

Voice Controlled Game Sprite

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Project Overview

- Displays car and map sprites on screen
- Takes in microphone input
- Compares input to bank of known commands (“UP”, “DOWN”, “LEFT”, “RIGHT”, “STOP”)
- Moves car sprite using identified command
- Game ends when car sprite reaches finish line

Project Motivation

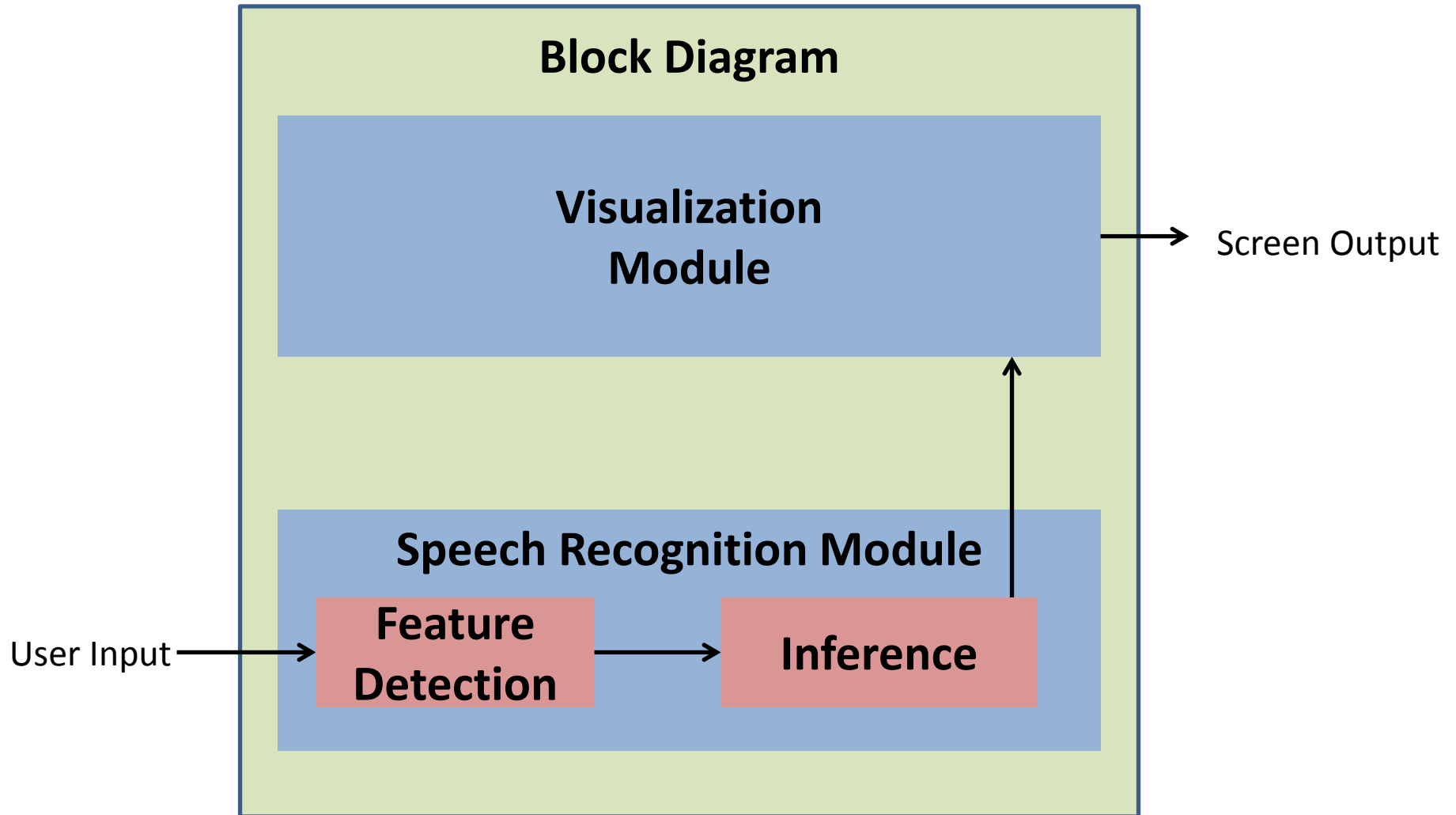
- Many current technologies use speech recognition
- Speech recognition is computationally expensive



Project Implementation

- Speech Recognition
 - Divides input into small samples and computes feature vector
 - Features compared to Gaussian Mixture Model PDF (GMM PDF) to compute similarity
- Visualization
 - Compares projected movement to obstacles
 - Display sprites to screen

