

VCA-Bridge

Using GStreamer for Video Analytics

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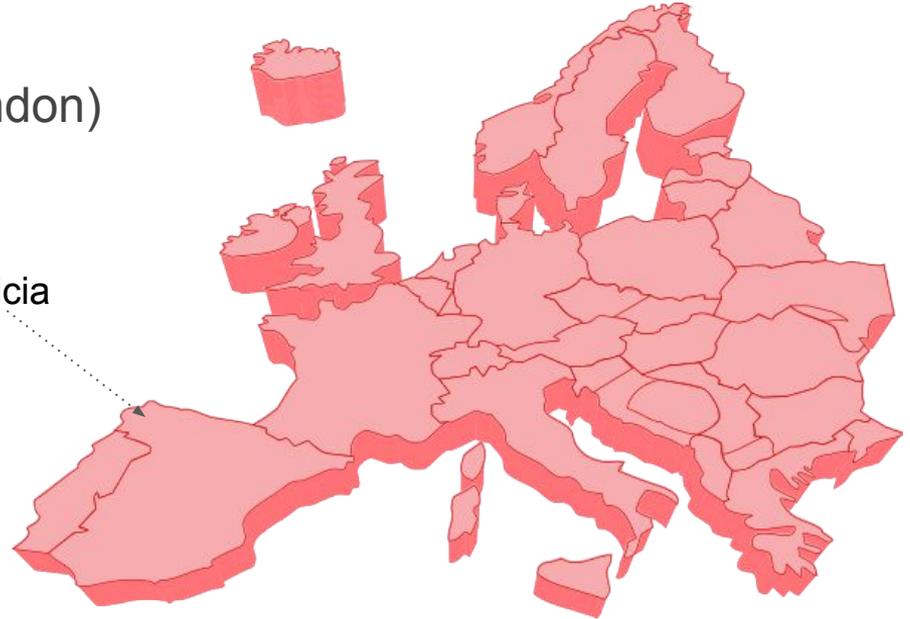


Who I am



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

Galicia



- Video Analytics Software for Video Surveillance

Video Analytics Software (VCA5)



