AI-Powered Language Translation & Accessibility Tool

Course Description

This course empowers students to create innovative AI-powered tools that break language barriers and improve accessibility for diverse communities. Through engaging, hands-on projects, students will explore the intersection of artificial intelligence, linguistics, and inclusive design. This curriculum aims to foster not only technical skills but also empathy and problem-solving.

Industry-Specific Problem

Language and communication barriers affect millions of people globally. These barriers manifest in many ways:

1. Educational Disparities

- Students from non-native language backgrounds struggle to comprehend lessons and textbooks.
- Limited access to multilingual educational content affects academic performance.

2. Disabilities

- Hearing-impaired individuals face challenges in understanding verbal instructions.
- Visually impaired learners often cannot access written or on-screen materials effectively.

3. Global Communication

- Businesses and institutions face miscommunication in international collaboration.
- Emergency services and public communication may not reach non-native speakers in time.

4. Digital Content Accessibility

- Many websites and applications are not multilingual.
- Voice interfaces often lack accurate translation and accessibility features.

AI-Based Solutions

1. AI-Powered Language Translator

- Real-time translation of voice and text using AI models like Google Translate API or HuggingFace models.
- Supports multilingual conversations and subtitles for videos.
- Integration in educational platforms to make content accessible in multiple languages.

2. Speech-to-Text & Text-to-Speech Converters

- Converts classroom audio into written text for hearing-impaired students.
- Converts text into speech for visually impaired users.
- Built using platforms like Scratch or Code.org for beginner-friendly implementation.

3. AI Chatbot for Language Learning

- Chatbot uses natural language processing to simulate conversation practice.
- Offers vocabulary quizzes, pronunciation checks, and instant feedback.
- Helps students build confidence in foreign languages.

4. Multilingual Accessibility Plugin (Advanced Option)

- Students can create a browser extension that translates web pages on-the-fly.
- Includes TTS and STT toggle features.
- Helpful for disabled and non-native users browsing digital content.

Project Details

- **Target Grades**: 6, 7, 8
- **Duration**: 6 Weeks
- **Schedule**: 2 Lessons per Week
- **Deliverables**: 1 Mini-Project or Milestone per Week

Week-by-Week Breakdown:

Week 1: Introduction to AI, Language Barriers, and Accessibility - Problem exploration - Brainstorming ideas - Researching AI tools

Week 2: Build Speech-to-Text or Text-to-Speech Prototypes - Use Scratch/Code.org - Simple voice input and text display system

Week 3: Develop AI-Powered Language Translation Feature - Integrate text translation APIs - Test with simple multilingual phrases

Week 4: Create an AI Chatbot for Language Learning - Add input-response logic - Train with basic grammar and vocabulary

Week 5: Combine Features into a Unified App - Design UI/UX - Merge translation, STT, TTS, and chatbot components

Week 6: Final Presentation and Testing - Real-world testing - Peer review and feedback - Showcase demo and document reflections

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Team Structure

- **Solo Mode**: Student handles all tasks (coding, design, testing)
- **Group Mode**:
- Developer: Codes AI features
- Designer: UI/UX
- Tester: Evaluates usability and accessibility
- Presenter: Prepares project presentation and documentation

Learning Outcomes

- Understand and apply basic AI concepts
- Build assistive technologies using beginner-friendly tools
- Improve empathy and design thinking
- Enhance problem-solving and teamwork skills

Tools & Platforms

- Scratch / Code.org (STT, TTS)
- Google Translate API / HuggingFace Transformers
- Replit / Glitch / Thunkable for App Development

Assessment Criteria

- **Innovation (25%)**: Creativity of the AI-powered solution
- **Technical Implementation (25%)**: Functionality and integration of AI tools
- **Impact (20%)**: How well the tool addresses accessibility and language issues
- **Teamwork & Documentation (20%)**: Clear roles, process journal, and collaboration
- **Presentation (10%)**: Clarity and persuasiveness of final demo

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Real-World Relevance

- Projects can be submitted to science fairs or innovation competitions.
- Encourages students to pursue careers in AI, accessibility tech, and language technology.

Optional Extension Ideas

- Add voice emotion detection to understand tone
- Use AI to detect and correct grammar in spoken sentences
- Integrate into classroom websites or LMS for practical use

This curriculum encourages innovation, empathy, and inclusion—key values for the future of technology and society.