



ALS 2019

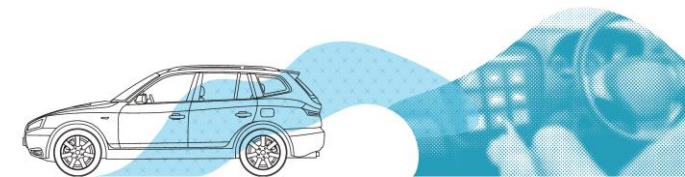


# AGL-based Container Technology Applied to Mass Production of RSE\*

Rear Seat Entertainment

19 July 2019

DrimAES Inc. / Guktae Kim(CEO) & Won Lee(CTO)





# CONTENT

## I. Overview

- Speaker Introduction
- Audience Guide
- Vision Video
- DrimAES Inc.
- Container Virtualization in RSE
- Container Virtualization in IIP

## II. Technical description

- Why LXC container(Docker vs. LXC)
- Major Developments
- Remaining works

## III. Discussion

- Q&A
- Open discussion



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# SPEAKER INTRODUCTION



**Guktae Kim**

**DrimAES, Inc.**

CEO/Co-Founder

Guktae Kim is the co-founder and CEO of DrimAES, inc., a silver member of AGL since 2017. His brief experience is as follows.

- (Current) Adjunct professor of DGIST(Daegu Gyeongbuk Institute of Science & Technology), Korea University of Science and Technology
- (Current) CEO/Co-founder of DrimLAB, Inc., a technology-based company builder

- (Former) Technology Innovation Consulting Project of Korean Large Enterprise(3 times)
- (Former) 10 international papers published
- (Former) 6 international conference presentations
- (Former) 5 best paper awards

## I. Overview



**Won Lee**

**DrimAES, Inc.**

CTO

Won Lee is the CTO of DrimAES, Inc. His brief experience is as follows.

- A mentor of BoB (Best of Best), a white hacker training program in Korea
- A security Researcher of GrayHash
- Experience in many development projects

1. Security Analysis and Pen-testing
2. Carplay, Carlife, MirrorLink
3. System emulator based OVP (Open Virtual Platform)
4. Air-BEST (Korea Aero-fighter embedded government project), RTOS kernel, DO-178B Experience
5. DMB, PMP solutions