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

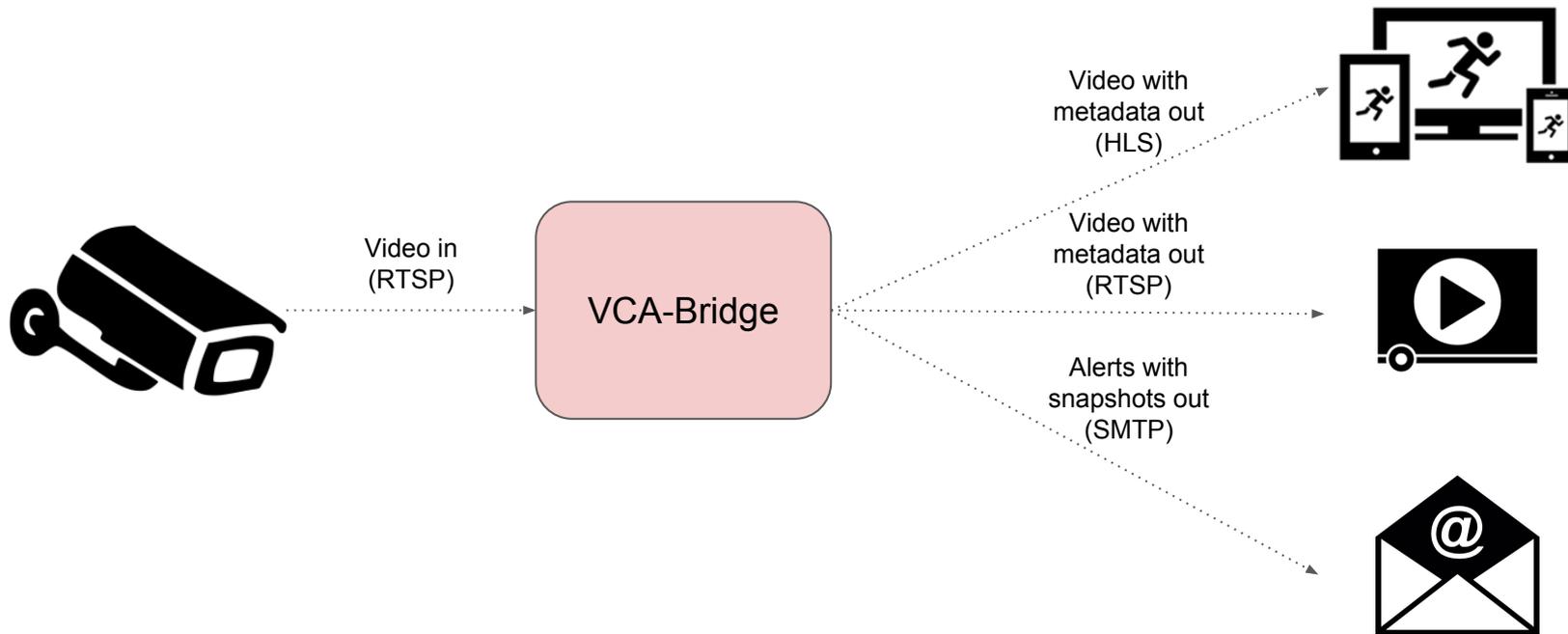
VCA-Bridge



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



Use Cases



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

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

- 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

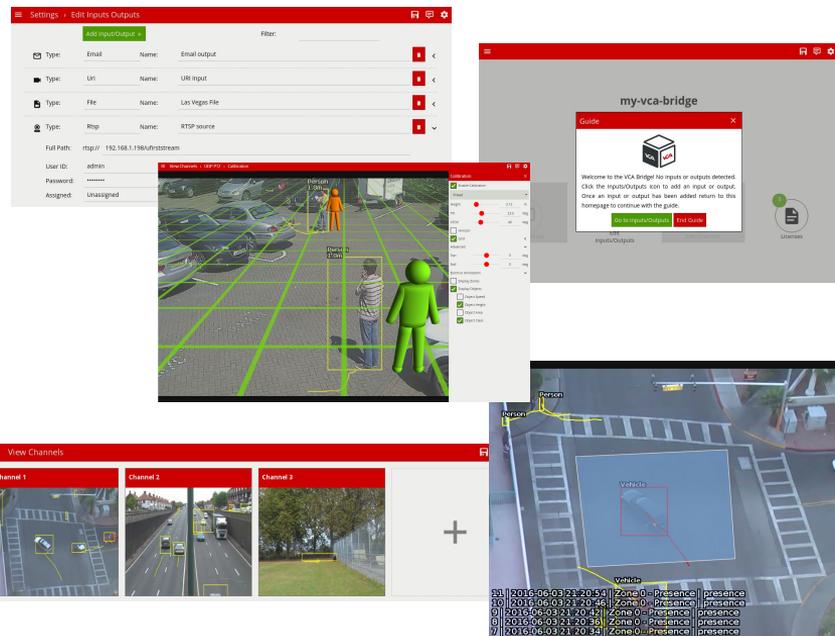


- Porting the firmware to many different devices:
 - Ambrella S2
 - HiSilicon 3516
 - Raspberry Pi
 - TI Davinci series
 - Qualcomm Snapdragon
- Need to write hardware encoding/decoding gstreamer plugins for those devices

