

Touch and Go

Tianye Chen and Natalie
Mionis

Overview

Control a remote control tank with a touch screen

Real time path following



Goals

Baseline Goals:

- Tank roughly follows path
- Image processing feedback

Reach Goals:

- Display real time position of the tank on VGA monitor
- Display path animations on VGA monitor

Overall Block Diagram

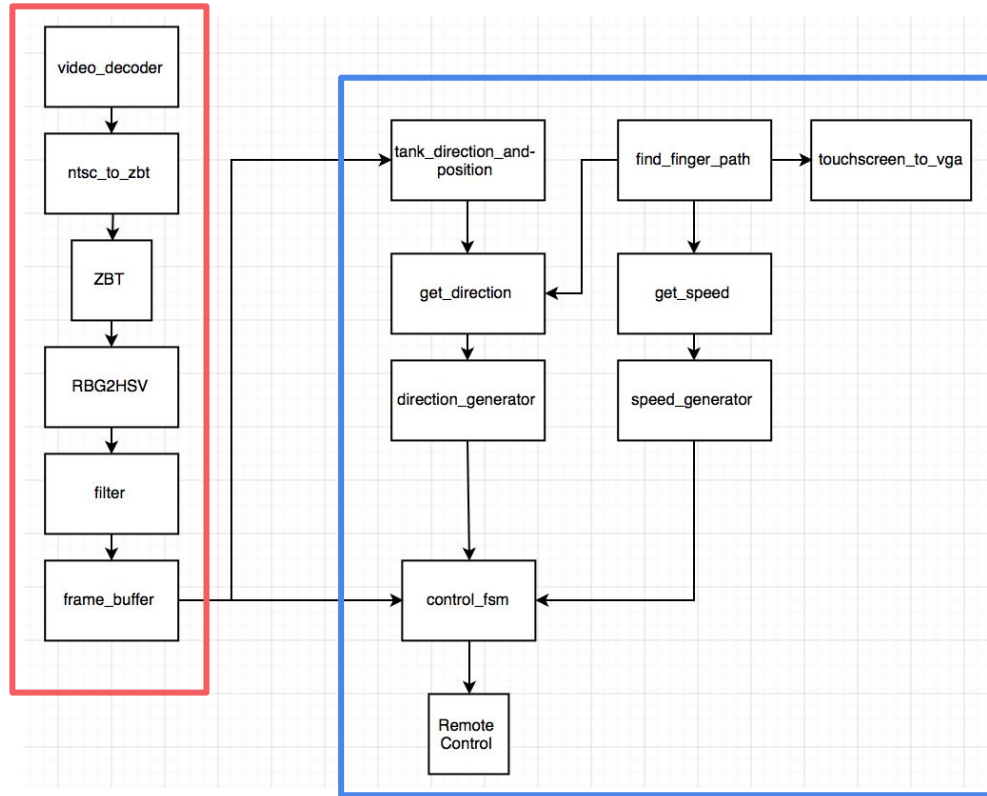


Image Detection

Video Decoder

- 30 bit YCrCb value

ntsc_to_zbt

- Generate memory addresses, YCrCb to RGB conversion and store 18 bit RGB value in memory.

RGB2HSV

- 24 bit conversion from RGB to HSV to allow for hue filtering
- Reduce noise from different lighting

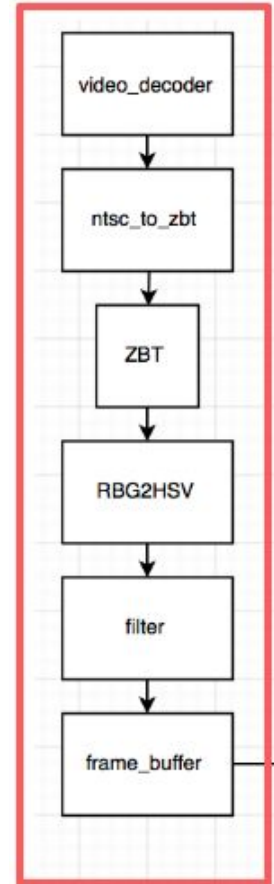


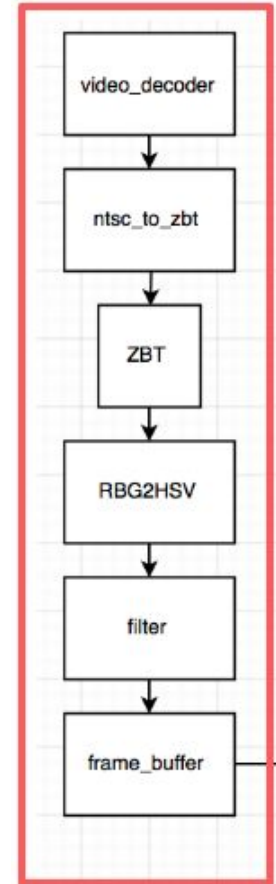
Image Processing

Filter

- Find center of mass of green and red areas of the tank
- This gives angle of the car

Frame_buffer

- Store the last 8 center of mass values to reduce noise
- Output overall center of mass, as well as center of mass of red and green



