**Functional Requirements**

1. The GUI shall provide a text area for users to input program instructions.
2. A "Load Program" button shall load the inputted code into UVSim memory.
3. Memory contents shall be displayed in a scrollable table with addresses and values.
4. A "Run" button shall execute the loaded program until completion.
5. A "Step" button shall execute the next instruction and update the GUI.
6. Real-time display of the accumulator, program counter, and instruction register.
7. Input validation for instructions (must be integers between -9999 and +9999).
8. A "Reset" button shall clear memory, input fields, and registers.
9. Error messages shall appear in a dedicated panel with plain-language descriptions.
10. Support for loading/saving programs to/from .txt files.
11. A "Help" menu with instructions and example programs.
12. A pause/resume toggle during program execution.
13. Syntax highlighting for inputted program code.
14. A dark/light mode theme toggle.
15. Responsive UI that avoids freezing during long operations.

**Non-Functional Requirements**

1. The application shall launch within 3 seconds on modern hardware.
2. The GUI shall be compatible with Windows, macOS, and Linux.
3. User inputs shall be sanitized to prevent code injection.