Block Diagram



Speech Recognition Module

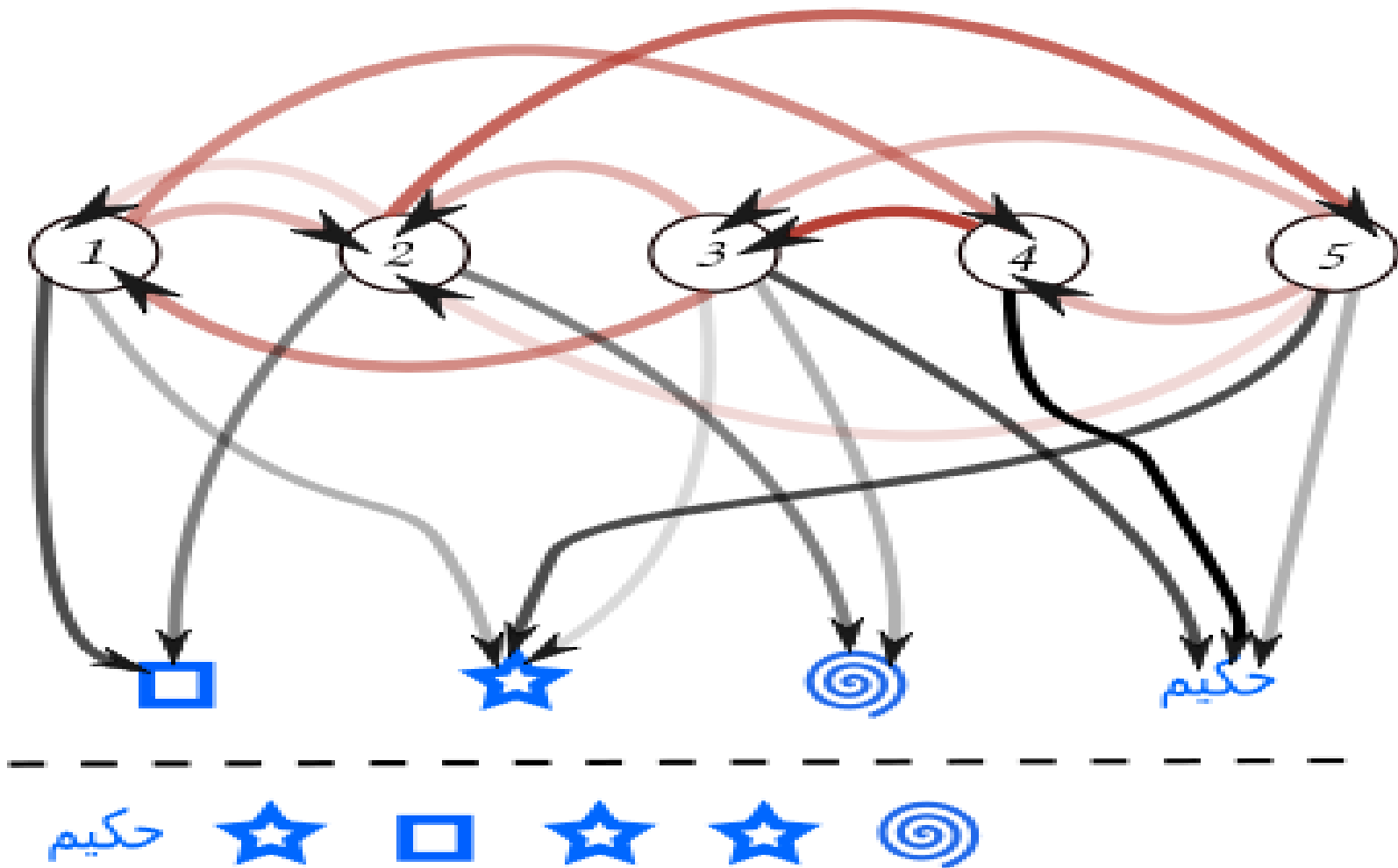
- Feature Detection
 - Downsample input, break into 512 sample chunks
 - Chunks sent to FFT
 - Extract 6 highest frequencies
- Inference
 - Feature vectors compared to GMM PDF to compute similarity score
 - Similarity score passed to Decision Tree to infer command

Visualization Module

- Offsets
 - Computes car sprite offset from center using current command
 - Determines collisions and animates bump
 - Determines collision with finish line
- Pixel Logic
 - Combines sprite data from car, map, and done screen
 - Displays via xVGA