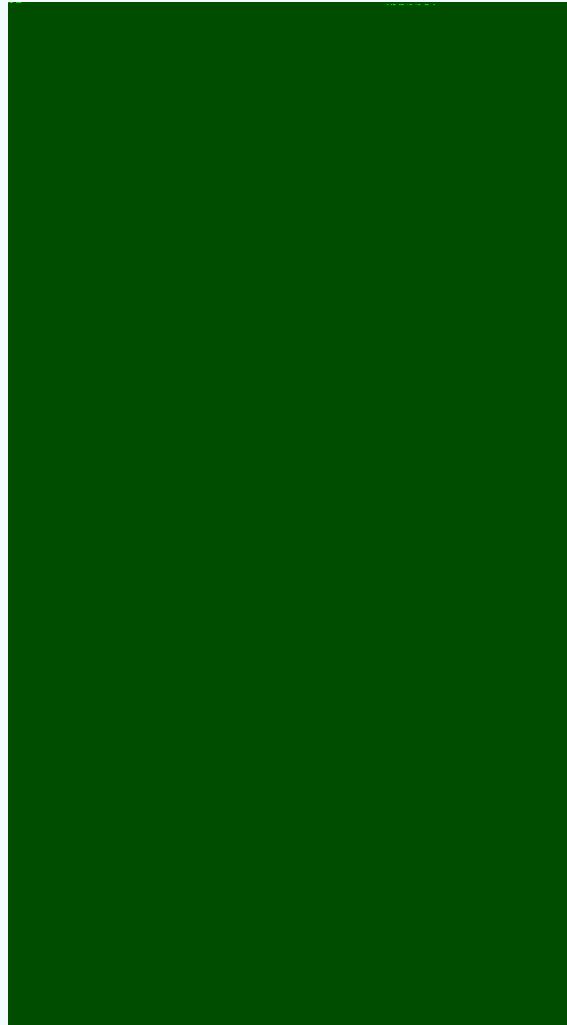


# AUDIENCE GUIDE

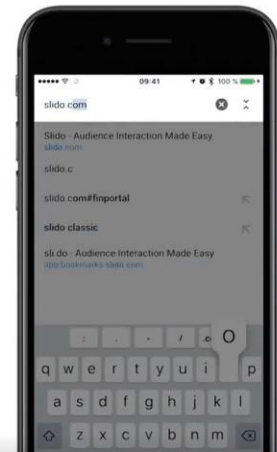
## I. Overview

To facilitate communication we will take advantage of the question-and-answer solution.

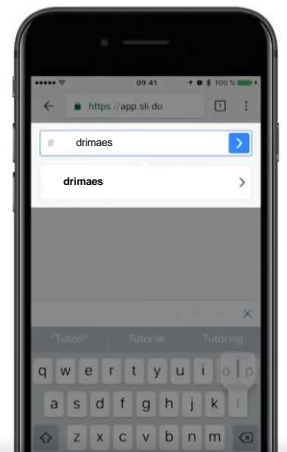
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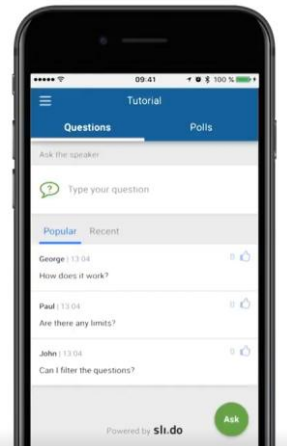
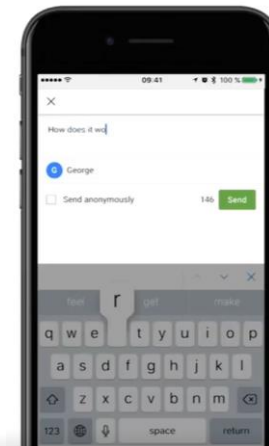
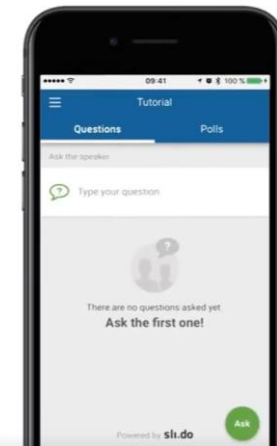
Open any browser and go to  
**www.sli.do.com**



Join with event code  
**#drimaes**



Type your question







Since 2015, we have developed automotive embedded software technologies. Especially, we are specialized in developing and customizing infotainment software platform based on AGL and virtualization technologies. As AGL silver member, we would like to have diverse chance to collaborate with other global infotainment leaders.

2015



- 11**  
Won the 2<sup>nd</sup> place at Infineon Asian Venture Forum  
Founded DrimAES, Inc.

2016

- 03**  
Acquired an embedded software start-up
- 05**  
