



Automatic Tracking Camera

6.111 Project

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Outline

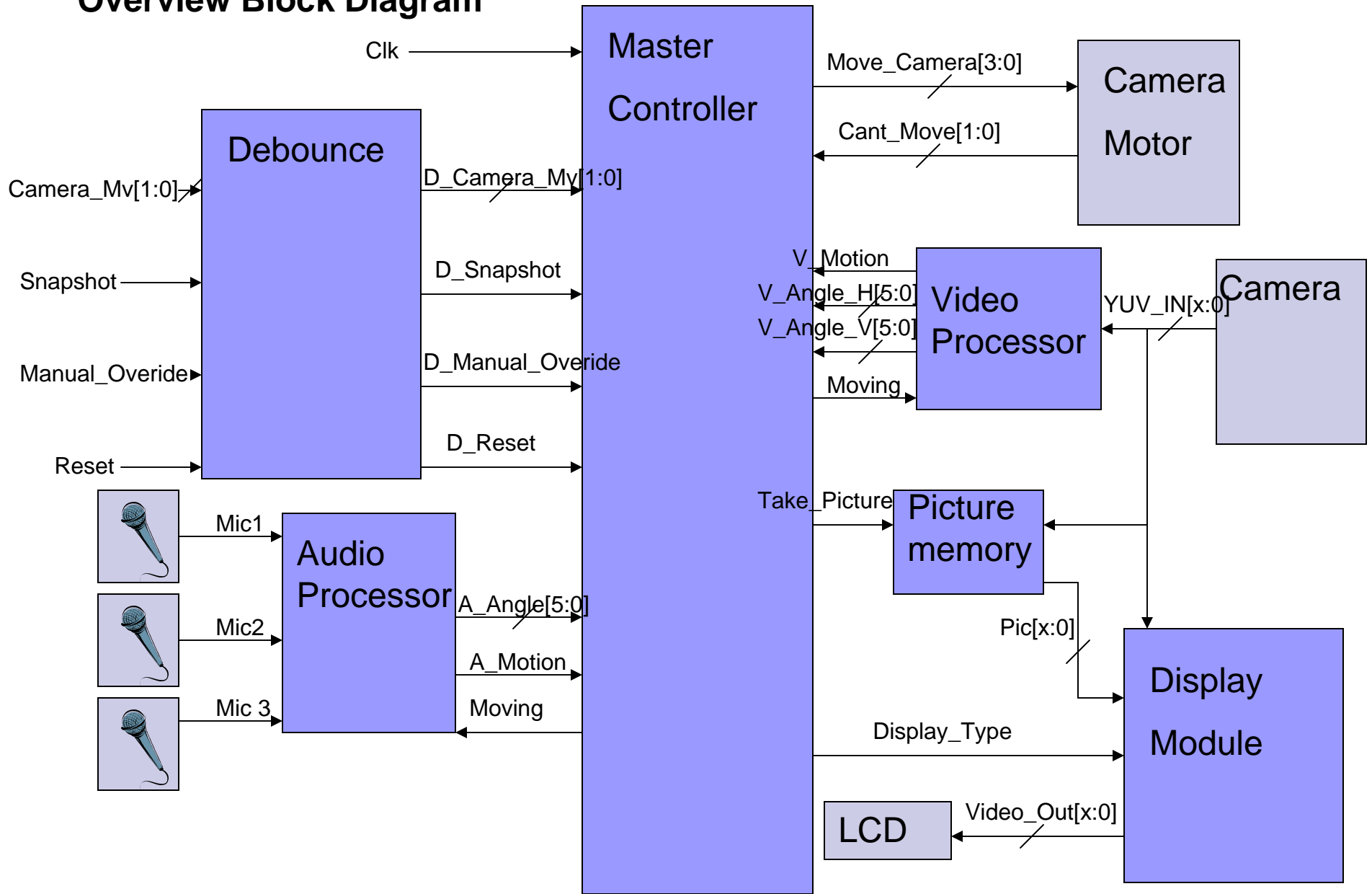
- Overview
- Audio Processing and Triangulating
- Video Processing and Tracking
- Integration of Video and Audio
- Required Hardware
- Conclusion (Potential Add-ons)