Extension: Hidden Markov Model

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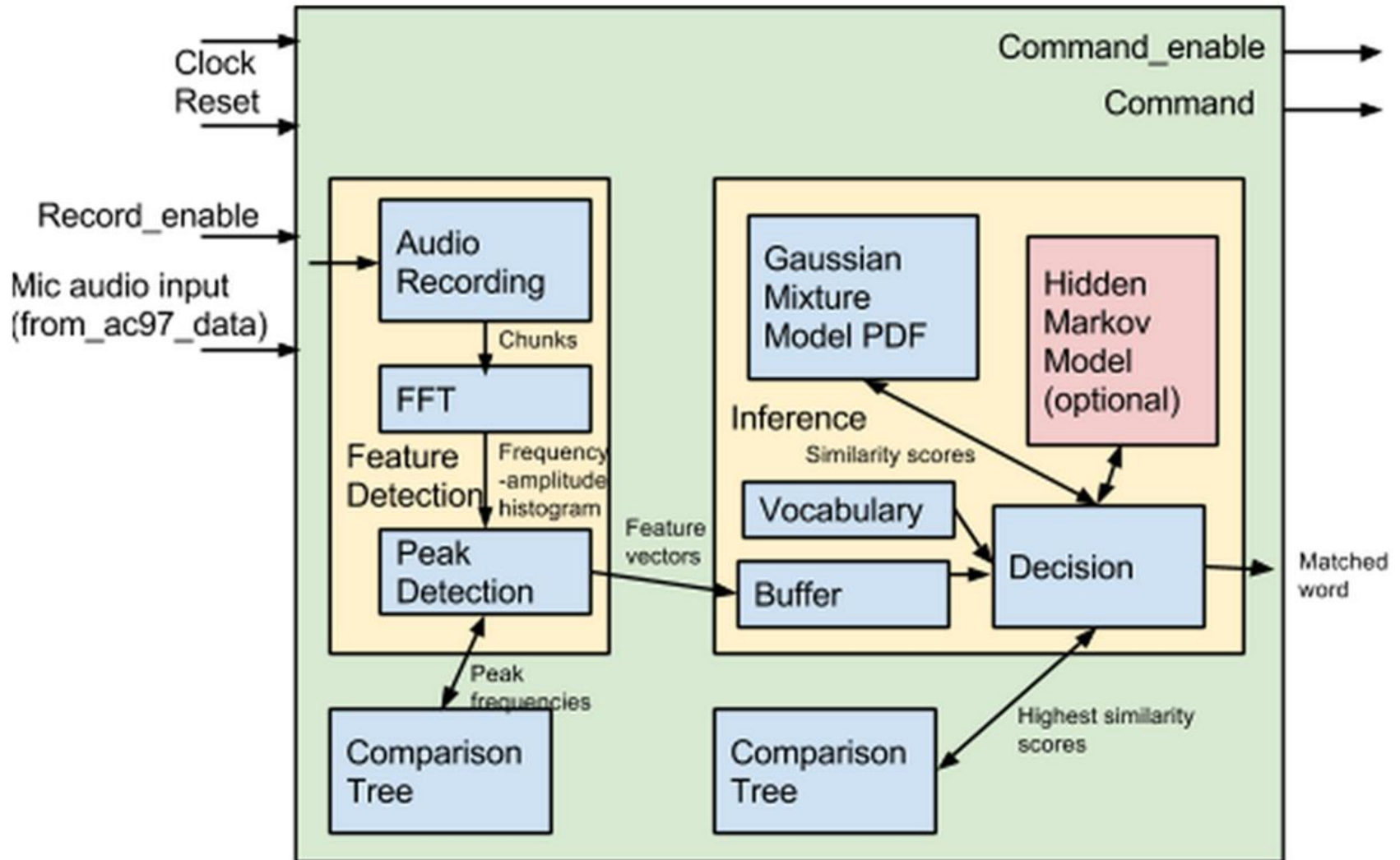
Project Timeline

- Week of 11/11
 - A: software model complete, start feature detection
 - C: display sprites with offsets
- Week of 11/18
 - A: feature detection complete
 - C: visualization and collision complete
 - Both: Collaborate on inference

Project Timeline (continued)

- Week of 11/25 (Thanksgiving)
 - Both: Inference complete
 - Both: merge project, begin debugging
- Week of 12/2
 - Both: debugging complete
 - Both: HMM extension (time permitting)

Speech Recognition Wiring Diagram



Visualization Wiring Diagram

