VCA-Bridge

Using GStreamer for Video Analytics

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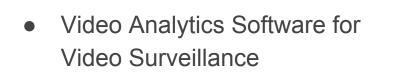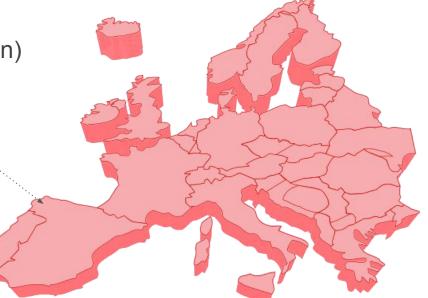
Who I am

- Software Developer
- From Galicia (Spain)
- Working at VCA Technology (London)

- Video Analytics Software for Video Surveillance

Galicia

Video Analytics Software (VCA5)

VCA

Focused on **Intrusion Detection** and **Counting**

- Intrusion detection
- Shake cancellation
- Tamper detection
- Enter & exit filters
- Appear & disappear filters
- Stopping filter
- Tailgating filter

- Dwell filter
- Direction filter
- Object counting
- Intrusion & occupancy filters
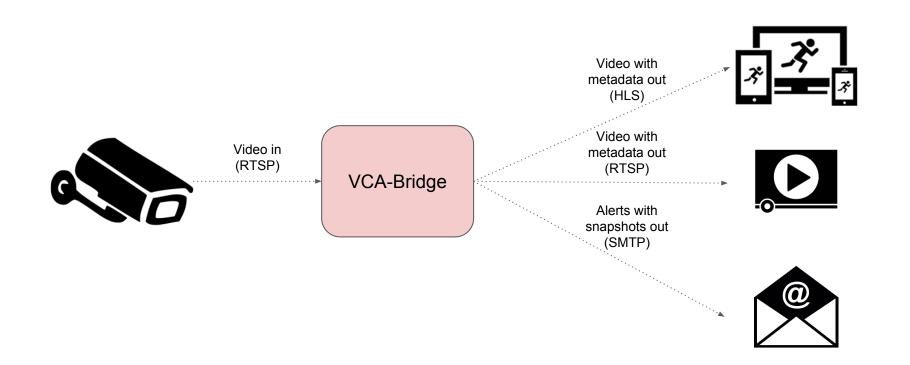- Speed filter
- 3D calibration for consistent classification

- Home-made device that provides an **all-in-one solution** for analysing video streams from different sources.

Use Cases

Firmware

- Build with:
  - Linux Kernel
  - Busybox
  - Glibc
  - Systemd
  - Gstreamer 1.8.3 (with VAAPI plugins)

- Analytics Software:
  - VCA-Core (home-made video analytics web server)

Hardware

- Specifications:
  - 4GB of RAM
  - CPU Intel Core i3-5010U
    - 2 Cores
    - 3M Cache
    - 2.10 GHz
  - GPU Intel HD Graphics 5500

- Limitations
  - 4 channels @ 1080p 30fps
  - 8 channels @ 720p 30fps
  - 16 channels @ D1 30fps
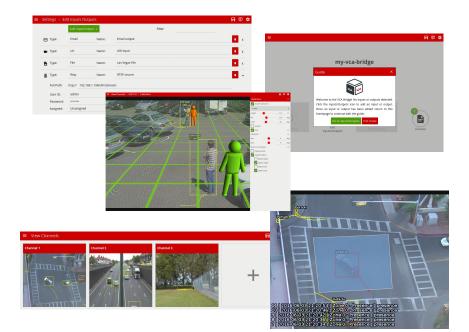
Third Party Devices

- Porting the firmware to many different devices:
  - Ambrella S2
  - HiSilicon 3516
  - Raspberry Pi
  - TI Davinci series
  - Qualcomm Snapdragon

