

ABSTRACT

Developing artificial intelligence (AI)-based systems often faces complex challenges in terms of modularity, integration between components, and code maintenance. Frontend development for Assurance Case Playground (ACP), in particular, requires a systematic approach to managing the complexity of AI systems integrated with Large Language Models (LLMs).

This research aims to develop AI-based products using Object-Oriented Programming (OOP) methods for ACP frontend that can be integrated with LLM efficiently and modularly.

The implementation uses React class components with fundamental OOP principles (encapsulation, abstraction, inheritance, and polymorphism). The system is developed with a component-based architecture using the Higher-Order Components (HOC) pattern and isolated state management.

With the successful implementation of two main AI components: AiPanel as a chat interface with 298 lines of code and TokenPanel as a complex token management system with auto-generation capabilities. The implementation demonstrates effective OOP implementation with encapsulation through private methods, abstraction through clean interfaces, and high modularity with a clear separation of concerns.

Keywords: *object-oriented programming, artificial intelligence, react class components, large language model, assurance case playground, frontend development*