Launched automotive embedded software training kits [DK-AUTOSAR, DK-IVI, DK-AVR]
- 07**  
Set up a research lab
- Obtained the Korean venture business certification
- 11**  
Secured 3 Korean government R&D funding projects

2017

- 01**  
Joined AGL as a silver member  
Registered DAVINCI(visual launcher) as AGL 3<sup>rd</sup> party app in CES 2017
- 07**  
Set up partnership with several SoC companies
- 08**  
Participated in the ARM Partnership Meeting as an exhibitor



2018

- 04**  
Secured Seed funding and premier Korean R&D funding program, TIPS(Tech Incubator Program for Startup)
- 09**  
Filed two patents in the US and Europe  
Made a contract to develop RSE software platform with a Korea Tier 1



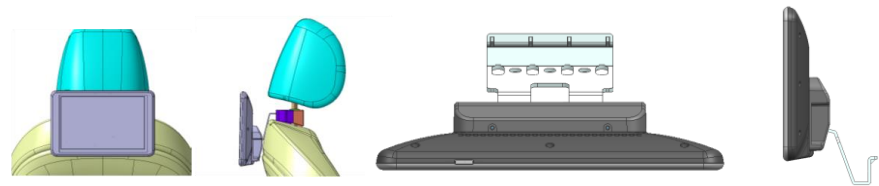
2019

- 01**  
Secured Series A funding
- 02**  
Made a contract to develop AVN software platform with a Korea Tier 1
- 05**  
Enlisted as top 10 fast-growing SW startups by Korean government
- 07**  
Participating in the Automotive Linux Summit 2019 (CFP awarded)