Web UI



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



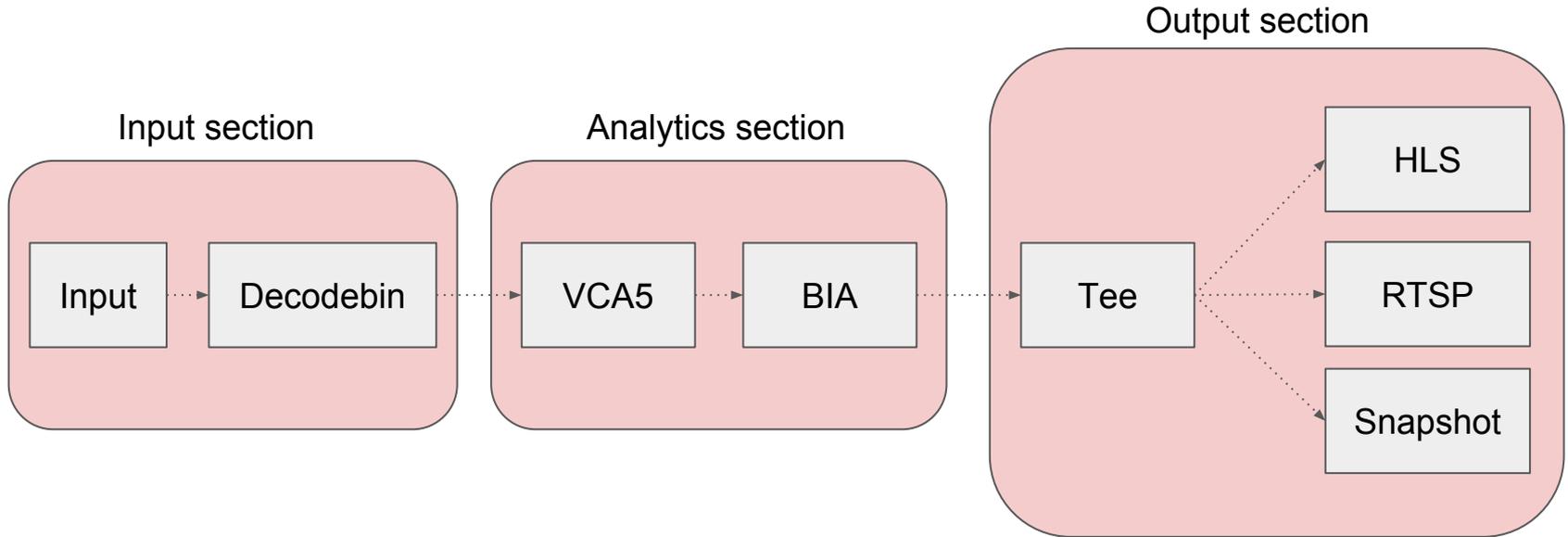
Demo



The image displays a composite of screenshots from the VCA Bridge software interface. The top-left window, titled "Settings - Edit Inputs/Outputs", lists various input and output types such as Email, URL, File, and RTSP source, each with a name and a red "X" icon. The top-right window, titled "my-vca-bridge", shows a "Guide" dialog box with a 3D cube icon and instructions: "Welcome to the VCA Bridge. No inputs or outputs detected. Click the Inputs/Outputs icon to add an input or output. Once an input or output has been added return to this homepage to continue with the guide." Below the guide is a "Go to Inputs/Outputs" button and a "Logout" link. The central 3D scene, titled "New Channels - MP123 - Camera", shows a street view with green bounding boxes around a person and a car, and a green 3D figure. The bottom-left window, titled "View Channels", shows three camera channels: "Channel 1", "Channel 2", and "Channel 3". The bottom-right window shows a 3D scene with a red bounding box around a vehicle and a data table below it.

10	2016-06-03 21:20:51	Zone 0	presence	presence
10	2016-06-03 21:20:56	Zone 0	presence	presence
9	2016-06-03 21:20:47	Zone 0	presence	presence
9	2016-06-03 21:20:59	Zone 0	presence	presence
7	2016-06-03 21:20:34	Zone 0	presence	presence

