MICHIGAN STATE UNIVERSITY

Project Plan Presentation

Everyday Agent

The Capstone Experience

Team Launch

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From Students…
…to Professionals

Project Sponsor Overview

- Accelerator to guide ideas from concept to long-term execution
- Helps develop and deploy cutting-edge solutions for clients
- Partners with top brands, like Rivian, Jeep, and Adidas
- Created in 2023 by combining four leading companies: Nexient, Postlight, Umvel, and Vectorform

Project Functional Specifications

- Assists users in locating misplaced personal items
- Tracks and remembers item locations (e.g., keys and wallet)
- Provides verbal descriptions of item locations
- Demonstrate advanced functionality on compact hardware

Project Design Specifications

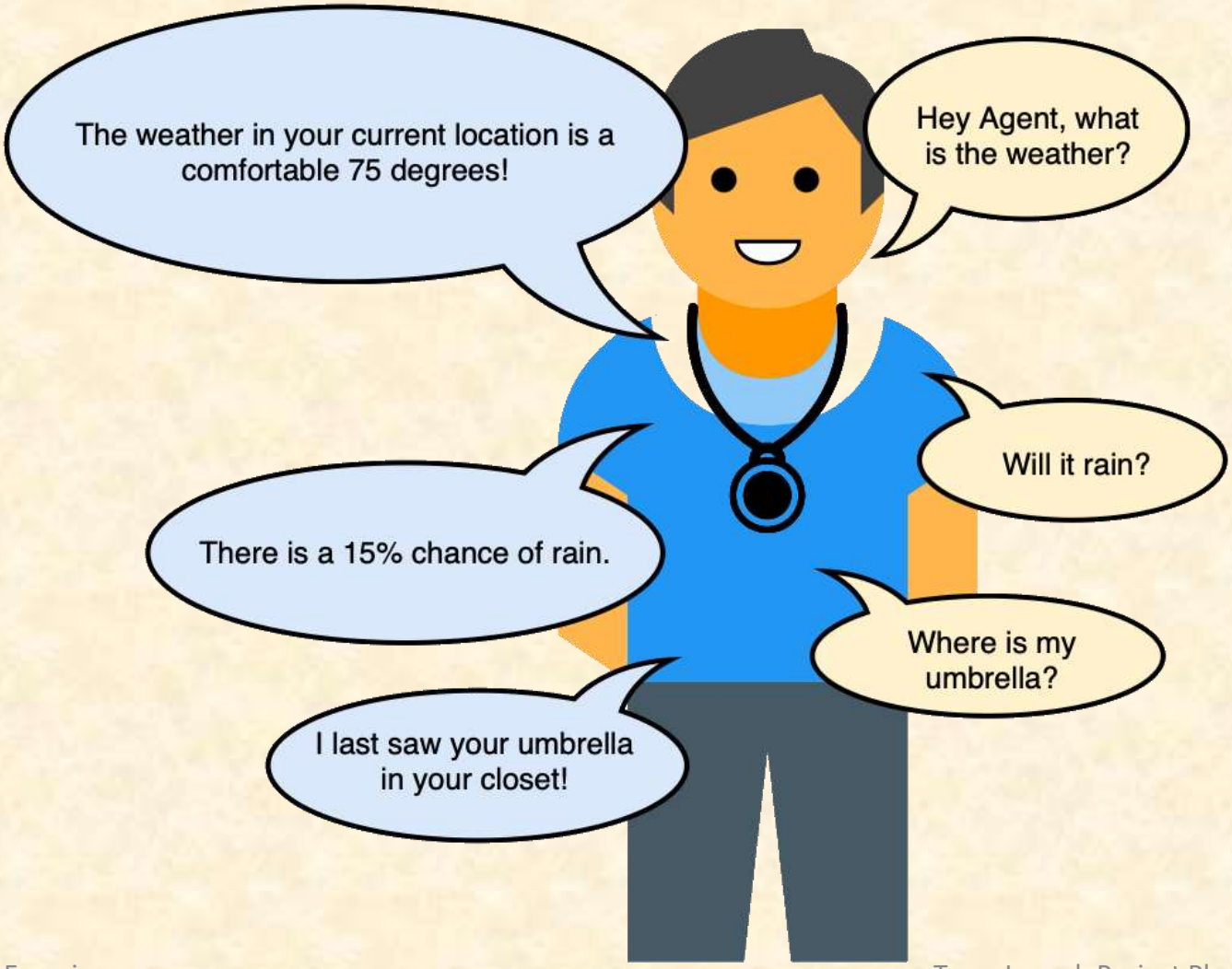
- Device with camera worn around neck
- Speech input via microphone
- Speaker for unique voice output
- Raspberry Pi Zero 2 W
- Predictive algorithm

