

IOT SYSTEMS. ANALYSIS OF INFORMATION TRANSMISSION SYSTEMS

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Abstract

Today, IoT systems are very widely used in all industries. The Internet of Things is a network of electronic devices equipped with built-in technologies to interact with each other and the external environment. Nowadays, IoT is becoming an integral part of our life. In particular, our scientists have been presenting experiments with high results, from home automation systems to high-precision medical devices. High-speed wireless networks and a modern electronic base allow IoT devices to efficiently and seamlessly collect, process and transmit large amounts of data.

Keywords: Bluetooth, Wi-Fi/802.11, ZigBee, 5G, Sigfox, NB-IoT, LoRa- WAN.

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IoT has further enabled devices to be used in remote locations requiring minimal physical monitoring and maintenance. For example, the use of IoT devices for water facilities is very beneficial. By installing devices for water filters, it is necessary to replace, correct or repair some part of it. Through sensors to this place itself without going there, it is possible to determine the condition of the devices by water hardness, salinity and other parameters.

Any existing wireless data transmission technologies must have characteristics such as range, speed, and energy efficiency. In this regard, range and energy efficiency are of the utmost importance.

Internet devices are based on three main principles. First, the always available communication infrastructure, secondly, the global identification of each object, and thirdly, the ability of each object to send and receive data through the private network or Internet connected to it. [1]



Networks with low power consumption and short distances:

Low-power, short-haul networks are ideal for home, office and other small environments. Small batteries are enough for their operation. As a rule, such networks are more economical in operation.

Bluetooth 5.0 - Designed specifically for Internet applications, operates at 2.4 GHz at speeds of up to 1 Mbit / s, but uses 40 channels of 2 MHz each and allows for local positioning systems. Bluetooth 5.0 enables high-speed data transfer The most important thing about BLE is that communication devices can switch to synchronous operation mode. [2]

ZigBee - Zigbee consumes less power by putting low-performing devices into sleep mode. End devices wake up from sleep mode only on a predetermined event, such as pressing a button, running a timer, etc. The disadvantage of ZigBee technology is that it is not often used in devices such as smartphones.

NB-IoT operates on licensed GSM or LTE bands and provides connectivity. Provides long-distance operation with low power consumption. Because NB-IoT is secure, it supports data transmission, works over long distances, and supports many devices. [3]

5G is the fifth generation of communication. 5G includes the development of a new radio interface (NR), improvements to existing ones, radio LTE Advanced Pro and the development of a new core network architecture. 5G technology works on devices such as smartphones or tablets. These devices receive information from sensors on the human body and forward it to the SSOP. [4]

SigFox is a technology developed specifically for Internet of Things applications by the French company SIGFOX. This technology uses base stations using ultra-thin band (UNB) binary phase shift keying (BPSK) and changes the phase of the carrier wave to encode data. This allows to reduce the level of noise on the receiving side, therefore, to make receiving devices cheaper. [5]

LoRaWAN is developed by the LoRa Alliance. LoRaWAN can operate up to 20 km at speeds of up to 50 kbps. LoRaWAN is perfect for healthcare. Interference can cause potential problems when operating in unlicensed frequency bands. [5]

Wi-Fi is a wireless LAN technology with devices based on IEEE 802.11 standards. Currently, a whole family of standards is being developed for the transmission of digital data streams over radio channels. A Wi-Fi signal can be transmitted for miles



even at low transmission power, but an antenna is needed to receive a Wi-Fi signal over long distances from a regular Wi-Fi router. [6]

Conclusion

IoT implementation improvement services are offered for the development of various systems and areas. Various data transmission technologies were considered in the thesis, such as Bluetooth Low Energy, Zigbee, 5G, SigFox, LoRaWAN and NB-IoT. It is recommended to use Bluetooth technology for wearable devices for short-range communication. And for long-distance communication use, there are several options.

Sources used

1. "Internet of Things" Abbas Dilmurodjonov
<https://community.uzbekcoders.uz/post/internet-of-things---tu--6038826846ec804cc4365693> Murojaat vaqti: 11.04.2022 12:50
2. Liu Y. H. et al. A 1.9 nJ/b 2.4 GHz Multistandard (Bluetooth Low Energy/ZigBee/IEEE802. 15.6) Transceiver for Personal/Body-Area Networks // Solid-State Circuits Conference Digest of Technical Papers (ISSCC). 2013. pp. 446–447.
3. NB-IoT vs LoRa Technology. URL:
https://docs.wixstatic.com/ugd/eccc1a_fb4ea35d44a5492b8c7c58c3b64cdc3d.p df
11.04.2022 14:30
4. Koucheryavy A., Makolkina M., Kirichek R. Tactile Internet. Ultra-Low Latency Networks // *Electrosvyaz*. 2016. No. 1. pp. 44–46.
5. <http://www.sut.ru/doci/nauka/review/20174> Murojaat vaqti: 12.04.2022 09:10
6. <https://ru.wikipedia.org/wiki/Wi-Fi> Murojaat vaqti: 12.04.2022 10:25.