Path Calculations

Tank_direction_and_position

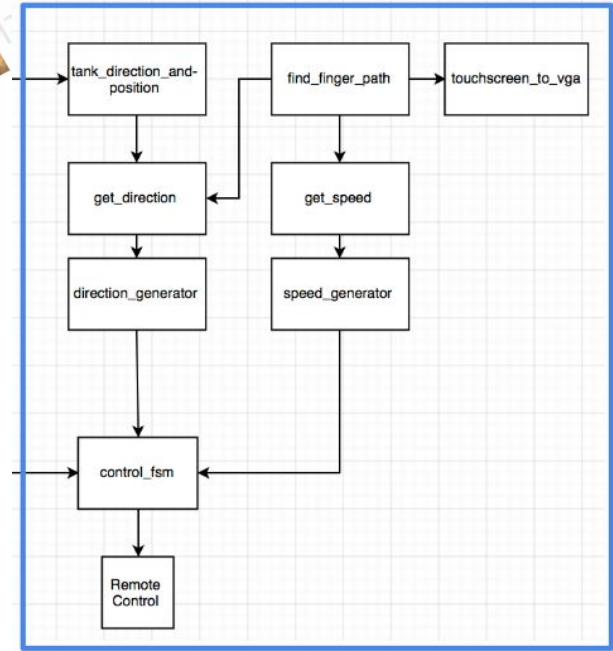
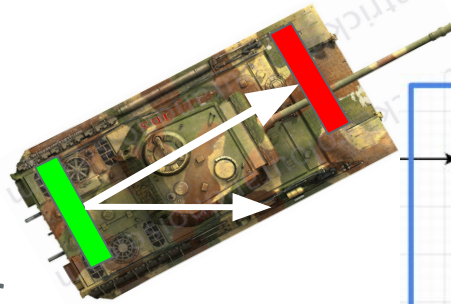
- Information from tank

get_direction/direction_generator

- Compare tank and finger position
- Output the direction of the next move

get_speed/speed_generator

- Translates finger movement to speed

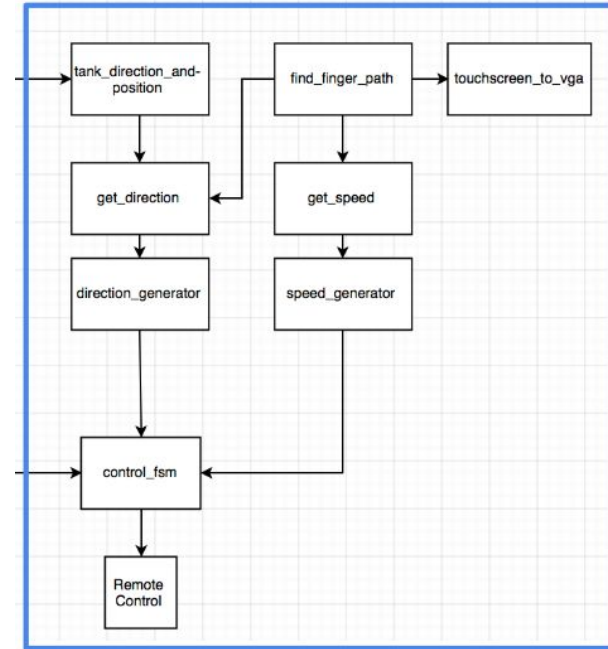


Control FSM

Outputs signals to control the tank controller

High Level States:

- Idle
- Initializing
- Moving



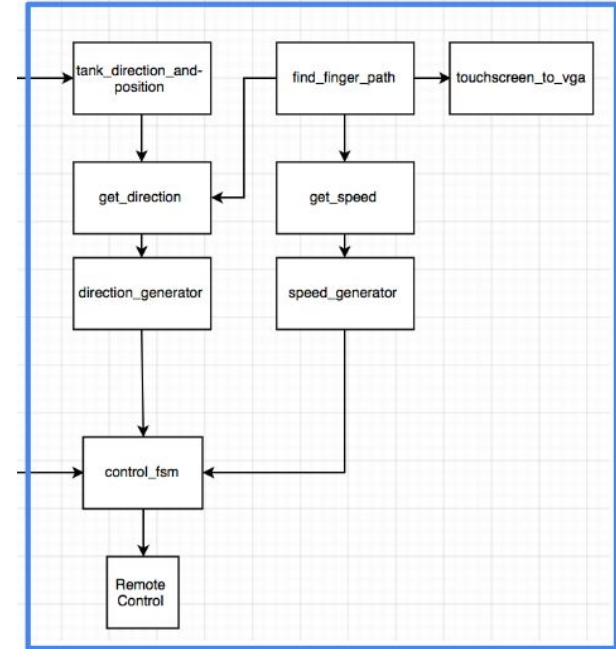
Hardware

Hardwire the tank remote controller

- Direction
- Speed

Challenge: Correcting for unwanted deviation

- Tank naturally veers slightly off course



Timeline

Currently working on:

ZBT memory for NTSC camera and I2C for the touchscreen

Before Thanksgiving:

Track center of mass of tank

Write control FSM and work out the control math

Control the tank with labkit signals