Background

- Driver's face a decision each time they are approaching a yellow light, to stop or to go through.
- This decision is what is referred to as the dilemma zone, the area at which a driver is not sure whether to stop or go.

Solution

Our product is the DESTINY, a dash mountable device intended to aid the driver in everyday driving scenarios.

1. Detects traffic light at intersection and state of light.
2. Displays the state of the light onto the UI and recommends a decision if a yellow light is detected.
3. Alerts the driver if a car in front is slowing down using audio and visual feedback.
4. Provides useful information to the driver such as distance to the light, light state, distance to car in front, and velocity.

Hardware

Power

The system gets external power from the 12 volt auxiliary outlet of a car. Then buck converters regulate the power to 5V DC and 3.3V DC.

Machine Vision

SSD: Single Shot Multibox Detector

- Object localization and classification are done on a single forward pass of network (input image)
- Multibox is a class-agnostic bounding box proposal method

MobileNet v2

- Image Classifier and Feature Extractor Backbone
- Fast and efficient for use in mobile and embedded applications

Design

SOM Carrier Board

- The Custom PCB provides the hardware connections for
  - Microcontroller (I2C, UART, ADC)
  - GPS Module (UART)
  - SOM (MIPI, DDR4, UART)
  - Camera (MIPI)
  - Radar (SMA)

Display UI

1. Detects traffic lights and displays state to user with audio and visual feedback.
2. User can customize screen using the capacitive touch screen
3. When a yellow light is detected the audio cue is triggered and the screen switches to display distance to light and light state

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Literature Cited