-Proposal, Debt Inquiry and E-Payment System, IT Management Information System, Media and Public Relation Information System, Reconstruction Application Information System, Project Management Information System, Nursing Home Information System, Cultural Activities Information System, Audit Information System, Legal Business Information System, Fire Service and Emergency Information System, Disabled Services Information System, Tender Information System, Document Information System, Fixture Management Information System, Advertisement Information System, Request Complaint Form, Pharmacies, Assembly Decisions, Council Decisions.

All of the information systems mentioned above are accessible to citizens via web or mobile platforms. In this way, the density created by the institutions is reduced. In addition, the cities can be watched 7/24 by placing municipal cameras at important points of the city by municipalities. This contributes to the credibility and presence of the city. By entering the websites of the municipalities, city can be viewed.

Institutional Constitution and Legal Legislation

Smart city works in Turkey continues rapidly. In order to make these studies more efficient and effective, T.C. Ministry of Environment and Urbanism, General Directorate

of Geographic Information Systems, Department of Smart Cities and Geotechnology, Smart Cities Branch Directorate is founded. Their mission is as follows (https://cbs.csb. gov.tr/birimler/akilli-sehirler-ve-cografi-teknolojiler-dairesi-baskanligi/1565):

1) To develop software related to smart city applications, to carry out policy and strategy studies, to carry out projects, to coordinate and to ensure widespread use,

2) To make the necessary arrangements for establishing city information systems in a standard and common way,

3) To carry out implementation, regulation, development and monitoring activities related to navigation, management, automation and documentation systems that integrate geographic information systems applications,

4) To conduct business and operations related to the operation, maintenance and management of geographical applications developed by the General Directorate,

5) To conduct research, monitoring, indexing and reporting activities related to geographical information technologies and smart cities,

6) To represent our country in the work carried out by national and international institutions and organizations in matters concerning the field of duty, to coordinate cooperation and harmonization activities,

7) To do other work and operations given by the General Manager.

No legislation has been published until the first half of 2018. Work on the subject continues. In the short term, it is expected that the legislation to include policies and strategies will be published.

Municipalities and Smart City Applications

We have municipalities that want to smart their cities as soon as possible in cooperation with major technological organizations. This section presents some of these municipalities and their practices that have been worked or carried out within the municipality.

Adana

Adana (http://create.adana.bel.tr/) is the partner of an international smart city project under H2020. The project "Congestion Reduction in Europe: Advancing Transport Efficiency-CREATE" is an H2020 research development project. While the project's manager is London, Adana is a partner in the project. Within the scope of the project, economic, social and environmental transport policies and social / economic pressures

will be evaluated in 1st step cities Bucharest, Skopje, Amman, Talin and Adana. Solutions have been produced for transportation problems in London, Paris, Vienna, Copenhagen and Berlin. Based on the results of these solutions, a sustainable solution proposal for transportation problems in Adana will be developed.

Ankara

In Ankara (https://www.ankara.bel.tr/), there is a tracking system in the context of smart transportation systems. All buses can be monitored over the internet.

Antalya

Antalya (https://www.antalya.bel.tr/) is an advanced level in our country within the scope of smart cities. Within the scope of manageable internet service, it provides the necessary infrastructure for free Wi-Fi service in more than 30 locations.

Smart lighting and smart irrigation systems were established in Yavuz Özcan Park as pilot project. The smart irrigation system works according to the moisture condition of the soil and when the soil is dry, the irrigation system is active.

City information screens, which will serve citizens and tourists, are also installed in many different locations. With the screens, various benefits will be provided, such as informing the citizens and communicating their problems, and the governance systems of the municipality will be strengthened. It will provide significant convenience for tourists and will be accessible to many points in the city.

Electronic monitoring system is installed in more than 50 locations within the scope of smart transportation and traffic project. This will provide the necessary data base for traffic safety, real smart signaling and smart transportation.

Smart lighting systems that will make a significant contribution to energy consumption of the city are also established in Yavuz Özcan and Serdengeçti Park, which are chosen as pilot regions. In the parks there will be street lights that increase or decrease their light according to the light level of daylight. The system, which can be managed remotely and the light level can be adjusted, will save the city lighting. Central monitoring of defective lamps positions, on / off / off of hourly lamps, follow-up of remaining lamp life, daylight on / off / dimming, on / off / dimming with motion sensor will be included in smart lighting system.

Within the scope of smart health, the following transactions are carried out. Patients with chronic illnesses will be monitored online by the attendant doctors. The sugar, blood pressure and heart rate measurements that will be made in the patients' homes will be controlled by doctors. In case of high values in the measurements, the citizens

will contact the patient before they go to the hospital and they will give information about what to do. If the patient feels bad and encounters an urgent situation, 112 emergency services will be reached with the panic button. Any team that sees the patient's previously identified anomalies immediately will be able to determine what kind of intervention is needed.

Bursa

In Bursa (http://akillisehir.bursa.bel.tr/), free, secure and high quality internet service is offered for use in long distance travel buses which are in the service of citizens.

Many inland wireless internet services are provided in line with the internet needs of domestic and foreign guests coming to public service buildings.

