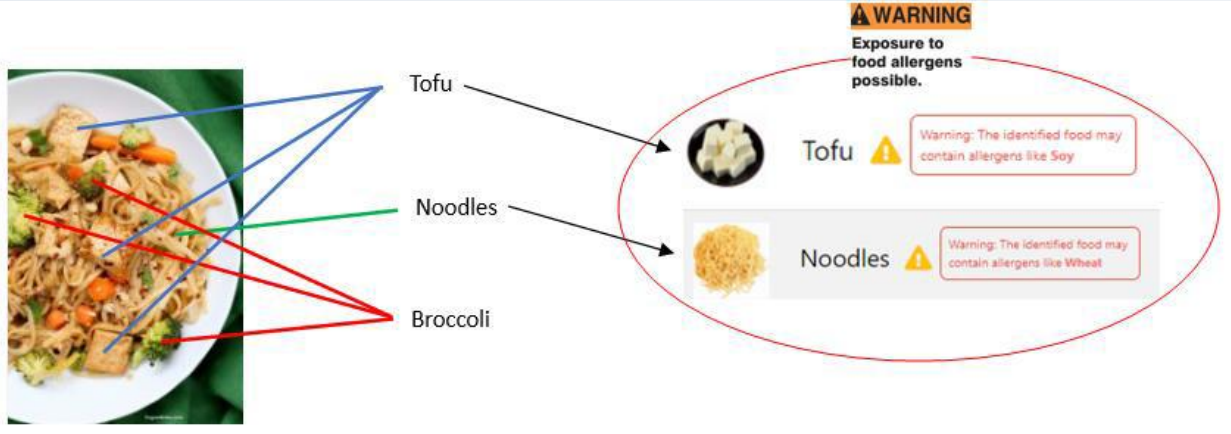
CAPSTONE PROJECT PROPOSALS FOR 2025-26

RAYMOND PANG'S PROJECTS : PWM1- 5

PWM1

FOOD COMPONENT DETECTION FOR DIETARY RECOMMENDATION

- This is a collaborative project with Dr. KC Kwan Assistant Professor, Computer Science Department, California State University, Sacramento, USA
- Employ computer vision and AI for food/nutrition advices



Expected Outcome

1. A database of foods and their nutrients.
2. A system that can recognize food components from images.
3. A simple interface for users to enter their dietary preferences and health goals.
4. Personalized dietary advice based on the food detected.
5. Reports on what nutrients users are consuming and tips for improvement.
6. Compatibility with mobile devices for dietary tracking and recommendation.

PWM2 EMBEDDED AI FOR THE MULTIFUNCTIONAL DELIVERY ROBOT

- This is a collaborative project with Mr. YIU Chi Wai, Senior Engineer, Hong Kong Logistics and Supply Chain MultiTech R&D Centre
- Enrich the multifunctional delivery robot with AI functionalities.
- Focus on AI chatbot, object recognition, and autonomous navigation
- involve developing and implementing machine learning models to facilitate these functionalities, deploy on the robotics system (e.g. ROS).

Expected Outcome

1. Integration of AI chatbot functions for enhanced user interaction.
2. Development of object recognition capabilities for accurate item identification.
3. Implementation of autonomous navigation algorithms for efficient route optimization.
4. A multifunctional delivery robot capable of operating in diverse environments.

PWM3 MOBILE APP TOUR GUIDE WITH VISION AND LLM FOR UNIVERSITY CAMPUS

- Create a smart mobile application that enhances the visitor experience on university campuses

