Project Scope

Version 2.0

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Prepared for Prof David Smith

Date [04-15-2025]

Abstract

This document outlines the scope, structure, and strategic direction for the CHI research team's involvement in developing a personalized Large Language Model (LLM) system as part of the broader CHI initiative. The aim is to harness artificial intelligence to interpret, recreate, and manipulate various inputs, including literature, visual art, and mathematical problems. The outlined plan involves onboarding, model evaluation, data governance, model training, reinforcement learning, system integration, and long-term optimization. Through structured phases, the team explores open-source LLMs, evaluates suitable architectures, ensures ethical compliance, and develops a scalable, high-performing AI model that delivers intelligent responses while remaining lightweight and adaptable to the CHI ecosystem.

Objective

The core objective of this project is to research, develop, and implement an efficient, ethical, and scalable LLM tailored to the CHI project's interdisciplinary needs. Specifically, the CHI research team seeks to:

1. **Evaluate and benchmark** existing open-source and commercial LLMs.

2. **Create a customized LLM** optimized for interpreting and generating various input types.

3. **Design and implement** a scalable AI framework with real-time personalization.

4. **Ensure ethical compliance** by incorporating fairness, transparency, and data governance measures.

5. **Establish feedback-driven optimization** to support long-term AI adaptation and responsible use.

Literature Review

The CHI project aims to explore and develop a custom Large Language Model (LLM) that can efficiently process and generate content across domains such as literature, artwork, and mathematical problems. Within this scope, the research focuses on the entire lifecycle of LLM development—starting with the evaluation of open-source models, continuing through data collection, cleaning, and manipulation, and culminating in the training, deployment, and refinement of a custom-built AI system.

Ethical considerations are central to the project, with specific attention paid to fairness, transparency, bias mitigation, and regulatory compliance. The framework includes mechanisms to ensure explainability, user consent, and alignment with legal standards. These constraints are integrated into the foundational phases of the

project, guiding both the design and implementation processes.

Technically, the project involves benchmarking existing LLMs, selecting appropriate models based on task complexity and resource availability, and refining performance using methods such as reinforcement learning. It also emphasizes the importance of real-time interaction, dynamic personalization, and long-term scalability. The system architecture is designed to support modularity and continuous optimization while maintaining secure data governance through anonymization, encryption, and access control.

This initiative builds its foundation entirely from internal project planning, structured development phases, and practical implementation goals, ensuring that all research and development are tailored to the specific objectives of the CHI project.

1. Team

This Agreement shall begin on [02/23/2025] and continue for [05/22/2025] between professor David Smith and the following CHI members:

1   Kazi Tasin (Project Leader)

2   Kazi Islam

3   Naureen Asha

2. Resources

1   [BBS Website](#)

2   [Github](#)

3   [Discord Channel](#)

4   [Our LLM Project Scope](#)

3. Links For [Onboarding](#)

1   **[GitHub Account](#)** (Everything is posted and updated on Github)

2   **[Zotero Account](#)** (It will help you let Professor know, what we are doing, what we have done)

3   **[Discord Account](#)** (For informal communication with professor and other members from different teams)

4. Project Phases and Deliverables

Phase 1: Onboarding and Survey (Weeks 1-2)

- **Complete Onboarding** (BBS, BRPS, Github, Zotero)
- **Survey AI Models:** Evaluate emerging LLMs for real-time interaction and multi-modal processing.

- **Benchmark AI Performance:** Compare commercial and open-source models in the context of AI driven mediation within BRPS.