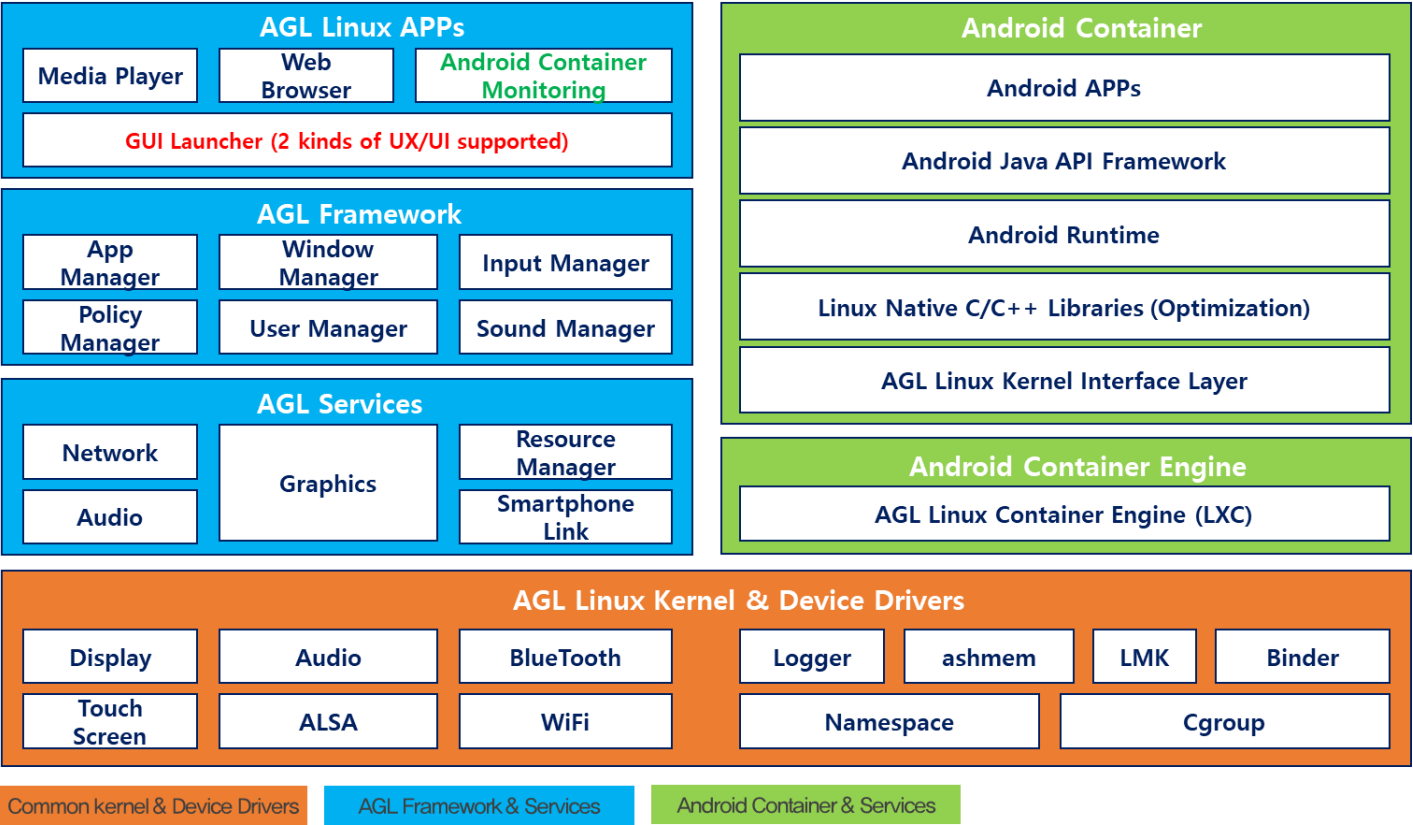




## Headrest type RSE



## SW Architecture







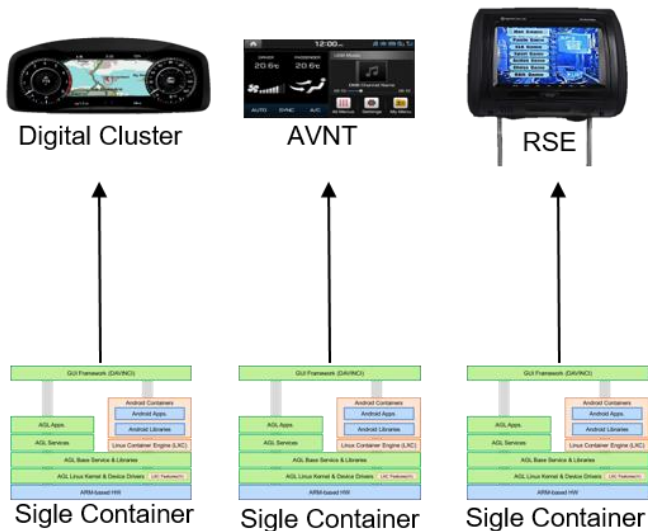
# CONTAINER IN IIP\*

\*Integrated Infotainment Platform

## I. Overview

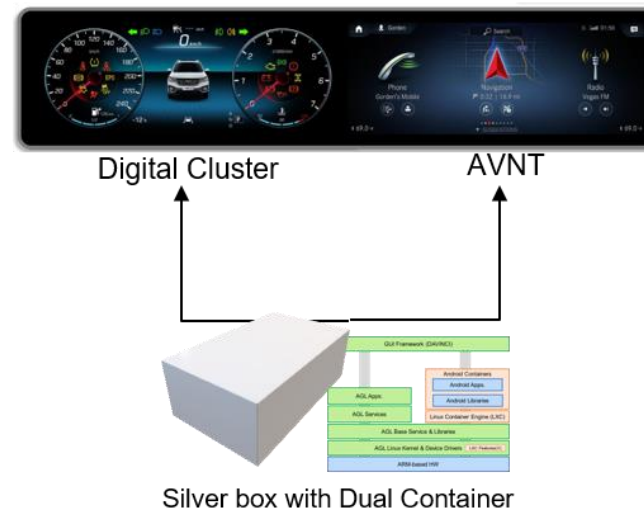
Beyond RSE\_ RSE / AVN → Integrated Cockpit System → Integrated Infotainment Platform

