



FINAL YEAR PROJECT REPORT

MENTAL AND EMOTIONAL HEALTH SUPPORT SYSTEM USING CBT-BASED LLM

**In fulfillment of the requirement
For degree of
BS (COMPUTER SCIENCES)**

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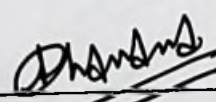
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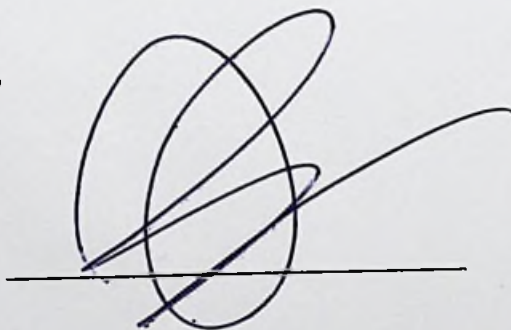
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Specially dedicated to

My beloved mother, father and sister

Ahmed Farrukh

My beloved grandmother, mother and father

Shavana Yousuf

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MENTAL AND EMOTIONAL HEALTH SUPPORT SYSTEM USING CBT-BASED LLM

ABSTRACT

Despite stigma, high costs, and resource scarcity, mental health challenges are increasingly afflicting people in all generations, but support on time, in personal and affordable manners, is still not easily reached. For this reason, Artificial Intelligence is taking on a nurturing role as a means of augmenting emotional support and scale delivery of therapeutic interventions. In this project, a Generative AI-Based Mental and Emotional Health Support System is presented, which is built upon a modular agent-based architecture to simulate a CBT inspired support. The system is built using the Gemini API and LangChain, integrating nine specialized tools such as a Retrieval Tool (Pinecone), Mood Analysis, Thought Reframing, Crisis Detection, Reflective Listening and a Web Search component (Tavily). The tool set consists of each tool as an autonomous agent coordinated through a central executor that dynamically determine user input and select the appropriate tool for instance and intent. The prompt engineering is based on modular template design with structured instructions, persona settings and few shot learning to guarantee tone, safety and coherence. Retrieval Augmented Generation (RAG) puts responses in relation to scientifically validated mental health literature to increase factual accuracy. It has a private and seamless interaction through a Streamlit interface. Crisis detection and topic filtering provide ethical safeguards to protect the user. Users and psychologists had positive feedback on the system as a potential reliable and emotionally intelligent digital mental health companion.

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