Mobile App frontend

Multimodal LLM

Description and Guidance

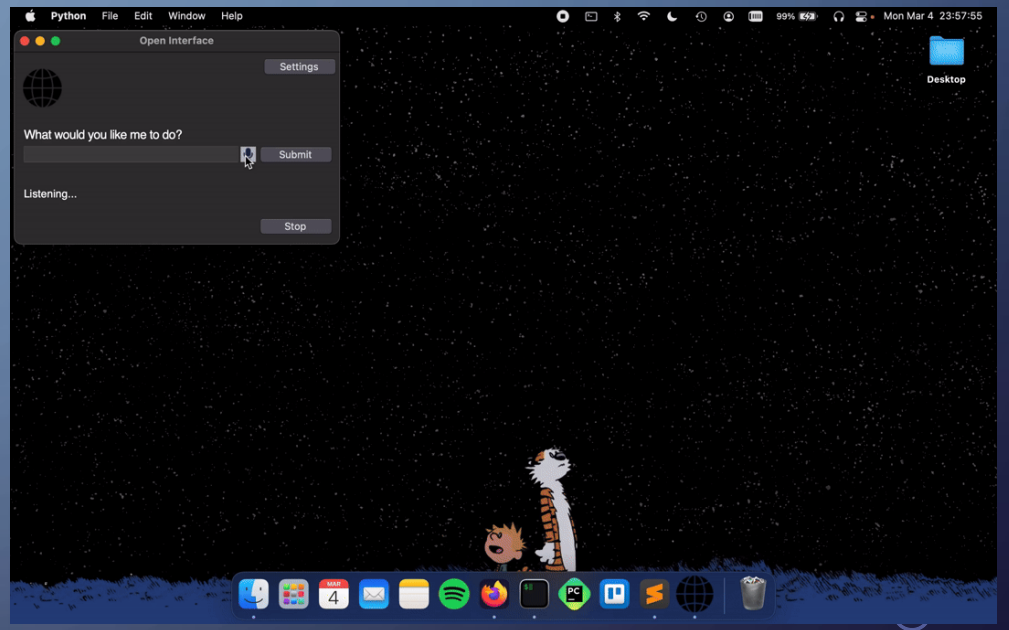
This is the Plaza

Expected Outcome

1. A mobile app that uses vision technology to recognize campus landmarks.
2. Integration of LLM for interactive and conversational capabilities.
3. Real-time delivery of information and tour guidance based on recognized locations.
4. Personalized tour experiences tailored to user preferences and interests.
5. A user-friendly interface for easy navigation and interaction.
6. Increased visitor engagement and satisfaction with campus tours.

PWM4 RPA (ROBOTIC PROCESS AUTOMATION) FOR SCREEN CONTROL AUTOMATION

- Robotic process automation (RPA) is a program (in this case, it is a software robot) to mimic human users' interaction with their desktop to perform tasks — for example, copying information from an Excel spreadsheet to a form, inserting customer data and placing an order on a website, etc.
- Develop a Robotic Process Automation (RPA) tool combined with **Large Language Models (LLMs)** to automate repetitive screen-based tasks
- Preliminary thought on the ways of command:
  - Via Natural Language (text)
  - Via Screen Demonstration + Natural Language (text)
  - Via Screen Demonstration + Voice command
- https://github.com/AmberSahdev/Open-Interface?tab=readme-ov-file

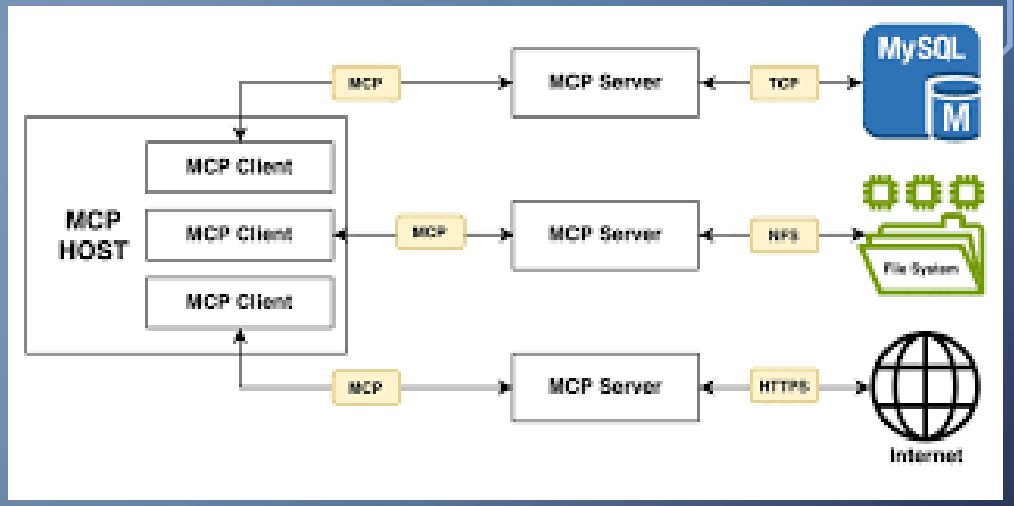


Expected Outcome

1. Development of RPA bots capable of controlling and automating screen-based tasks.
2. Integration of LLMs for understanding and executing natural language instructions.
3. Automation of repetitive tasks such as data entry and form filling.
4. Improved accuracy and efficiency in screen-based operations.

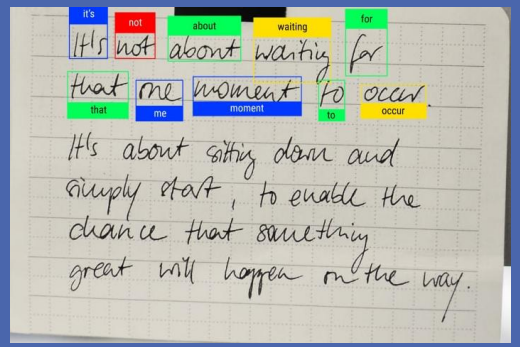
PWM5 A MCP SERVER FOR HANDWRITTEN QUIZ OR ASSIGNMENTS

- MCP is an open-source protocol that standardize how external applications provide context to LLMs. In simple it provides seamless integration between LLM and external tools.



MCP Server

PaddleOCR



Provide Context

LLM for Grading

Expected Outcome

1. Implementation of an MCP server capable of accessing scanned images of quizzes and assignments.
2. Robust integration of OCR technology to accurately digitize handwritten content.
3. Reliable delivery of digitized results to LLMs for processing and evaluation.
4. Development of a simple demo application that utilizes the server to request comments, grading, or other feedback from the LLM on the quizzes.

WELCOME TO FIND ME FOR A DISCUSSION !

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