- Need to write hardware encoding/decoding gstreamer plugins for those devices

Web UI

- Polymer framework
- HLS for video streaming
- No plugins needed
- Supported on multiple browsers:
  - Chrome
  - Firefox
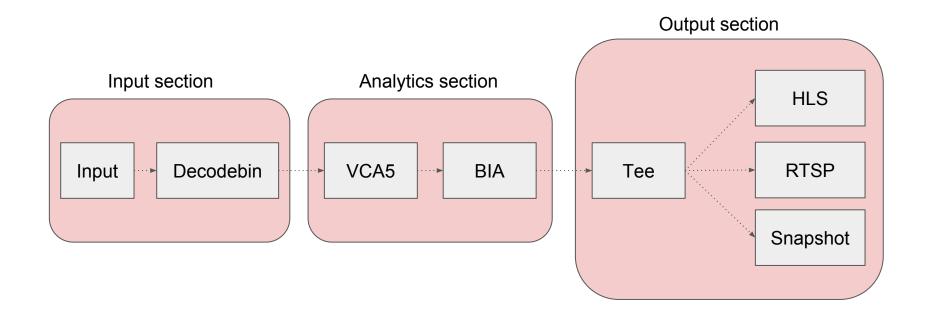 - Safary
  - Edge
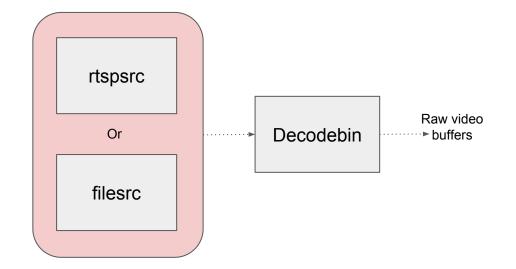 - Internet Explorer

Demo

Gstreamer Pipeline

Input Section

- Decoders (Decodebin):
    - RTSP (H264 and Jpeg)
    - File (AVI, MP4, MKV...)

- Gstreamer VAAPI plugins for hardware acceleration
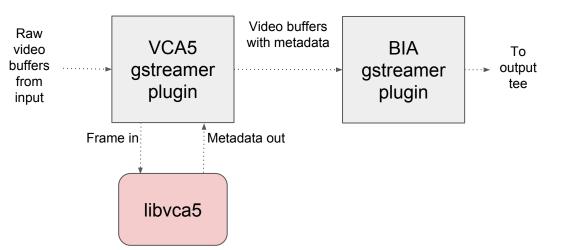
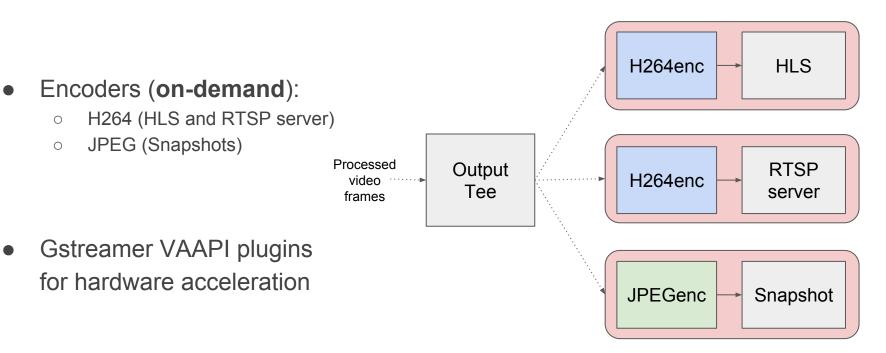# Analytics Section

- ## VCA5 element
  - ### Reads video frame
  - ### Adds metadata using the libvca5 library

- ## BIA element
  - ### Reads the metadata from the coming frame
  - ### Draws metadata in the frame

Raw video buffers from input → VCA5 gstreamer plugin

Video buffers with metadata → BIA gstreamer plugin → To output tee

Frame in | Metadata out

libvca5

- Encoders (**on-demand**):
  - H264 (HLS and RTSP server)
  - JPEG (Snapshots)

- Gstreamer VAAPI plugins for hardware acceleration

Issues we faced

VCA

- HLS stops generating segments when seeking
  - Something wrong with the keyframes and multifilesink
  - Solved by stopping and playing again the pipeline
- RTSP Deadlock (metadata?)
  - Seems to only happen with RTSP sources coming from VLM with metadata
- Pipeline might not play again (decodebin?)
  - Playing -> Null -> Playing -> Null -> Playing …
  - Only with RTSP sources
  - Solved by destroying decodebin and creating it again

Future plans

- TCP events
- Logic rules
- Multi-channel rules
- Improve latency (Use webRTC instead of HLS)
- Improve performance
  - Split VCA5 plugin into different plugins (1 per algorithm)
  - Share encoders
- Desktop notifications
- Improve stability

http://www.vcatechnology.com

Thanks!

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