**UI/UX AUTOMATION USING LLM**

# Project Code:

*To be assigned*

# Project Advisor:

Dr. Fahad Maqbool

# Project Manager:

Dr. Muhammad Ilyas

# Project Team:

Muhammad Dawood (BSCS51F21S089): Team Lead Muhammad Rashid (BSCS51F21S084): Team Member Ghulam Rasool (BSCS51F21S080): Team Member **Submission Date:**

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# Abstract

The demand for efficient and intelligent UI/UX design processes has grown significantly. This project seeks to address this need by automating UI/UX workflows using Large Language Models (LLMs) [1] in combination with a Neo4j-based knowledge graph and OWL (Web Ontology Language) for semantic enrichment.

The project uses GraphRAG (Graph-based Retrieval-Augmented Generation) to enable context-aware querying and response generation[2]. Ontologies developed using Protégé, a popular ontology development tool [3], will serve as the backbone for the knowledge graph, ensuring semantic accuracy and scalability [2].

By integrating GraphRAG with an OWL-based knowledge graph, the framework will automate tasks like wireframe generation, design validation, and UI/UX adherence checks, ultimately delivering **Figma designs** as high-fidelity outputs for developers and designers.

# Background and Justification

Traditional UI/UX design relies heavily on manual efforts and expertise, leading to inconsistencies and inefficiencies. The introduction of knowledge graphs and ontologies has transformed data organization and decision-making. This project introduces:

* **OWL Ontologies** created in Protégé to define UI/UX principles, components, and relationships.
* **Neo4j Knowledge Graphs** to represent these ontologies and their data.
* **GraphRAG** to enable contextual retrieval and informed LLM responses.

This novel approach combines state-of-the-art tools and techniques to enhance productivity, consistency, and innovation in UI/UX design workflows while producing professional-quality outputs directly usable in **Figma** [3].

# Research Methodology

## Ontology Design and Knowledge Graph Construction:

* Use Protégé to create OWL-based ontologies [4] for UI/UX components, design principles, and relationships.
* Build a Neo4j-based knowledge graph to represent the ontology and store relevant data [4].
* Incorporate semantic reasoning to infer new relationships and validate data consistency [5].

## Integration with GraphRAG:

* Implement GraphRAG for context-aware retrieval of design principles and components from the knowledge graph.
* Use Cypher queries to retrieve graph data and provide it as input to the LLM.

## Framework Development:

* Develop features like:
* Wireframe generation using GraphRAG and ontology-based prompts.
* Consistency checks based on OWL-defined constraints.
* Interactive suggestions leveraging graph queries and LLM responses.
* Exporting generated wireframes into high-fidelity Figma designs.

## Evaluation and Refinement:

* Validate the system with real-world UI/UX scenarios, focusing on usability and efficiency.
* Refine the ontology and knowledge graph based on evaluation feedback.

## Deployment and Documentation:

* Document the framework architecture and methodologies.
* Deploy a prototype for academic and industrial testing.

# Project Scope

1. Development of OWL-based ontologies using Protégé [6].
2. Construction of a Neo4j knowledge graph integrated with GraphRAG.
3. Automation of wireframe generation and design validation.
4. Export of generated wireframes into **high-fidelity Figma designs** for developers and designers.

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| **Phase** | **Duration** | **Deliverables** |
| Requirement Analysis | 2 weeks | OWL ontology schema, initial knowledge graph structure. |
| Ontology Development | 3 weeks | UI/UX ontology in Protégé. |
| Knowledge Graph Design | 2 weeks | Fully integrated Neo4j graph with OWL ontologies. |
| GraphRAG Integration | 3 weeks | Context-aware query and response system. |
| Framework Development | 2 weeks | Prototype with key automation features, including Figma design export. |
| Evaluation & Testing | 2 weeks | Test cases, performance reports, user feedback. |
| Documentatio n | 1 week | Project report, user guide, ontology schema. |

# High-Level Project Plan

References

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