### Stage1: Separate products & Reuse platform



- Simultaneous use of AGF and Linux/Android-based OS on one device

### Stage2: Partial integration & silver box



- Simultaneous IVI control with one silver box

### Stage3: Full integration & silver box



- Control all IVIs with one silver box



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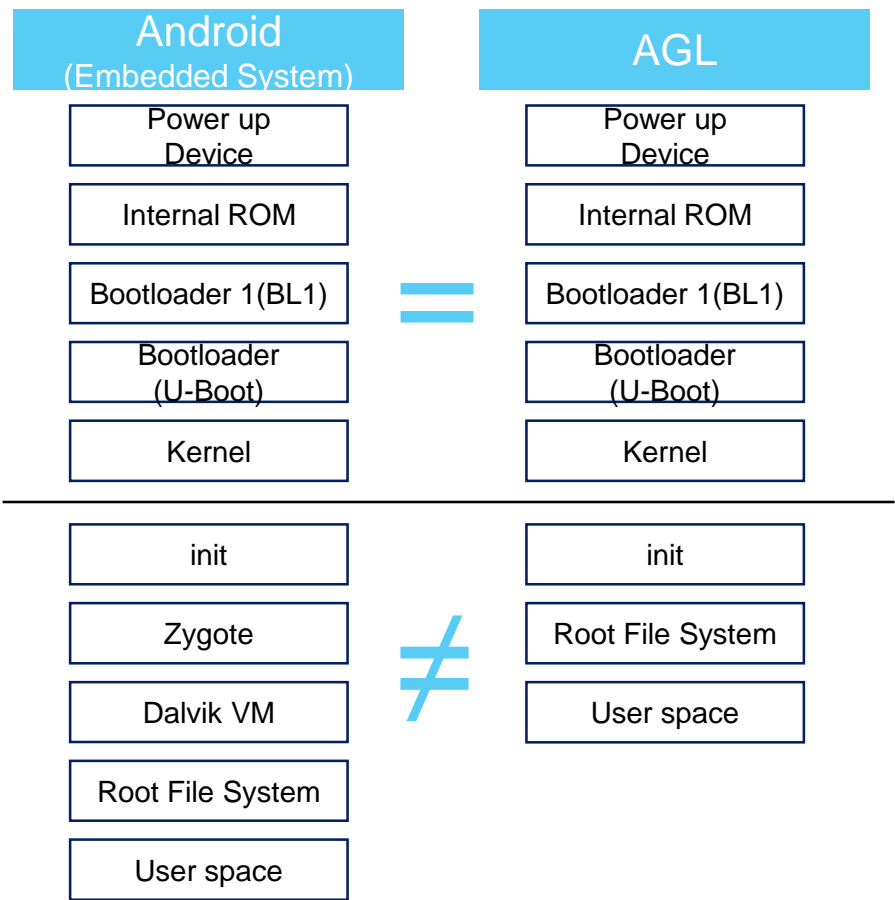
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- Q&A
- Open discussion

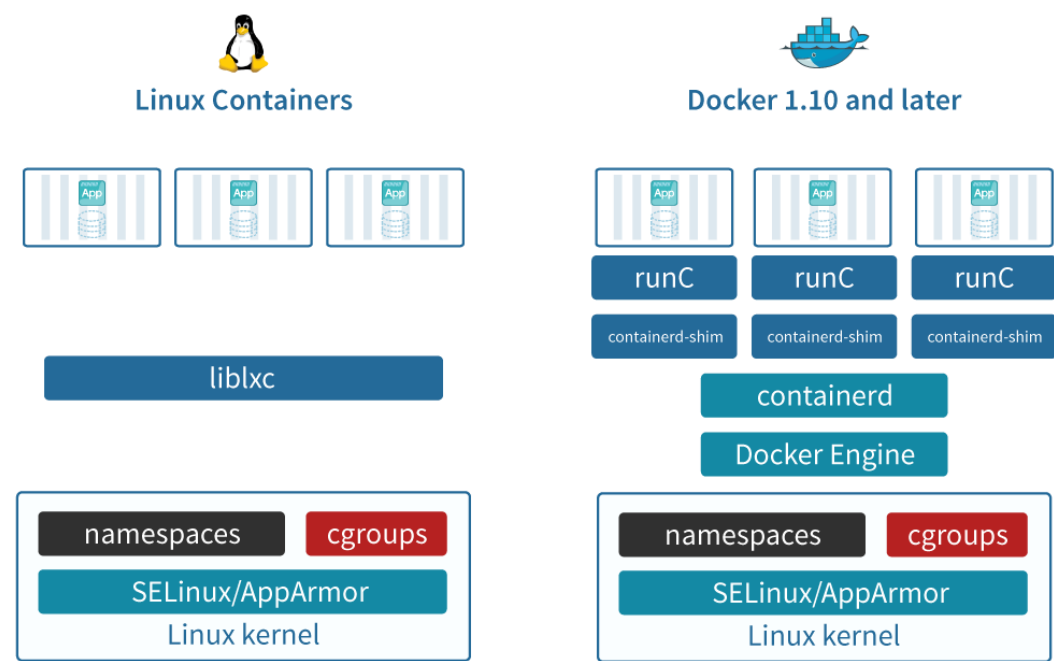



# WHY LXC (LXC vs. DOCKER)

## Booting Sequence



## LXC vs. Docker



DOCKER VERSUS LXC/LXD	
bobcares.com 	
DOCKER	LXC/LXD
Application virtualization	Full system virtualization
Data not saved	Data can be retrieved
Single purpose	Multi-purpose
Platform independent	Linux platform
Security by isolation	No app isolation



