# Vision-Aware Smart Assistant

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**Course**: E-104 Advanced Deep Learning

My proposed project demonstrates a real-time object detection system integrated with a smart home assistant. Using a webcam and a PyTorch-based YOLOv5 model, the system continuously monitors a home environment and identifies objects in the camera’s field of view. Detected objects are logged with timestamps and summarized hourly.  
  
The summarized output is exposed to Home Assistant as a custom sensor, enabling integration with popular smart assistants like Google Nest Mini and Amazon Alexa. This allows users to ask, in natural language, what objects were seen recently, and receive a spoken summary response. For example: “Hey Google, ask Home Assistant what it saw.”  
  
The project showcases the application of deep learning in edge computing and user-facing interfaces, bridging the gap between computer vision and interactive home automation. It also explores optional fine-tuning of the YOLOv5 model using a custom dataset to adapt to the specific environment.  
  
**Technology Stack**: Python, PyTorch, YOLOv5, OpenCV, Home Assistant, Google Assistant, REST API, TTS  
  
**Benefits**: Real-time CV feedback, smart assistant integration, custom voice interaction, privacy-aware local inference  
  
**Challenges**: Integration across platforms (vision → Home Assistant → voice), maintaining inference performance, optional fine-tuning  
  
**Dataset**: Live video stream from webcam; logs accumulated over time to simulate a moderately big dataset.  
  
**Demonstration**: Includes object detection logging, smart assistant response, and a reproducible setup via a detailed MS Word report and working code.  
  
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**YouTube Links**: To be delivered after a working demo is complete  
2-minute video  
15-minute video