Screen Mockup: Locating Case

Screen Mockup: Predicting Case

Screen Mockup: Unknown Item Case

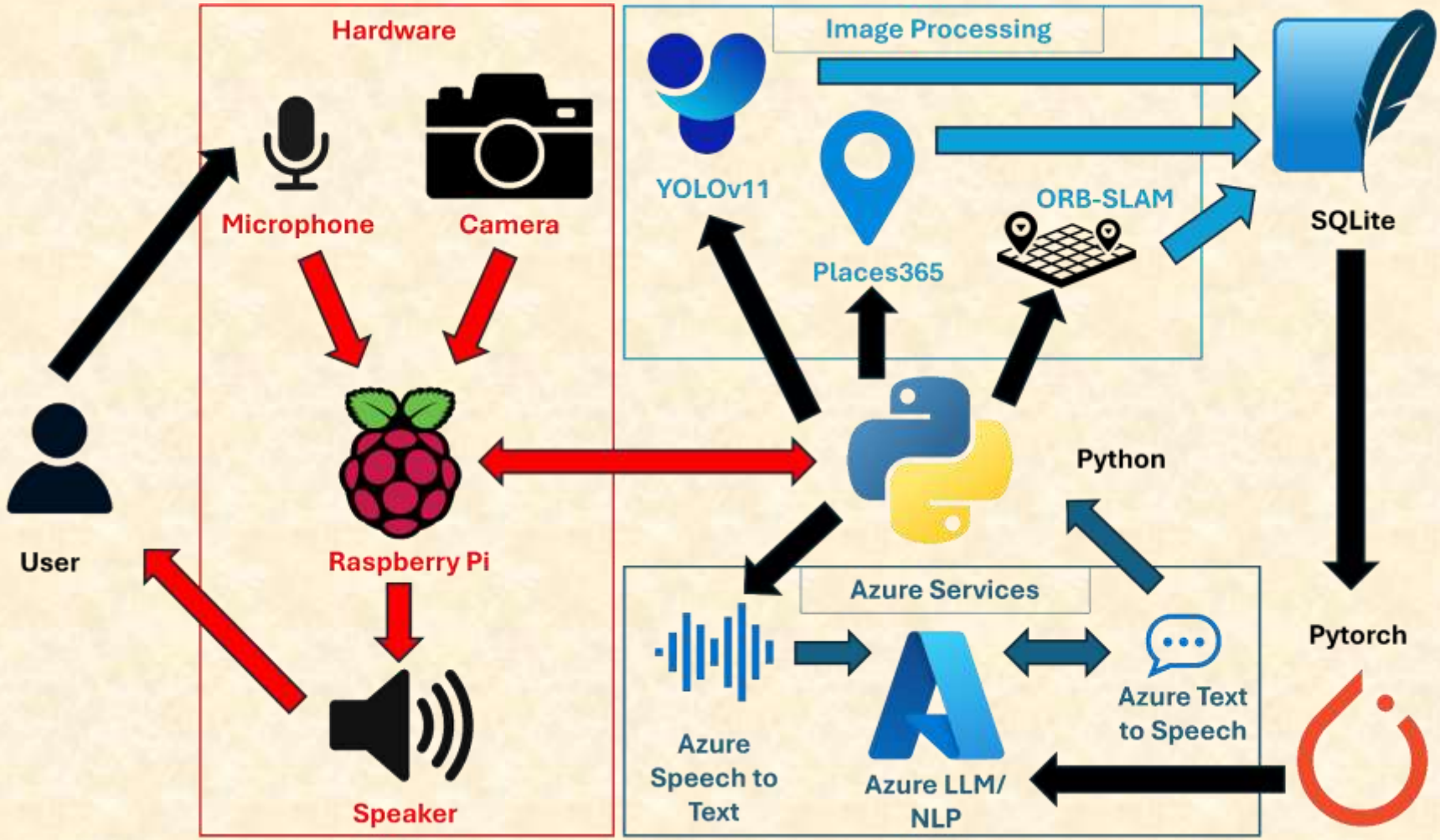
Screen Mockup: Diverse Queries Case



Project Technical Specifications

- Object Detection
- Environment Mapping
- Place Detection
- Speech to Text & Text to Speech
- Natural Language Processing
- Predictive Algorithm

Project System Architecture



Project System Components

- Hardware Platforms
  - Raspberry Pi
  - AI Camera
  - Mono Enclosed Speaker
- Software Platforms / Technologies
  - Microsoft Azure
  - SQLite
  - Pytorch

Project Risks

- Object Detection Accuracy
  - How to keep track of items/what if the item isn't clearly visible
  - Testing multiple AI models and implement post processing
- Natural Language Processing for Queries
  - Understanding complex, user-specific queries like "where are my glasses most likely to be right now" requires advanced intent recognition and context handling
  - Use LLMs for advanced NLP and validate results with a test suite of queries
- User Voice Recognition Constraints
  - Ensuring the system only responds to the owner's voice while ignoring background voices is challenging
  - Implement speaker verification and fine-tune voice recognition models to differentiate between users
- Software Optimization for Raspberry Pi
  - The software must be optimized to prevent excessive CPU/memory usage, which could degrade performance
  - Use lightweight models, optimize inference times, and explore task offloading to prevent software bottlenecks

Questions?