El Toro Grande Presentation

Surya Dantuluri

Monta Vista High School

13^{th} June 2018

High-speed vehicle localization

- Using Arduino to poll 4 ultrasonic sensors
- On average, 18 readings a second without required buffer Pyserial needs
- All sensor data is sent from Arduino to RPI3 using Pyserial

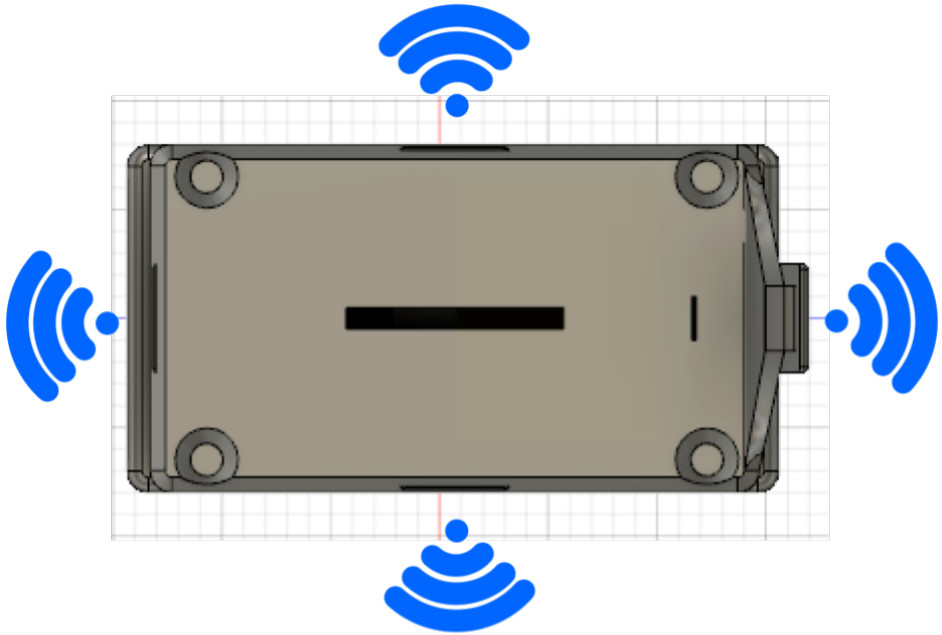

Figure 1: High speed localization

High-speed vehicle control (acceleration and braking) on different surfaces

- We use Recurrent Attention Models to take care of speed control

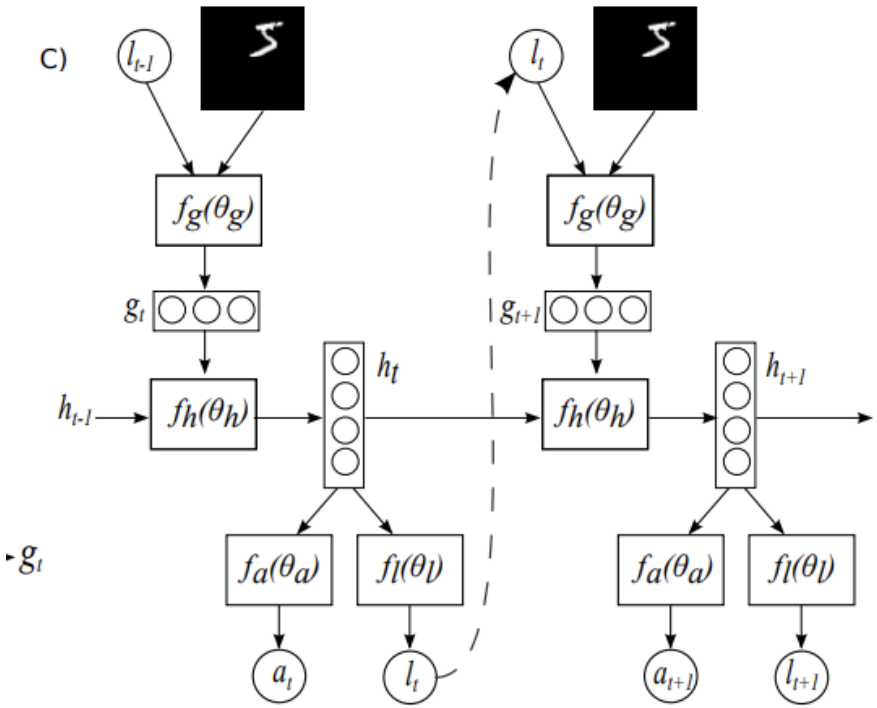

Figure 2: From:Google NIPS 2014

Stop light and roadway detection

- Devised two ways (haven't tried reliability)
- OpenCV
  - Change colorspace to HSV
  - Define ranges of Red and Green
  - Create 3 masks (thresholds)
  - Bitwise AND all the masks
- 3 layer CNN
  - Find green stop light pictures
  - Find red stop light pictures
  - Train this data on a 3 layer CNN
  - All layers are densely connected (all tensors are transformed)
    - In really simple terms, each tensor is transformed as such:
    - output(output tensor) = relu(dot(Weight, input(input tensor)) + bias)
    - Used Dropout(.1) to prevent overfitting