# MAJOR DEVELOPMENTS (1)

## II. Technical description

### Android Bridge Service

01

#### Manage android app list

- Install / Remove android apps (scan)
- Execute android app
- Terminate android app

02

#### Switch I/O Between AGL and Android

- Display (Frame buffer)
- Touch input

03

#### Watch dog for abnormal android status

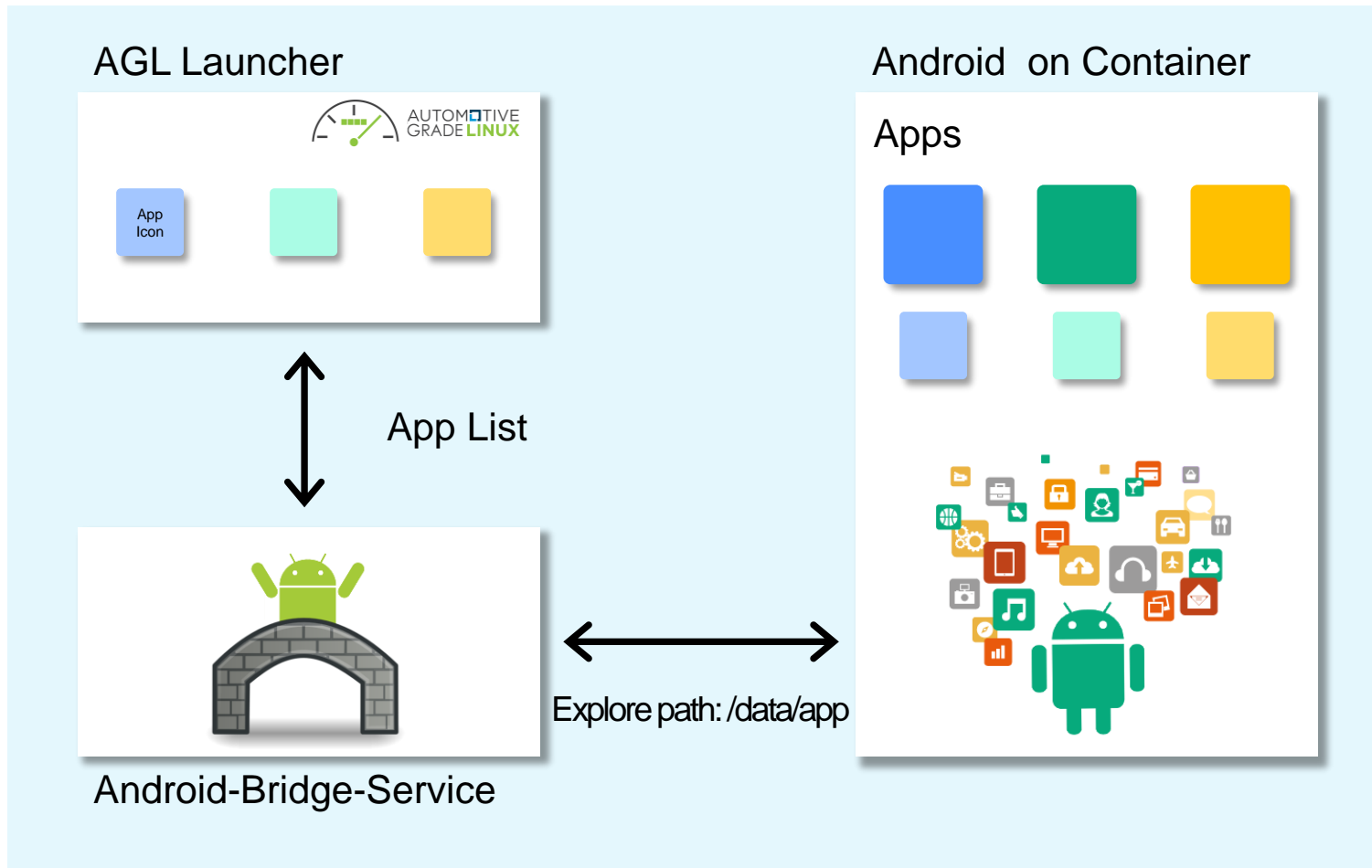
- If no reply from android, switch I/O to AGL and restart android