Overview

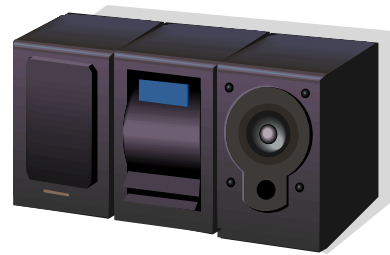
- Automatic Intrusion Detection and Anti-Theft Device
- Security Camera that tracks moving objects using both video processing and audio targeting
- Video processing used when an object in view of the camera is moving to follow the direction of movement
- Audio processing used when no objects are moving in order to find the object causing the sound
- After object is targeted a snapshot of the objects center will be stored into RAM

Overview Block Diagram



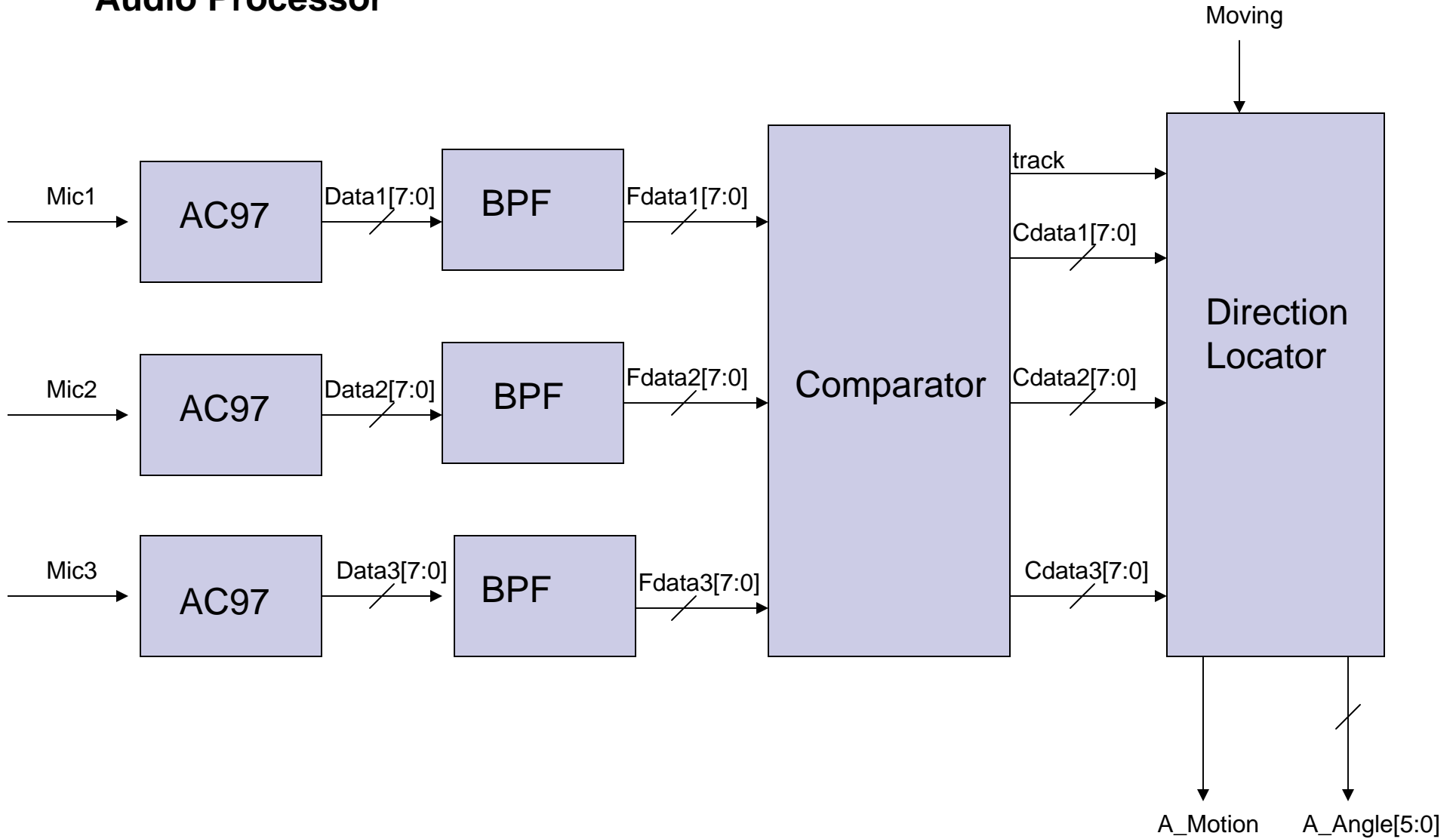


Audio





Audio Processor



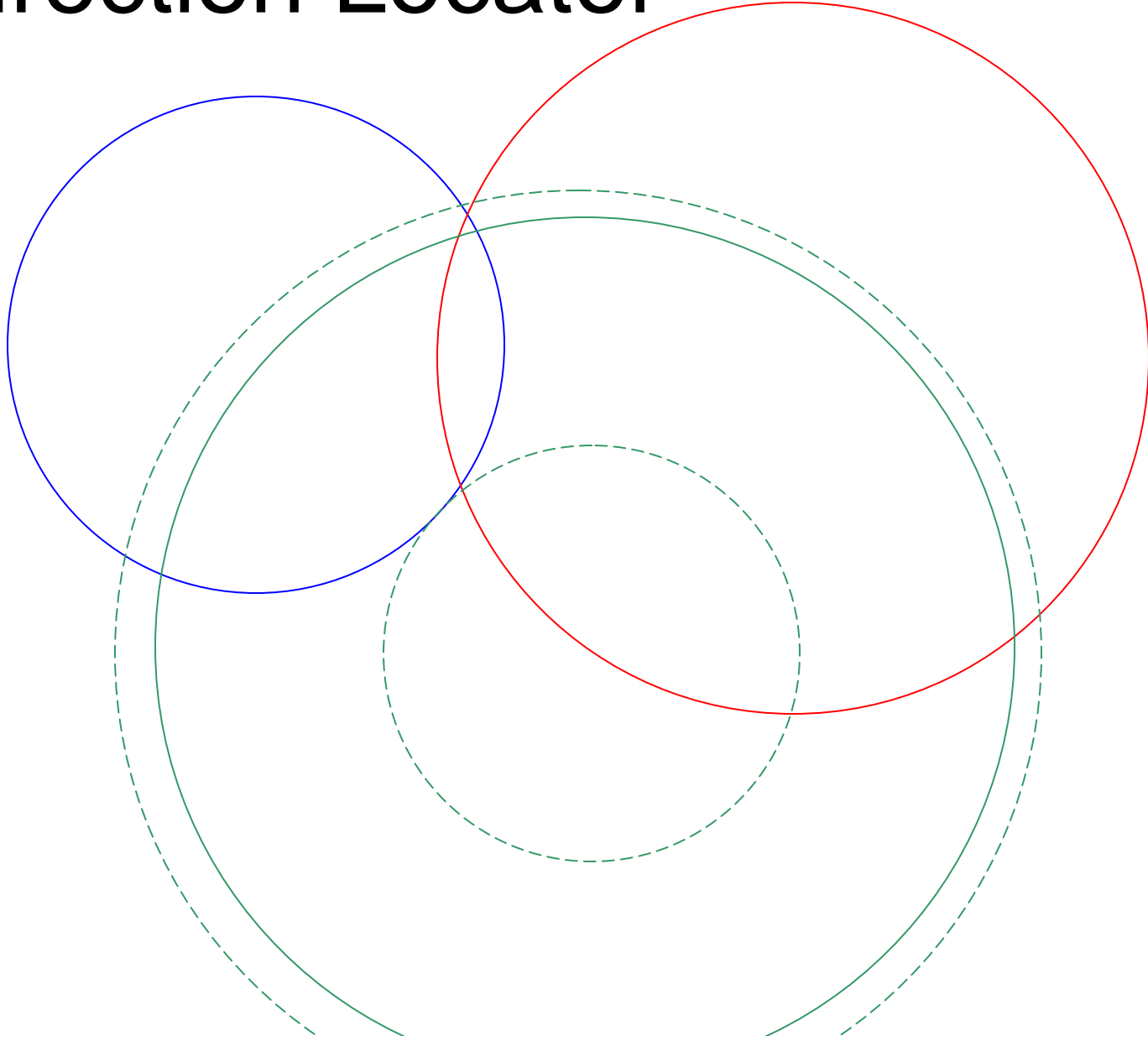


Audio Processing Pipeline

- AC97 performs A/D conversion
- Band Pass Filter only lets through 500Hz-1KHz frequencies
- Comparator triggers Direction Locator if amplitudes pass threshold
- Direction Locator takes in audio data to locate sound source based on differences in sound arrival times.



