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OVERVIEW OF DIGITAL LOCKS WITH ARTIFICIAL INTELLIGENCE

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In today's world, automation processes are increasingly penetrating our daily lives, and home safety is no exception [1-3]. Important place in this area is occupied by electronic locks, which offer modern solutions to protect our homes [4-6]. Thanks to innovative technologies and automated access control systems, such locks provide convenience, security and variety of access methods, which allows them to be integrated into overall smart home system.

In this work, we will consider four different models of electronic locks, analyze their characteristics, advantages and disadvantages, which will help to better understand which of them can be best choice for home.

First, main characteristics of Philips Easy Key Alpha lock (Fig. 1) are defined: numeric touch keypad, automatic locking system, modern black design, ability to open by code and built-in security system.

In course of analysis, advantages of Philips Ease Key Alpha lock were determined: ease of use without physical keys, automatic door closing, modern style, reliable security, ease of installation and management.



Figure 1 – Digital locks with artificial intelligence Philips Easy Key Alpha

The main disadvantages include: dependence on battery, higher cost compared to mechanical locks, need for periodic battery replacement, possible difficulties at low temperatures and risk of forgetting code.

The second analogue will be Philips Easykey DDL702E lock (Fig. 2) with following characteristics: smart lock with Wi-Fi, has ability to remotely manage access codes, supports various opening methods (smartphone, code, key), ability to receive access notifications and status changes, and is also intuitive interface and high level of encryption.

The advantages of lock are as follows: ability to control from anywhere in world, support for various access methods, real messages, wide range of mobile applications for ease of use, and advanced encryption systems for protection.

The disadvantages are: dependence on Wi-Fi (an unstable signal complicates management), power consumption (need to regularly replace battery), cost (higher price compared to traditional locks), vulnerability to hacker attacks and potential system failures.



Figure 2 – Smart lock Philips Easykey DDL702E

Thirdly, let's consider main characteristics of Philips Easykey7300 lock (Fig. 3): digital lock with elegant and compact design, support for various access methods (code, key, mobile application), has intuitive interface, high level of encryption and ease of installation.

The advantages of lock are defined: compactness, ease of use, ease of installation, high security and modern design that harmoniously fits into interior.

The disadvantages of such lock will be: dependence on power source (need to replace battery), higher cost compared to traditional locks, vulnerability to hacker attacks, possible software failures and need for user training.



Figure 3 – Smart lock Philips Easykey 7300

Fourth, let's look at main characteristics of Kaadas K9 Black lock (Fig. 4): electric lock with fingerprint function, access via fingerprint, key or mobile application, modern stylish design with Push-Pull handle, ease of installation and high level of encryption.

Let's highlight advantages of lock: ease of use (quick access by fingerprint), aesthetic appearance, convenient Push-Pull handle, support for multiple access methods and high level of protection.

Now let's highlight disadvantages: dependence on battery (may require replacement), higher cost compared to traditional locks, possible software failures, need for user training, and limited operation in low temperature conditions.



Figure 4 – Smart lock Kaadas K9 Black with fingerprint

Key aspects that you need to pay attention to when designing artificial intelligence lock for access control: safety & security; technical characteristics (reliability of hardware, energy efficiency and autonomy of operation, resistance to various weather conditions, speed of recognition system, quality and durability of mechanical components); AI functionality (biometric recognition algorithms, anomaly detection system and hacking attempts, adaptive learning to improve recognition accuracy, analysis of user behavioral patterns, prediction of possible failures and maintenance needs); user experience & integrations.

In this work, comprehensive review and comparative analysis of four modern digital locks with elements of artificial intelligence was carried out: Philips Easy Key Alpha, Philips Easykey DDL702E, Philips Easykey7300 and Kaadas K9 Black. The purpose of study was to determine main characteristics, advantages and disadvantages of each model to help consumers choose best solution to protect their homes. As result of analysis, it was found that all models under consideration offer high level of security and ease of use due to variety of access methods (fingerprints, codes, smartphone), but have common disadvantages, such as dependence on batteries and higher cost compared to traditional locks. The conducted research allows potential users to make informed choice of smart lock in accordance with their specific needs and priorities in ratio of functionality,

security, and usability. In future, this research will be prerequisite for creating your own lock design with artificial intelligence

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