

**THE ROLE AND IMPORTANCE OF OBJECT-ORIENTED PROGRAMMING IN THE
STUDY OF "INFORMATION TECHNOLOGIES IN TECHNICAL SYSTEMS"**

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Annotatsiya: Ushbu maqolada texnik tizimlarda axborot texnologiyalari fanini o'rganish jarayonida obyektga yo'naltirilgan dasturlash (OYD) yondashuvining o'rni va amaliy ahamiyati tahlil qilingan. Maqolada dasturlash paradigmalari ichida OYDning ustunliklari, texnik tizimlarni modellashtirish va boshqarishdagi qo'llanilishi, shuningdek, uni o'qitish jarayonida talabalar bilimni chuqurlashtirishdagi roli yoritiladi. OYD yondashuvi asosida texnik jarayonlarni avtomatlashtirish, ma'lumotlarni qayta ishlash, intellektual boshqaruv tizimlarini yaratish imkoniyatlari keng muhokama qilinadi.

Аннотация: В статье анализируются роль и практическое значение объектно-ориентированного программирования (ООП) в процессе изучения информационных технологий в технических системах. Показаны преимущества ООП среди парадигм программирования, его применение при моделировании и управлении техническими системами, а также его роль в углублении знаний студентов в процессе обучения. Широко обсуждаются возможности автоматизации технических процессов, обработки данных и создания интеллектуальных систем управления на основе ООП-подхода.

Annotation: This article analyzes the role and practical significance of the object-oriented programming (OOP) approach in the process of studying information technology in technical systems. The article highlights the advantages of OOP among programming paradigms, its application in modeling and controlling technical systems, as well as its role in deepening students' knowledge in the teaching process. The possibilities of automating technical processes, data processing, and creating intelligent control systems based on the OOP approach are widely discussed.

Keywords: object-oriented programming, technical system, information technology, class, object, polymorphism, encapsulation, modeling, algorithm, programming language.

Introduction

In modern society, technical systems are widely used in all aspects of our lives - from industrial production to transportation, energy, medicine and education. For these systems to work effectively, the software that controls them must be stable, reliable and flexible. The object-oriented programming (OOP) approach plays an important role in meeting such requirements.

The subject "Information Technologies in Technical Systems" forms the skills of effective use of information technologies in the analysis, modeling and automation of technical processes. Through this subject, the student not only understands the essence of technical processes, but also learns to implement them through software tools.

Therefore, OYD is of great importance not only as a programming methodology, but also as a key tool for shaping technical thinking. It teaches students to look at real-world problems from

an object-oriented perspective, think systematically, and express technical problems in algorithmic language.

1. The essence of technical systems and the role of information technology

A technical system is a set of technical tools aimed at achieving a specific goal and facilitating human activity. They usually consist of the following components:

- **Information part:** deals with the collection, transmission and analysis of data.
- **Control part:** performs decision-making and system management functions.
- **Execution mechanism:** performs practical actions (e.g. motor, actuator, manipulator).

Information technologies are the "brains" of technical systems. They create the following capabilities:

- automation of measurement and control processes;
- processing large amounts of data;
- establishing real-time communication between systems;
- creating digital control systems;
- support for decision-making based on artificial intelligence.

Programming languages serve as the primary tool for managing technical systems. This is where object-oriented programming comes into its own.

2. The essence and principles of object-oriented programming

Object-oriented programming is a programming paradigm based on representing real-world objects as software models. Each object has certain properties (attributes) and behaviors (methods).

The main principles of the OYD are:

1. **Encapsulation (Encapsulation)-** Combining data and the functions that process it within a single object. This increases the security of data in the application and prevents unnecessary external interference.
2. **Inheritance-** Allows you to create a new class based on an existing class. For example, you can create a "Temperature Sensor" or "Pressure Sensor" class based on the "Sensor" class.
3. **Polymorphism-** The same method can work differently for different objects. This makes the system flexible.
4. **Abstraction-** Simplifying complex systems allows us to isolate only the essential features.

These principles help create a clear, consistent, and reusable structure of the system when programming technical systems.

3. Application of OYD in technical systems

Programming technical systems is a multi-step process, and OYD shows its effectiveness at each stage of this process.

3.1. Modeling stage

OYD allows you to model real technical objects as classes. For example, in a production line:

- **Sensor**— information collection object,
- **Controller**— decision-making object,
- **Actuator**— is modeled as an object performing practical action.

This approach makes it easier to analyze, test, and improve the system.

3.2. Data management phase

Technical systems generate large amounts of data. Based on the OYD, this data is stored and managed in a structured way through classes. For example, values received from sensors are collected, analyzed and stored in the database through the “DataLog” class.

3.3. Automated control systems

In control systems, modules work independently of each other using classes created through OYD. For example, the “ControlUnit” class controls the algorithms of the production process, while the “DisplayUnit” class displays data on the screen.

3.4. Application in robotics

In robotics, OBJ is widely used. For example, the “RobotArm” class controls the movements of the manipulator, and the “SensorArray” class controls the measurements of the external environment. Each class is responsible for its own function, which ensures the reliability of the software architecture.

4. The role of learning OYD in the educational process

Teaching OYD in the subject "Information Technologies in Technical Systems" serves the following didactic goals:

- teaches students to think objectively;
- focuses on modeling real technical processes;
- forms a systematic approach;
- strengthens programming skills;
- combines theoretical knowledge with practical experience.

In practical sessions, students create programs that model technical processes using the principles of OYD in C++, Java, or Python programming languages. For example, when working with the Arduino platform, programming sensors, actuators, and controllers as objects in Python or C++ allows students to easily understand complex systems.

5. Advantages of OYD for technical systems

1. **Modularity:** allows the system to be divided into independent parts.

2. **Flexibility:** New features can be easily added to the system.
3. **Reuse:** allows you to reuse existing code in other projects.
4. **Reducing errors:** Each object is tested separately.
5. **System stability:** Reliability is ensured in the operation of the technical system.
6. **Simplifying complex systems:** Technical systems are structured through OYD.

6. Practical results and prospects

Today, the OYD-based approach is widely implemented in the following areas:

- **IoT (Internet of Things)** manage devices;
- **Automated production lines;**
- **Intelligent transportation systems;**
- **Energy systems monitoring;**
- **Digital diagnostic systems in medicine.**

In the future, these areas will expand further with the integration of artificial intelligence, neural networks, and cloud technologies. OYD serves as the software foundation for these processes.

Conclusion

In conclusion, the object-oriented programming approach in the study of information technology in technical systems plays an important role in developing technical thinking, forming practical skills, and creating modern digital solutions. OYD creates broad opportunities for modeling technical systems, automating management processes, and developing intelligent programs.

Through this approach, students not only learn to program, but also gain a deep understanding of the workings of technical systems and the ability to create innovative solutions. Thus, object-oriented programming has an indispensable place in technical education in today's information age.

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