Direction Locator

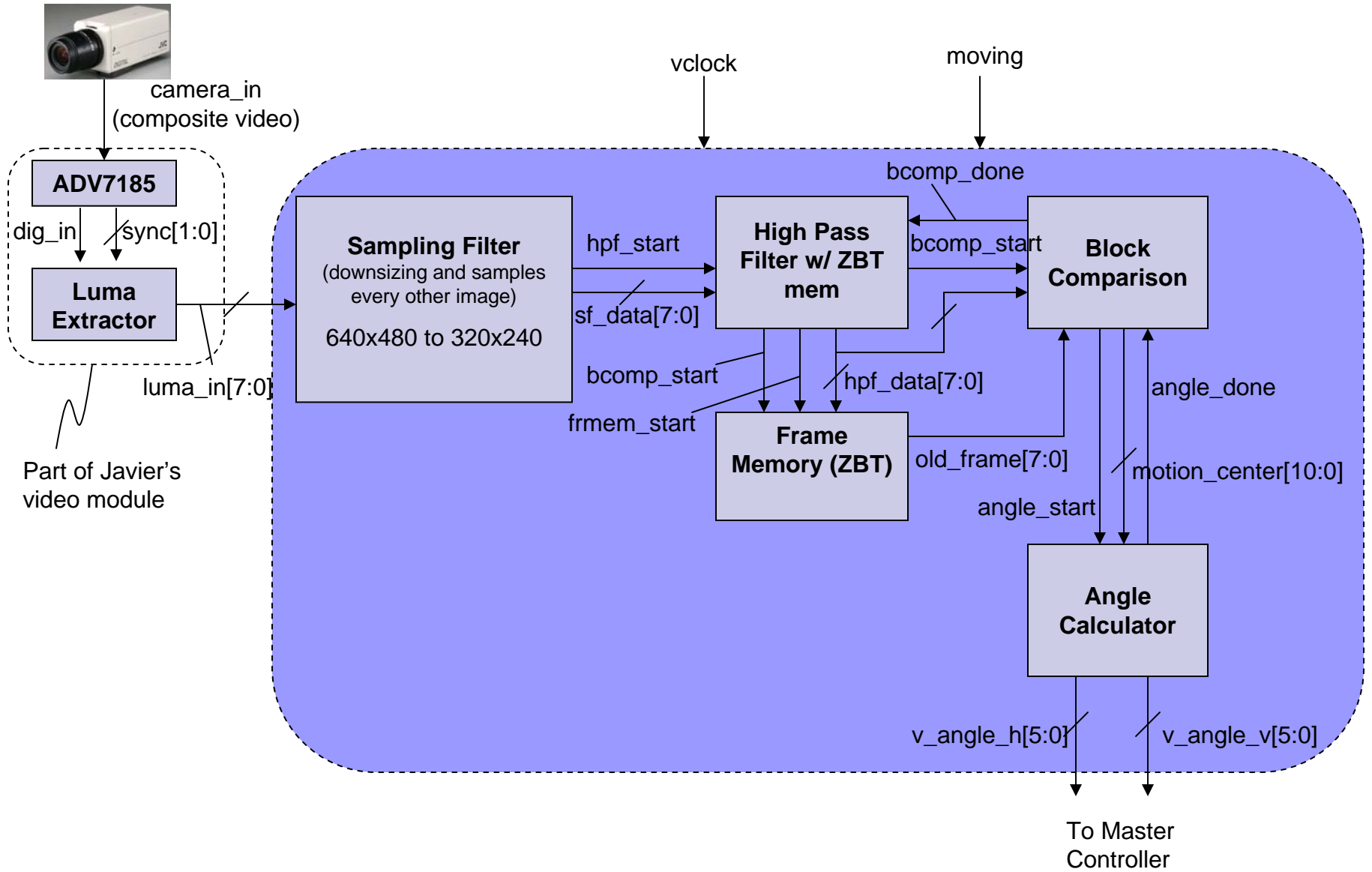




Video



Video Processor





Motion Detection Algorithm

- Interframe comparison
- SSLD: Sum of square luma differences for each macroblock (16pixel X 16pixel)
- Center of “movement” macroblocks calculated and sent to angle calculator
- Angle calculator determines movement of camera to center on target