Collision avoidance with static objects (and other competing robots) along boundaries of course

- In theory, with enough data the Attention model will learn to avoid static objects
- Opposed to a standard RNN, Attention model focus by using memory (I implemented it by being stored)

- Thank You.

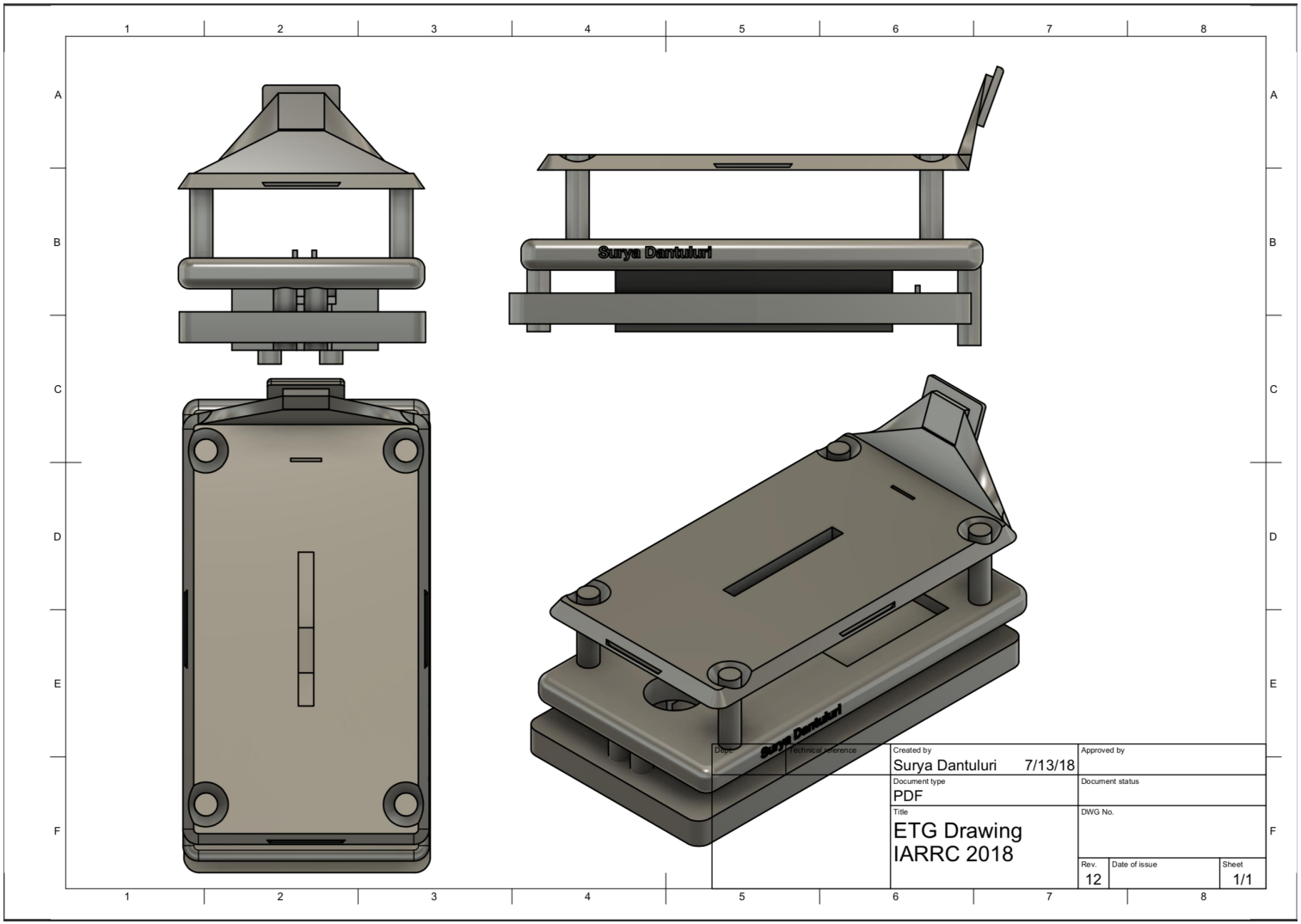

Figure 3: Drawings