The data coming from 20 different vehicle follow-up companies are collected in one center. Metropolitan Municipality has established the infrastructure for the system brought a sense become the first in Turkey to all users instantaneously public transport offers tracking and reporting facilities.

With the application 'Love Chip', it is possible to connect easily with the relatives of Alzheimer's and mentally ill citizens. The patient is carrying to it. In this way, it can monitor instantly from the internet environment 24 hours a day.

Ambulances and Funeral Transport Vehicles, Fuel Tankers, ... etc. A total of 2,175 defined vehicles including Authority vehicles and Excavation vehicles are followed through Vehicle Tracking System.

Enterprises that release wastewater to nature; can be monitored online in real time with the remote wastewater monitoring station instantly. All the values of the amount of water used by the enterprises, the amount discharged to the nature and the pollution parameters of the discharged water can be monitored instantaneously.

Denizli

Denizli (http://akillisehir.denizli.bel.tr/) is an important city at the point of smart cities. Smart City combines with many possibilities and smart solutions are offered to the citizens. These are:

Transportation: Traffic Management System Project, School Services Tracking System, Mass Transportation Control System, Green Wave System, Vehicle Tracking System, Smart Card and Free Wi-Fi Service in Buses, Denizli Kart Smart Spot Points,

Water Management: Scada System, Smart Drip Irrigation System

Information Systems: Geographic Information Systems, Urban Security Management System (MOBESE), Collection of 112 in One Number, e-Signature Project, City Cameras

Environment: Wastewater Treatment System, Energy Production from Biogas

Energy: Our Solar Power Project, Free Internet and Mobile Phone Charging Station

Smart Applications: Transportation Portal, Reading Water Meters Online System, Mobile Site Inspection Project, View / Send Application, Advertisement Mobile Control System, Pocket Parking Management System

İstanbul

In Istanbul (http://isbak.istanbul/), there are advanced information and communication technology applications that support transportation. These applications are Traffic Measuring Systems, Traffic Information Systems, Traffic Signaling Systems, Adaptive Traffic Management System, EDS-Traffic Control Systems, Traffic Control Center, Mobile Applications, Mass Transportation Information Systems and Public Transportation Camera Systems.

In modern tunnel management systems, control of field equipments is done with microprocessor based devices known as PLC. Thanks to the PLC and SCADA system, which plays an active role in the operation of the tunnel, all systems in the tunnel can be remotely monitored and controlled if necessary. Taking into consideration the fault conditions in the design of tunnel automations, it has been adopted that the technological precautions should be taken in order to prevent the faulty tunnel process.

With Fleet Management Systems, it is aimed to direct and control the vehicles and vehicle drivers in the best way. With the system, it is ensured that vehicles that serve your institution are monitored on-line, their speeds are controlled, where and how much they are paused and what paths they follow. The system works with the logic of transferring the data received from GPS satellites connected to the vehicles to the server computers via GSM / GPRS.

It is an automatic meteorology surveillance, analysis and anti-ice system installed on roads to avoid traffic accidents caused by hidden ice in tunnel entrances, exits, bridges, viaducts and roads so that the city life is not affected by icing detection and prevention system in winter months. With this system, it is guaranteed that the water formed on the road will remain as a liquid without freezing, and precautions can be taken in areas where there is risk of icing.

Smart Parking Management System is an integrated parking management system that contributes to the country's economy by aiming to reduce carbon emissions

by providing profit from fuel by time with smart systems for the use of high quality, efficient and environmentally friendly parking lots. Equipment and system solutions are offered in parking lots in order to speed up the transition safely and to save time with smart systems.

İzmir

621 thousand meters of fiber optic cable has been laid in Izmir (http://www.izmir.bel.tr/) within the scope of, "İzmirNet Project" and "Smart Traffic System". This situation has created a very important infrastructure in İzmir's smart city target.

The camera monitoring system, the wireless 3G data connection system and the passenger counting system are installed in 1500 buses. Priority system was established at 164 junctions of fire brigade.

All of the parking lots have been made "smart". With this system, how much space is available in the parking lots can be reached from internet or led screen. You also have the chance to learn how to navigate to the nearest car park using navigation on the mobile site.

"Traffic Mnitoring Camera" at 110 points, "Meteorology Measurement System" at 30 points and "Gabari Measurement System" at 16 points were established. In order to create traffic density information, 209 "Traffic Metering Sensors" and 48 "Variable Message Systems" (DMS) and 60 Parking Information Screens have been activated to transmit this information and other traffic information to the drivers. The system is managed by approximately 5,000 cameras and 10 thousand smart phones.

Observing and controlling rule violations, reducing emission rates, and reducing fuel and spare parts expenditures are among the advantages of the "Smart Traffic System". The system provides a safer vehicle and pedestrian traffic as well as high efficiency of road capacities. The shortening of travel times, the accumulation of junctions and the reduction of waiting times are the most important consequences of the system.