# MAJOR DEVELOPMENTS (2)

## II. Technical description

### Display android app icons



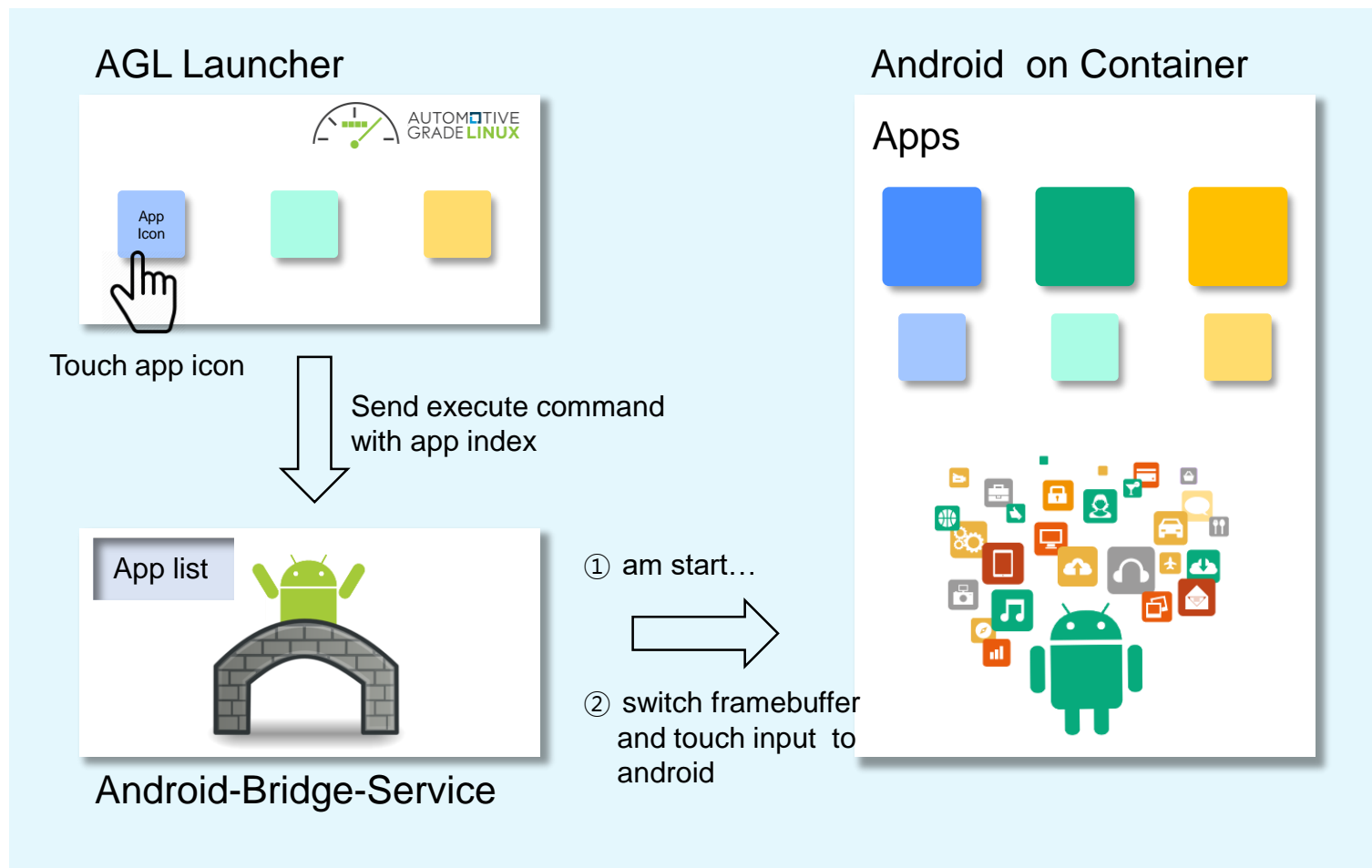
- Scan Android : /data/app Folder
- Parses APK file to get Icon, App name, etc.