Master Controller

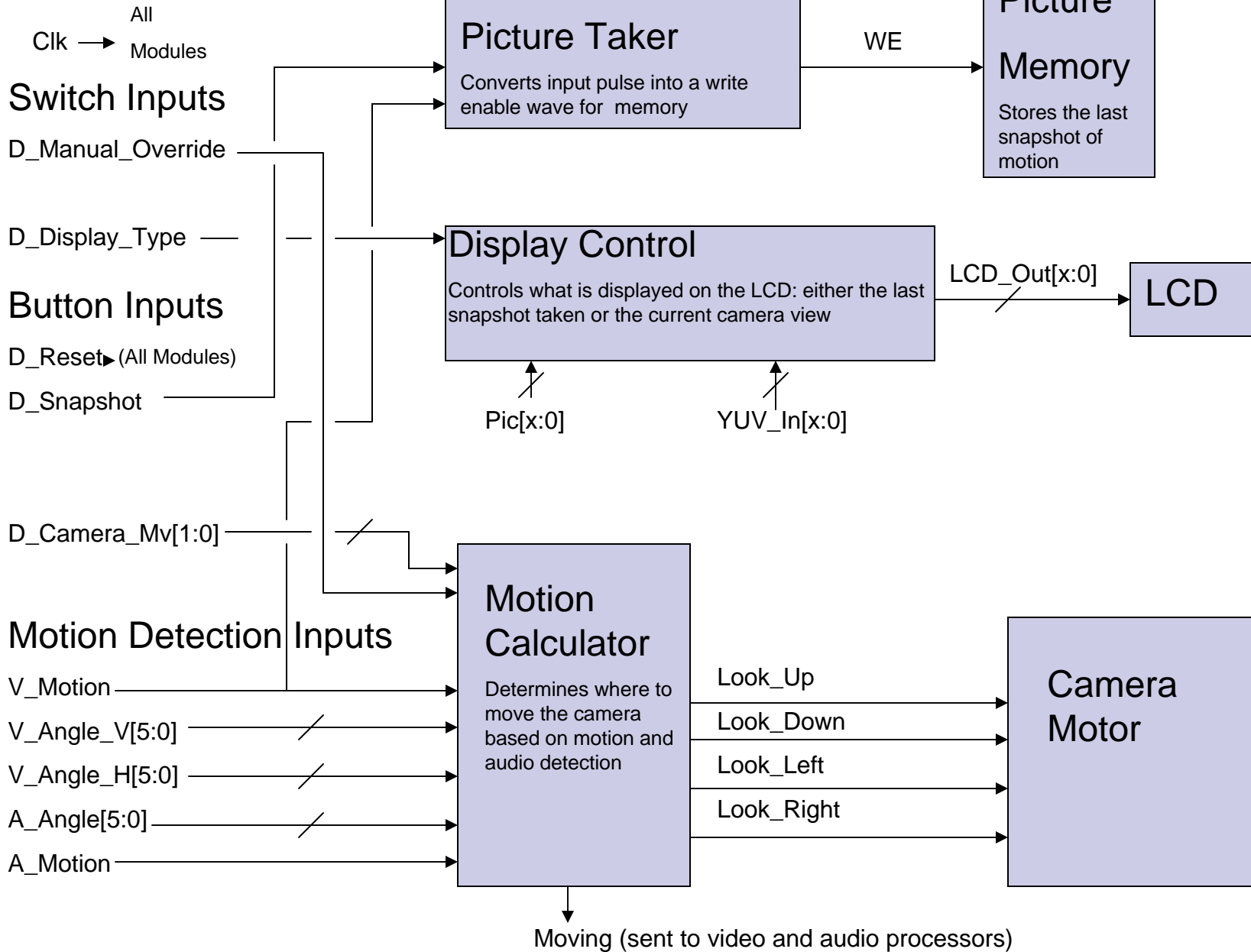


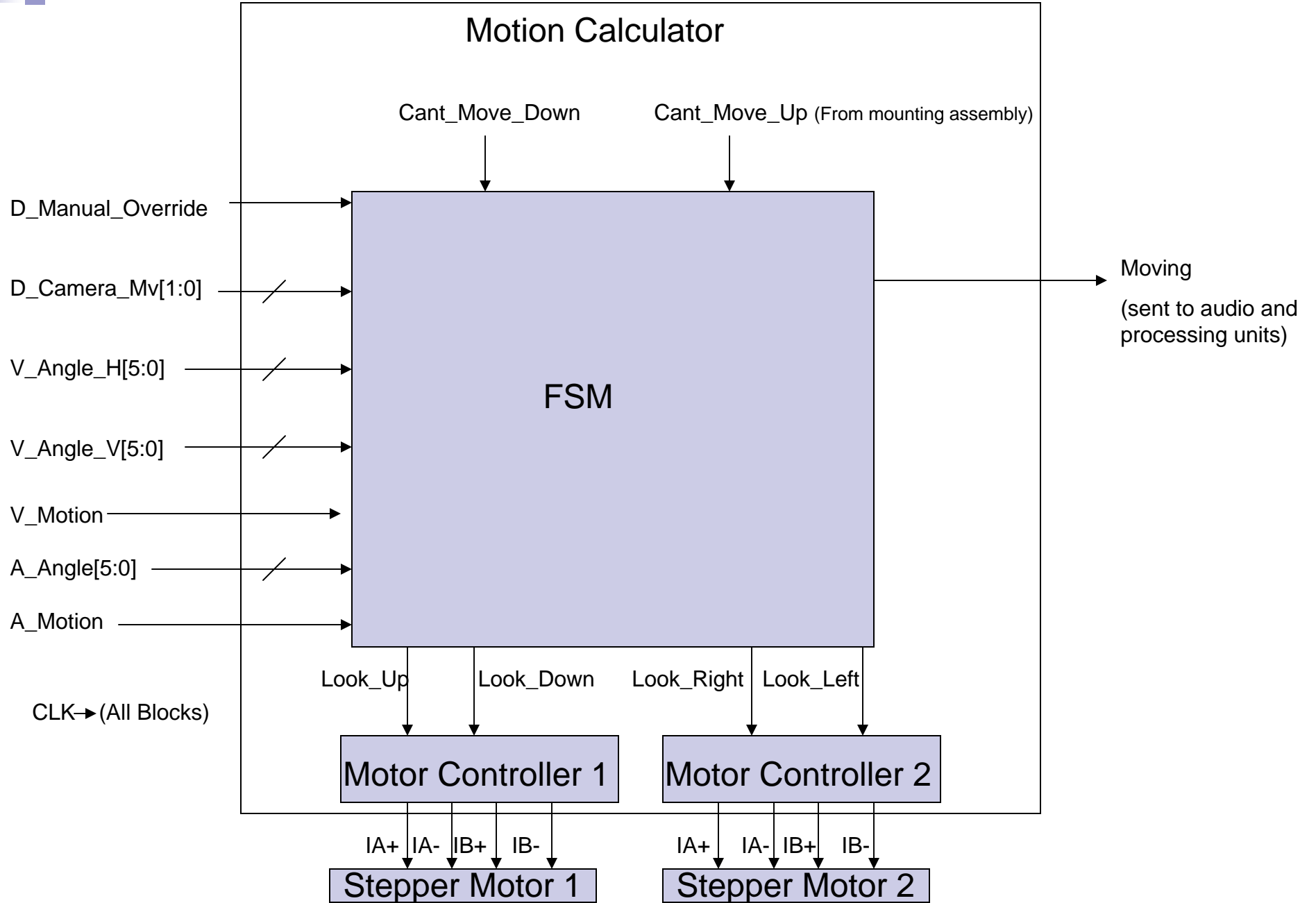
Purpose of Master Controller

- Accept input from video and audio processors to determine which direction the camera should move
- Interface with the camera motors to control motion
- Take snapshots of the object in motion
- Control display module
- Provide debugging interface to test integration of modules



Master Controller







Required Hardware

- 3 Omni-directional Condenser Microphones
- 1 CCX-Z11 Video Camera
- 2 AIRPAX LB82731-M1 Stepper Motors
- Camera and Microphone Motor Mount
- 2 doorbell buttons
- External Power supply for motors
- 2 External AC97's
- 6.111 Labkit



Potential Add-Ons

- Sentry Gun
- Video target overlay
- Picture Browsing Interface
- Enhanced audio triangulation
- Range Finder

Conclusion

Questions

