**AI Agent Architect IBM SkillsBuild**

**Presented By: Cosmic**

**Group Members:**

1. **Kirty Gupta**
2. **Vanshika**
3. **Rishika Gupta**
4. **Shlok Arora**
5. **Ishant Rajput**
6. **Parth Arya**

**Report**

**Title: Development of a Multi-Agent AI System for Mental Health Screening and Support**

**Introduction:**

Mental health challenges such as depression, anxiety, and emotional stress have become increasingly prevalent, especially in the digital age. Despite the growing awareness, many individuals continue to suffer in silence due to stigma, lack of accessible resources, or the unavailability of timely mental health services. Traditional mental health interventions often require professional involvement, which may not be immediately accessible or scalable.

With the rapid advancement of AI and large language models, there is a growing opportunity to provide intelligent, empathetic, and scalable mental health support systems. This report outlines the development of "MindCrew" — a multi-agent AI-based system designed to perform mental health screening, emotion analysis, support guidance, and risk escalation. The project uses transformer-based emotion detection and role-based agents, implemented via Google Colab, to simulate an accessible and privacy-conscious mental wellness assistant.

**Problem Statement:**

The primary challenge addressed by this project is the absence of scalable, low-cost, and stigma-free tools for early detection and emotional support in mental health. Traditional diagnostic approaches often require scheduled consultations, trained professionals, and manual evaluation — making them costly and inaccessible for large populations.

MindCrew aims to fill this gap by creating an automated, AI-powered mental health assistant capable of providing real-time emotional assessment, identifying potential risks, and offering supportive feedback — all without the need for immediate human intervention.

**Objective:**

The main objective of this project is to design and evaluate a multi-agent AI framework that can:

* Conduct mental health screening using validated questionnaires (e.g., PHQ-9).
* Analyze emotional states through user input using a transformer-based model.
* Provide tailored emotional support and recommendations.
* Detect escalation risks and advise professional help if needed.
* Generate session summaries and reports for follow-up or self-awareness.

**Why This Problem?**

Mental health is a growing global concern with high incidence rates across age groups and geographies. Suicide, self-harm, and untreated anxiety disorders are on the rise. Many individuals — especially students, remote workers, and underserved populations — hesitate to seek help due to stigma, cost, or unavailability of services.

Early screening and emotional feedback can prevent minor issues from becoming major crises. By automating these processes using intelligent agents, this project provides a scalable and private solution that empowers users to understand and manage their mental well-being — contributing to healthier, more resilient communities.

**Solution:**

**Overview:**

The proposed solution involves designing and implementing a multi-agent AI system that collaborates to assess a user's mental well-being through conversational input and standardized screening. Each agent plays a unique role — from emotion detection to triage — working together to deliver a seamless and empathetic mental health support experience.

The system is deployed in a Google Colab environment and utilizes natural language processing (NLP) models for emotion recognition, clinical scoring (e.g., PHQ‑9), and contextual response generation. By leveraging CrewAI-style task delegation, the system enhances efficiency, reliability, and personalization — making it accessible for both individual users and organizations.

**Features:**

* **Early Detection:** Uses validated mental health screening tools (like PHQ-9) to detect signs of depression, anxiety, and stress from user input.
* **Emotion Recognition:** Applies transformer-based emotion classifiers to analyze emotional tone and detect dominant mood in real-time.
* **Multi-Agent Collaboration:** Integrates multiple AI agents (Screening Agent, Emotion Agent, Support Agent, Escalation Agent, Report Generator) to simulate a full-service virtual counselor experience.
* **Privacy-Preserving & Low-Cost:** Operates in private cloud environments like Google Colab and supports local model deployment, making it secure and cost-effective.
* **Scalable Architecture:** Can be expanded into voice assistants, chatbots, mobile apps, or integrated into existing mental health platforms for wide adoption.

**Technical Implementation:**

Data Collection and Preprocessing: Uses public datasets (like EmotionLines or GoEmotions) and synthetic text input for model fine-tuning. User inputs are sanitized and tokenized for LLM ingestion. Model Selection and Training: Emotion detection is powered by a fine-tuned transformer model (e.g., DistilBERT or BERT + emotion classifier). Screening uses logic-based scoring for questionnaires like PHQ‑9.

**Agent Design and Role Assignment:**

* **Screening Agent:** Presents and scores mental health questionnaires.
* **Emotion Agent:** Detects emotion from textual input.
* **Support Agent:** Generates empathetic responses based on mood.
* **Escalation Agent:** Identifies red flags or high-risk cases.
* **Report Agent:** Compiles session logs and summary reports.

**System Flow:** Each agent is triggered sequentially or concurrently via a relay or orchestrator module, similar to CrewAI pipelines.

**Evaluation:** Output is validated based on emotional accuracy, escalation sensitivity, and quality of response. Qualitative user testing or simulated conversations are used for feedback.

**Why This Tech Stack?**

* **Google Colab:** Enables fast, collaborative prototyping without infrastructure overhead.
* **Hugging Face Transformers:** Provides access to pretrained emotion models and fine-tuning capabilities.
* **CrewAI:** Facilitates orchestration between agents and memory handling for multi-turn dialogue.
* **Open-Source Focus:** Ensures transparency, cost control, and ability to deploy offline for enhanced privacy.

**Conclusion:**

This project introduces an innovative and scalable approach to address the growing challenge of undiagnosed and untreated mental health conditions. By employing a collaborative, multi-agent AI system, MindCrew can screen, support, and escalate mental health conditions in a timely, empathetic, and private manner.

Unlike traditional methods, MindCrew offers continuous availability, personalization, and early intervention capabilities — making it suitable for deployment in academic, workplace, or community settings. Future work can expand into multilingual support, audio input processing, and integration with real-time therapist networks.