Kars

In Kars (http://www.kars.gov.tr/akilli-kent-kars), the applications that can be taken into consideration in the context of Smart Cities are:

- Smart City management center to monitor and manage Smart City applications

- Free Wi-Fi Internet service in the parks (Mesut Yılmaz Park, Ataturk Tea Garden, Harakanı Tomb)

- City Access Points / Information Points (Kiosks)

- Smart Junction, Smart Stop and Smart Lighting applications at various locations in the city

- Sarikamis Ski Center Transit System

- BuluTT Eye (recording of high-resolution images for security to Turk Telekom data center)

- History, culture, tourism etc. related to science through smart phones. information can be reached "Kars Mobil" application

- Application of the Voice Steps Project to the courthouse and the hospital building after the governorship of Kars

- "Barrier-free SMS" application for better service to disabled citizens

- Regular informing of Kars air quality with meteorological measurement, heat and snow thickness

It is aimed to modernize the communication infrastructure of Kars province center, to increase the fiber ratio in Kars province center to 100%, to increase the speed provided to the customers in the province center from 12 Mbit to 50 Mbit and to benefit from the services of TIVİBU by all the customers in the province center within the scope of Kars Fiberkent Transformation.

 The Voice Steps application for the Kars Governorate building, which was developed for the first time in the world, provides voice guidance service through the smartphones in places where they have visually impaired.

Kayseri

Kayseri (https://www.smartcitykayseri.com/) is a very conscious city within the scope of smart cities. While most of the projects listed below are in use in the city, others are still in the works.

Within Smart Environment, Smart Lighting, Solid Waste Energy Management, Sustainable Energy Action Plan, Smart Irrigation, Air Quality Stations.

Within the scope of smart community, Navigation Implementation for the Disabled, Charge Units for the Disabled, City Square Energy Pipeline, Smart Library Construction, Informative Kiosk, Sms System Installation (For City Visitors), City Guide Application.

Within the scope of smart transportation, Smart Station, Rail Control Center, Bike Road and Station, Transportation Application, Smart Junction, Ambulance

Transit Elevation, Autonomous Bulk, Transportation Vehicle, Electric Bus, Fleet Tracking and Management for Municipal Vehicles, Smart Parking.

Within the scope of smart life, Wi-Fi Points, Sports Centers, Erciyes Ski Center Live Cameras.

Within the scope of smart management, Smart City Management Platform, Business Processes and Document Management System.

Sakarya

In Sakarya (http://www.sakarya.bel.tr/), every step of drinking is followed by the Scada system, which is developed for continuous monitoring of the city's drinking water 24 hours a day. The problem experienced at any point of the drinking water network can be seen instantly and can be intervened immediately. By connecting to the Scada system, it is possible to instantly control the purification facilities, drinking water elevation centers, water depots, many mechanical equipment on the field and the level of Sapanca Lake in many points of Sakarya via internet.

Within the scope of smart transportation systems, there is a tracking system in the busses. All buses can be monitored over the internet.

<div align="center">

Discussion and Conclusions

</div>

It is seen that most of the municipalities working on smart cities are primarily oriented to smart transportation systems. As a result of detailed reviews and literature review, Smart City Applications are divided into 8 headings. These; Smart Transportation, Smart Environment, Smart Health, Smart Life, Smart Governance, Smart Industry, Smart Economy and Smart Security. Only one system or one space is not enough for a city to be a smart city. In order for a city to be an smart city, it must contain all necessary systems and communicate with each other in these systems. It is expected that the road data obtained by the Smart Weather System will be sent as information to the drivers in the Smart Transportation system and recommend the road route if necessary. In addition, it is expected that meaningful estimations will be made for the future through the relationships between the data, by collecting all systems at a single center. With so many solutions in place now, our country may face the danger of being a technology garbage disposal. Because, in the current situation, there are many smart systems but a system that is not familiar with each other. Immediately, smart city applications should be framed by a legal legislation and our country should not be allowed to have a technology repository.

As you can see, many municipalities carry out smart city studies in their own fields with institutional collaborations. The municipalities carry out these transactions in agreement with different companies. These applications are realized in smart cities with wired or wireless technologies. Before implementing smart systems, it is necessary to have comprehensive forward-looking road plans and act accordingly. The smart system, which is a stand-alone solution, will lose its effectiveness and efficiency after a certain period of time if it cannot communicate with other systems.

References

Department of Smart Cities and Geotechnology, https://cbs.csb.gov.tr/birimler/akilli-sehirler-ve-cografi-teknolojiler-dairesi-baskanligi/1565

Congestion Reduction in Europe: Advancing Transport Efficiency-CREATE, http://create.adana.bel.tr/

Ankara Metropolitan Municipality, https://www.ankara.bel.tr/

Antalya Metropolitan Municipality, https://www.antalya.bel.tr/

Bursa Metropolitan Municipality, http://akillisehir.bursa.bel.tr/

Denizli Metropolitan Municipality, http://akillisehir.denizli.bel.tr/

İstanbul Informatics and Smart City Technologies, http://isbak.istanbul/

İzmir Metropolitan Municipality, http://www.izmir.bel.tr/

Kars Governorship, http://www.kars.gov.tr/akilli-kent-kars

Sakarya Metropolitan Municipality, http://www.sakarya.bel.tr/

Smart City Kayseri, https://www.smartcitykayseri.com/