

A PROJECT AND IMPLEMENTATION OF A SMART CITY

An implementation and growth of smart systems take place in many cities around the world. The concept of a smart city ultimately aims to face and tackle number of challenges concerning agglomerations using for this purpose modern and progressive technologies which are already available.

Smart city studies highlight three main generations which relate to approaches to the application of latest technologies that can be implemented in order to build and create smart cities [1].

In first generation called Smart City 1.0, an initiative to transform metropolises was driven by companies in information and communication technologies sector (ICT). Currently, it is not recommended to develop the smart city based on this generation, because it omits demands, needs and ideas of residents of a particular city in decision-making process. Smart City 1.0 forces the deployment of ready-made solutions for agglomerations. These tools were prepared by tech companies that were looking for a new undiscovered market niche. Critics of the first approach emphasize, there is often no particular attention paid to an actual urban planning or an analysis whether these solutions realistically solve any problems of residents, while applying ready-made components.

In second generation, called Smart City 2.0, a technological transforming initiative is driven by local governments that are expected to understand real and essential needs of citizens. Critics point out that second generation still does not take into consideration a human factor while studying problems of the particular city and looking for technical solutions.

Third generation, also known as Human Smart Cities emphasizes the need to include initiatives and ideas of city residents in the urban planning. In Smart City 3.0 planning, the technology and residents who use this technology are equally important. City leaders understood that a reliable discussion with citizens is the best way to reveal and solve problems of the city. Local governments of Smart Cities 3.0 invite residents to active co-creation of innovative projects within a participatory budgeting for a social or economical city expansion.

Emerging smart cities provide tremendous opportunities that significantly improve the quality of life of its residents in many fields. Success is based on effective smart urban planning and re-envisioning. Regardless of the generation, the crucial factor in an aspect of designing the smart city is the technological layer. One of the key means of achieving the smart city

requires decision-making urban planners to obtain a basic knowledge of functioning and exemplary applications of latest technologies that already transform modern cities.

The smart city is dependent on effective functioning of sensors and actuators which are components of Internet of Things [2]. Usually sensors are hidden, but they are relevant to the modern city landscape. They incessantly measure and register various physical environment aspects. In urban conditions sensors monitor and manage public resources or transport systems. They also track and meter water and energy consumption in real time. An actuator on the other hand can optimize parameters of an attached equipment, basing its decision on collected data registered by the sensor. Both devices require a microcontroller which needs to be programmed for a specific task (fig. 1).

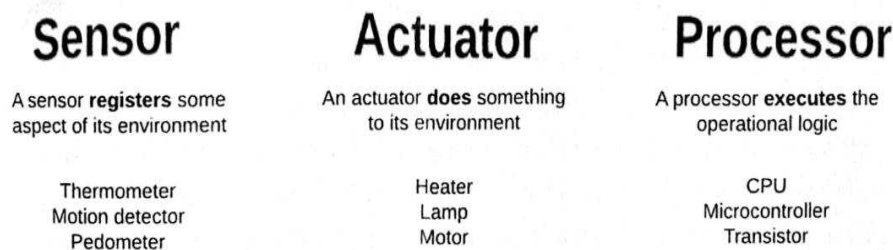


Figure 1 – Illustration of sensor and actuator [3]

In order to get the full potential and productivity of an IoT system, it needs more coordinated automation among system's components with as little human input and interference as possible [3].

Smart city runs on enormous sets of data. Potential sources of data include sensors or data services. In order to process collected raw data into understandable and useful information for humans, the city of the future requires an application of artificial intelligence algorithms. It is expected that AI will enhance an integration of machines and will be a crucial solution for developing smart traffic management systems that analyze traffic in real time, increasing an energy efficiency, optimizing water usage and its delivery costs by tracking consumption patterns or supporting an intelligence layer of healthcare appliances. Today, cities use AI-based video analysis in order to detect and identify well-known dangers or violations in procedures of property protection defined by administrators of the system. Video analysis provides tools for facial recognition, automatic number plate recognition or filter-based image recognition for an identification of various elements of images. AI will be a driver for an evolution of research on fully autonomous vehicles, also called self-driving cars which operate on Level 4 and Level 5 of a SAE autonomous driving classification. Vehi-

cles with a full level of an automation are controlled by automated driving systems that measure the driving environment [3, 4].

Though the concept of a blockchain is still seen as a new idea, its integration with an urban infrastructure will boost an information exchange among platform components. In effect this can improve security of citizens' data. An idea of the blockchain is based on a distributed ledger. Once the transaction has been approved and committed in the distributed ledger, it can no longer be revoked or reversed in any way. An information about the transaction is free and open for anyone to see that it has been noted in the system. The blockchain is widely used in systems where guarantying trust and validating data is a key issue [5]. An integration of the blockchain with IoT systems can also be used to prevent distributed denial of service (DDoS) attacks on the IoT-enabled platform. It is expected that the blockchain will support charging systems and urban properties management [3, 4].

In short, the concept of a smart city undoubtedly provides new solutions which help city leaders to effectively manage city's resources. Technological solutions that are already created provide possibilities to start process of rethinking and rebuilding existing cities into smart cities. An implementation of truly smart cities is a process that combines various elements together and needs investments and improvements in a new infrastructure and emerging innovative technologies. But what is most important is the fact that every change in an urban ecosystem requires adynamic cooperation of local governments, businesses and city residents.

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