HOMEWORK 1

(Software Engineering CS487)

1. Clarifying Requirements:

a. "Robo-tutor must explain concepts effectively."

- **Clarification:**
    - Tailor explanations to the student's learning style and prior knowledge.
    - Use clear, concise language appropriate for the student's age and vocabulary.
    - Employ diverse modalities for explanation (visuals, simulations, animations, text-to-speech, etc.).
    - Offer multiple examples and analogies to solidify understanding.
    - Provide opportunities for interactive practice and feedback.

b. "Robo-tutor must recognize a student's mistake and explain the error without 'giving away' the answer."

- **Clarification:**
    - Identify specific errors without directly revealing correct answers.
    - Guide students through a process of self-discovery and reasoning.
    - Offer hints and prompts that steer thinking in the right direction.
    - Break down problems into smaller steps to isolate misunderstandings.
    - Encourage experimentation and exploration of different approaches.

c. "Robo-tutor must make learning fun."

- **Clarification:**
    - Incorporate gamification elements (points, badges, levels, challenges).
    - Personalize learning experiences with relevant interests and preferences.
    - Foster a positive, encouraging, and supportive learning environment.
    - Use humor, storytelling, and relatable examples to engage students.
    - Offer creative activities and challenges that stimulate curiosity.

2. Test Cases:

a. Effective Explanation: - Student successfully answers questions about explained concepts. - Student demonstrates ability to apply concepts in new scenarios. - Student provides positive feedback on clarity and helpfulness of explanations.

b. Error Correction: - Student identifies and corrects errors after receiving feedback. - Student demonstrates understanding of underlying concepts. - Student independently solves similar problems without direct answers.

c. Fun Learning: - Student exhibits high levels of engagement and motivation. - Student expresses enjoyment and satisfaction with learning experiences. - Student voluntarily spends increased time interacting with robo-tutor.

3. H-C-I Protocol:

Interaction Modes: - Natural language conversation (text or speech) - Touchscreen interface - Gesture recognition - Physical manipulation of objects

Interaction Flow:
1. Student initiates interaction (e.g., asks a question, requests help).
2. Robo-tutor assesses student's understanding through dialogue or assessment probes.
3. Robo-tutor provides tailored explanation, feedback, or guidance.
4. Robo-tutor offers opportunities for practice and assessment.
5. Robo-tutor adjusts interaction based on student's progress and needs.
6. Student provides feedback on the interaction (optional).

Additional Considerations:

- Adaptability to different student abilities and learning styles.
- Personalization of content and interactions
- Engagement and motivation strategies
- Ethical considerations (e.g., privacy, equity, bias)