Gstreamer Pipeline

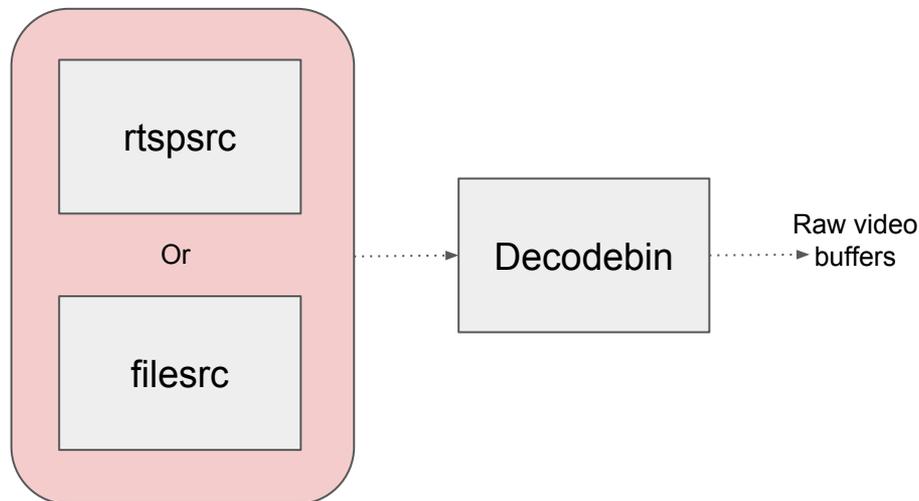


Input Section



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

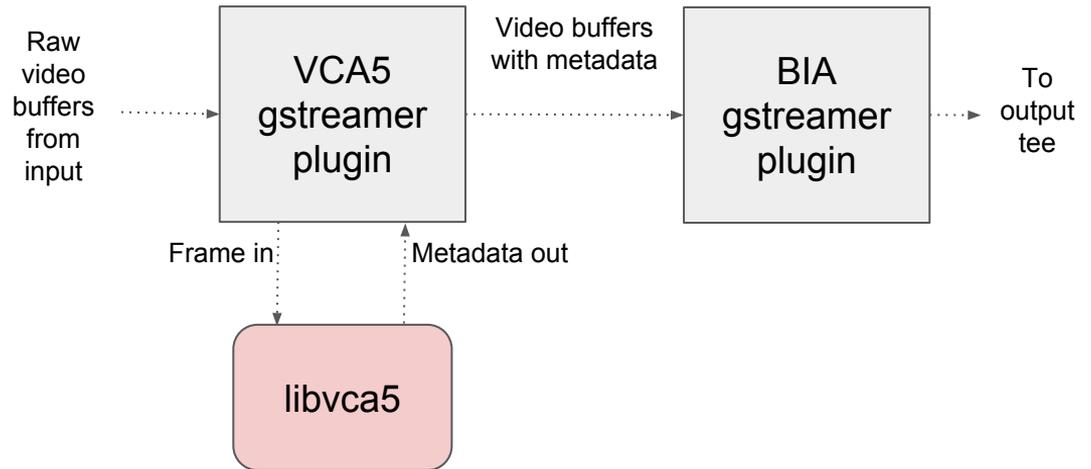
- Gstreamer VAAPAPI plugins for hardware acceleration



Analytics Section



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

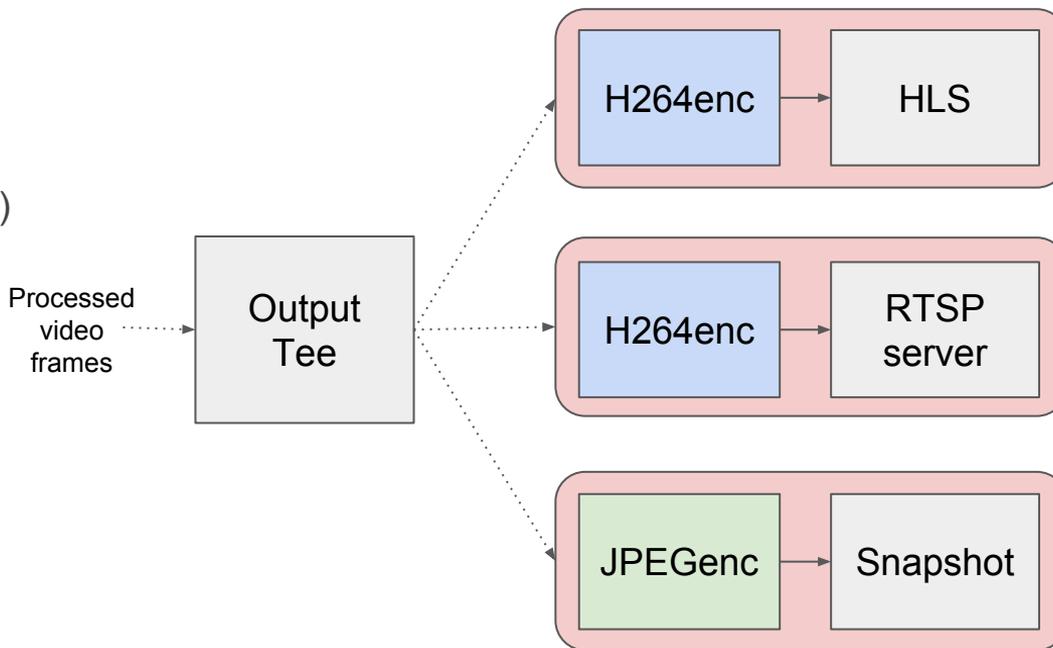


- BIA element
 - Reads the metadata from the coming frame
 - Draws metadata in the frame

Output Section



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



- Gstreamer VAAPAPI plugins for hardware acceleration

Issues we faced



- 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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