Develop AI Integration Framework (Weeks 3-18)

Phase 2: Foundation & Requirements Analysis (Weeks 3-6)

- **Define Personalization Criteria**
  1. Identify key personalization parameters (e.g., user behavior, preferences, interaction history).
  2. Establish levels of personalization (basic, intermediate, advanced).
  3. Define adaptive learning mechanisms for continuous refinement.
- **Ethical Constraints & Compliance**
  1. Set boundaries for AI decision-making (e.g., fairness, bias mitigation, transparency
  2. Align with regulations (GDPR, CCPA, etc.) and industry standards.
  3. Ensure explainability and user consent mechanisms.
- **Data Requirements & Governance**
  1. Specify data types (structured, unstructured, real-time).
  2. Determine data sources and validation techniques.
  3. Establish data security measures (encryption, anonymization, access control).

Phase 3: Model Selection & Training(Weeks 7-10)

Week 7: Model Selection

Goal: Decide which model(s) to use and prepare for training

1. Define the problem clearly (e.g., classification, regression, NLP, image recognition).

2. Research suitable AI approaches

   Machine Learning (e.g., decision trees, SVM)

   Deep Learning (e.g., CNNs, RNNs, Transformers)

   Rule-based systems (if applicable)

3. Evaluate pros and cons of each model type for your specific use case.

4. Choose the initial model(s) based on:

   Dataset size

   Task complexity

   Interpretability

   Available computing resources

5. Select performance metrics (accuracy, F1 score, AUC, etc.)

6. Decide on development tools/libraries (e.g., scikit-learn, TensorFlow, PyTorch)

Week 8: Data Preparation & Preprocessing

Goal: Get your data ready for training

1. Gather and clean the datasets

   Remove duplicates, handle missing values

2. Split datasets into training, validation, and test sets (e.g., 70/15/15)

3. Normalize/standardize features (especially for neural networks)

4. Apply data augmentation (if using image or audio data)

5. Label encode/categorize variables where needed

6. Identify potential bias in the dataset (e.g., class imbalance, underrepresented groups)

Week 9: Model Training

Goal: Train and evaluate baseline models

1. Set up training pipeline using the chosen framework

2. Train the model on the training set

3. Monitor training performance (loss curves, accuracy trends, etc.)

4. Tune hyperparameters using the validation set

5. Evaluate the model on the test set using your chosen metrics

6. Document performance and training observations

Week 10: Reinforcement Learning & Model Refinement

Goal: Improve and adapt the model

1. If applicable, implement reinforcement learning

   Define environment, states, actions, rewards

Use a framework like OpenAI Gym

2. Incorporate online learning or active learning (optional)

3. Run further training iterations for adaptive improvement

4. Compare performance pre- and post-RL or refinement

5. Run final evaluation on unseen data

6. Prepare a summary of model performance and limitations

Phase 4: AI Model Development & Implementation (Weeks 11-14)
- **System Architecture & Integration**
    1. Design modular, scalable AI architecture.
    2. Integrate AI with existing systems (APIs, cloud services, edge computing).
    3. Optimize real-time processing for dynamic personalization

Phase 5: AI Model Development & Implementation (Weeks 14-16)
- **Testing & Validation**
    1. Conduct A/B testing for personalization effectiveness.
    2. Implement fairness audits and bias detection frameworks.
    3. Ensure compliance with ethical and data governance standards.

Phase 6: Deployment, Monitoring & Continuous Optimization (Weeks 16-18)
- **Deployment Strategy**
    1. Roll out AI features in phases (pilot testing, controlled releases).
    2. Ensure rollback mechanisms in case of failure.
    3. Optimize for cross-platform compatibility.
- **Real-Time Monitoring & Feedback Loops**
    1. Establish KPIs for AI performance (accuracy, response time, user satisfaction).
    2. Monitor model drift and retrain AI models as needed.
    3. Enable user feedback integration for continuous improvement.

- **Long-Term Optimization & Scaling**
    1. Expand AI capabilities based on user engagement trends.
    2. Automate ethical compliance checks.
    3. Scale AI integration across broader applications while maintaining responsible AI use.

5. FWS Timesheet Template

[FWS Timesheet Template](#)

6. Version History

Version	Created on	Created by
1.0	3/16/2025	Kazi Islam
2.0	04/15/2025	Kazi Islam