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IMPROVING LIFT SAFETY BY USING DIGITAL TECHNOLOGIES

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The paper deals with the organization of the dispatching of elevators, as one of the important conditions for ensuring security, and monitoring the technical condition of elevator facilities through the use of digital technologies. This method allows to increase the safety of the operation of elevators, to ensure the operational control of the state of the elevator structures both by the operating organization and by the regulatory authorities, and to reduce the negative impact on the safety of the human factor.

Keywords: elevator, accident rate, safety, human factor, information technology

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ПОВЫШЕНИЕ БЕЗОПАСНОСТИ ЛИФТОВ ПУТЕМ ПРИМЕНЕНИЯ ЦИФРОВЫХ ТЕХНОЛОГИЙ

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Рассматриваются вопросы организации применения цифровых технологий для диспетчеризации лифтов, как одного из важных условий обеспечения безопасности и контроля за техническим состоянием лифтовых сооружений. Данный способ позволяет повысить безопасность эксплуатации лифтов, обеспечить оперативный контроль состояния лифтовых сооружений эксплуатирующей организацией и контролирующими органами, снизить негативное влияние на безопасность человеческого фактора.

Ключевые слова: лифт, аварийность, безопасность, человеческий фактор, информационные технологии.

Introduction. An important infrastructure element of any medium-sized and big city is lift facility. It is on the border of housing and communal services and the construction industry. Currently, lift facilities have become a separate industry operating on a global scale and include manufacturers of elevators and related equipment, organizations providing service maintenance and operation of elevators, system integrators.

Implementation of a range of measures is required for safe operation of lift equipment: creation of a system of regulation of commissioning and accounting of elevators, assessment of their technical condition at all stages of operation; providing information and automation of control and supervisory activities through the introduction of dispatching systems; use of control and supervisory activities of risk-oriented approach taking into account human factor risk [1-4].

Dispatching of elevator equipment. Main tasks of dispatching systems of elevator equipment are to lower operating costs and to provide safety of its operation through online monitoring of equipment operation, to create database on the operation of lifts and information analysis, to provide elevator control, automatic information about errors, faults and accidents [5].

Transfer of elevators parameters is through the dedicated line of dispatching communication, through a radio channel or with the use of infrastructure of other networks (telephone or TCP/IP). The main requirement for communication lines — reliable operation, interference resistance, protection from break-ins and damage.

The dispatching system is one of the necessary conditions that ensures the safe operation of elevators, as it allows increasing the efficiency and quality of their maintenance.

Digital technologies in dispatching. One of the ways to improve operation safety of elevator facilities in general, as well as to reduce the negative impact of human factor in particular, is the development of information and communication technology — a program using mobile devices (smartphone) based on ios and android and wireless Internet, which allows:

- to increase staff performance efficiency of official and production functions;
- to monitor elevator equipment current condition;
- to ensure information transparency on the state of the object to regulating authorities;
- to ensure the timeliness of technical inspection of elevators.

There are similar developments for such lifting structures as tower cranes [6]. However, the combination of elevator equipment with mobile devices for information transmission, object inspection and remote control of Rostekhnadzor (Federal Environmental, Industrial and Nuclear Supervision Service of Russia) at all sites online was not used at such hazardous facilities as elevators. This is the main difference of the proposed technology from the existing elevator dispatching systems.

When using information and communication technologies with the use of Internet resources, all information on the state of the facility will be open to Rostekhnadzor and it will be easier to control the hazardous facility.

The principle of the program is as follows (Fig. 1): central server receives data on lift park (within the operating organization — payroll, on a larger scale — from the databases of the Unified lift information-analytical system [7]), regulatory instruments (laws, regulations, technical regulations, etc.), manuals (instructions) for operation of elevators, officials and company specifications for employees, as well as data from dispatch systems of elevators.

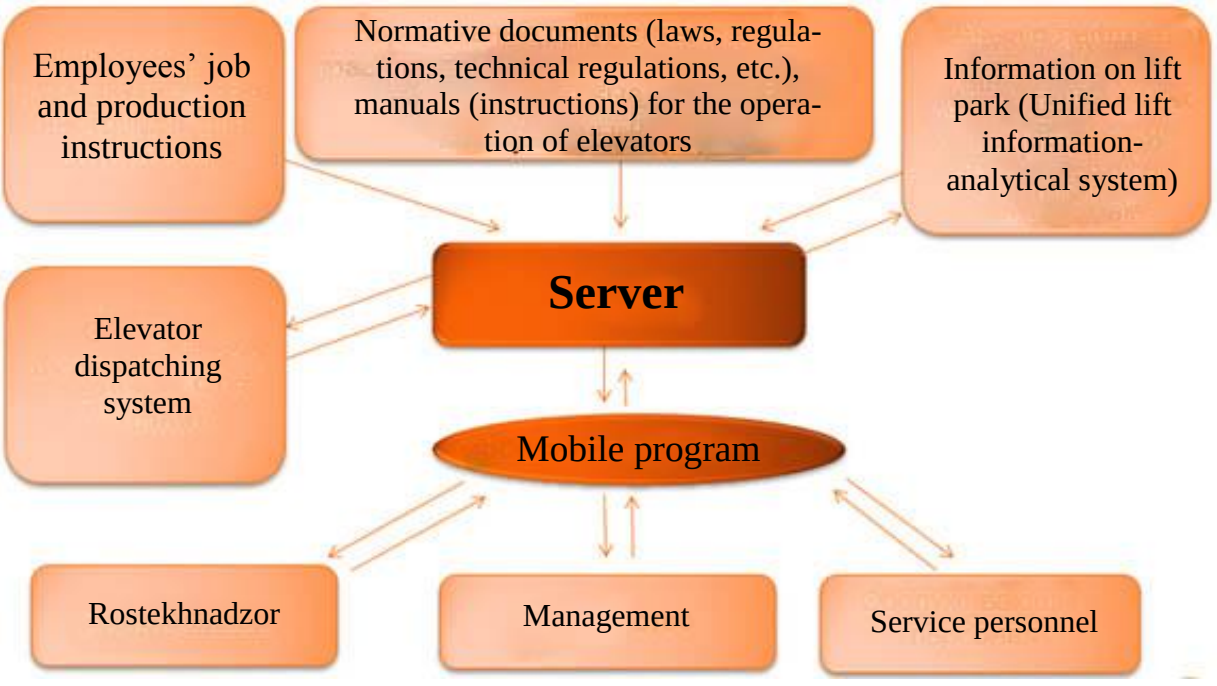

Fig. 1. Mobile program principle

Through the mobile application, and in accordance with his position and his authority, an employee receives information on elevators condition; the necessity in any works of their maintenance, repair; the timing and execution activities for inspection, maintenance, and examination of elevators; the nomenclature and content of the regulations and instructions for operation of elevators. In addition, it is possible to complete the supporting documentation and send it to the appropriate service or authority.

The personnel will log in using their personal login and password. When you enter data, the program sends information to the employee only in accordance with his job responsibilities. Each employee will be able to receive data only personally. There will also be an opportunity to use a mobile phone as an electronic pass to the objects with NFC-technology on the phone by integrating electronic pass cards.

Registration in the system is carried out by the person responsible for the facility safe operation.

Conclusion. The development of mobile technologies imposes new requirements and provides opportunities for the creation of operational control of technical systems online. The elevator industry should not be an exception in these circumstances.

The proposed development will allow for operational control over the technical condition of the elevator industry, thereby increasing safety of their operation.

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