# MAJOR DEVELOPMENTS (3)

## II. Technical description

### Execute android apps



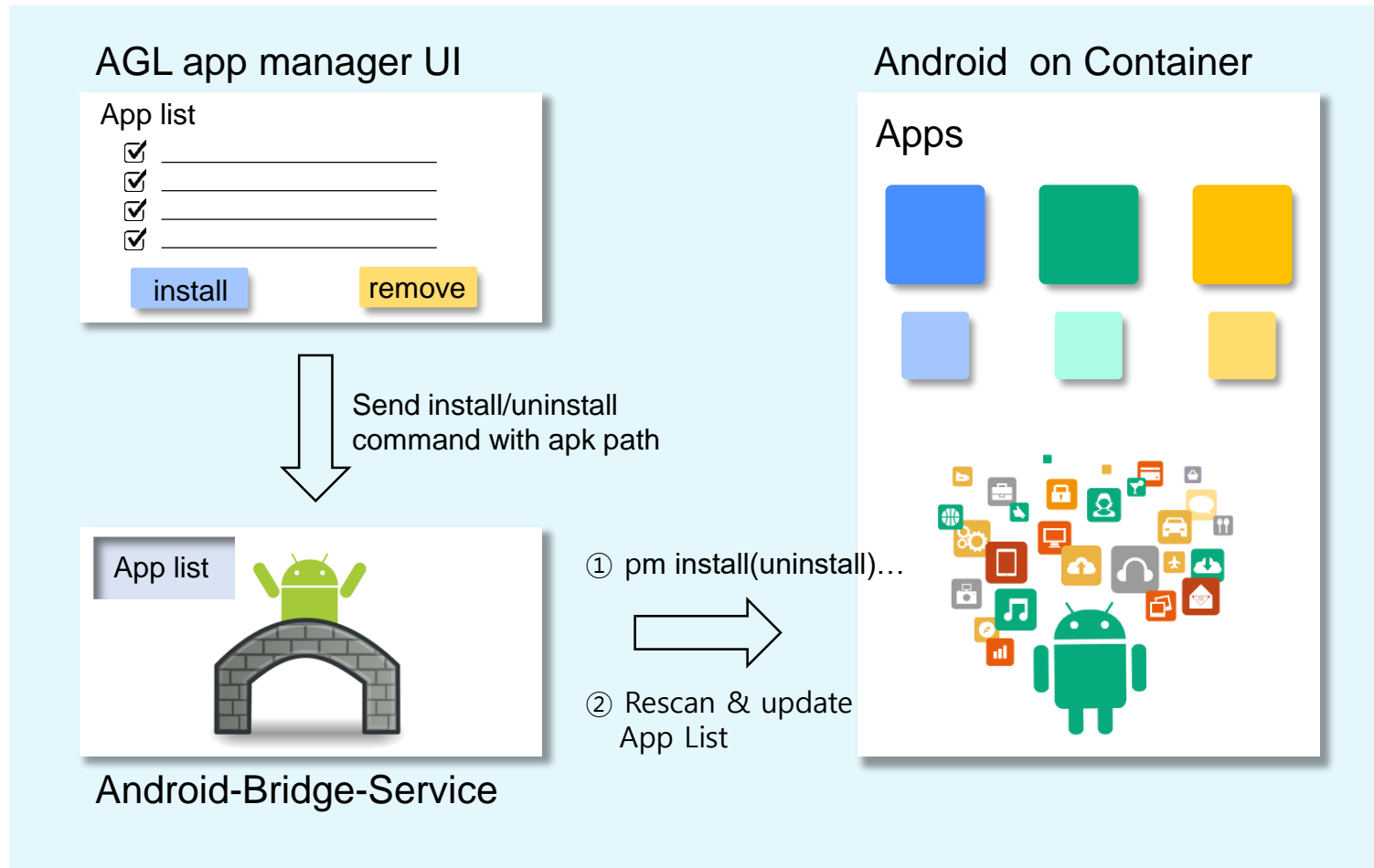
- If the user touches the Android App icon in the launcher of AGL, the App is executed through A-Bridge Service
- At this time, pass the display to android



# MAJOR DEVELOPMENTS (4)

## II. Technical description

### Install & remove android apps

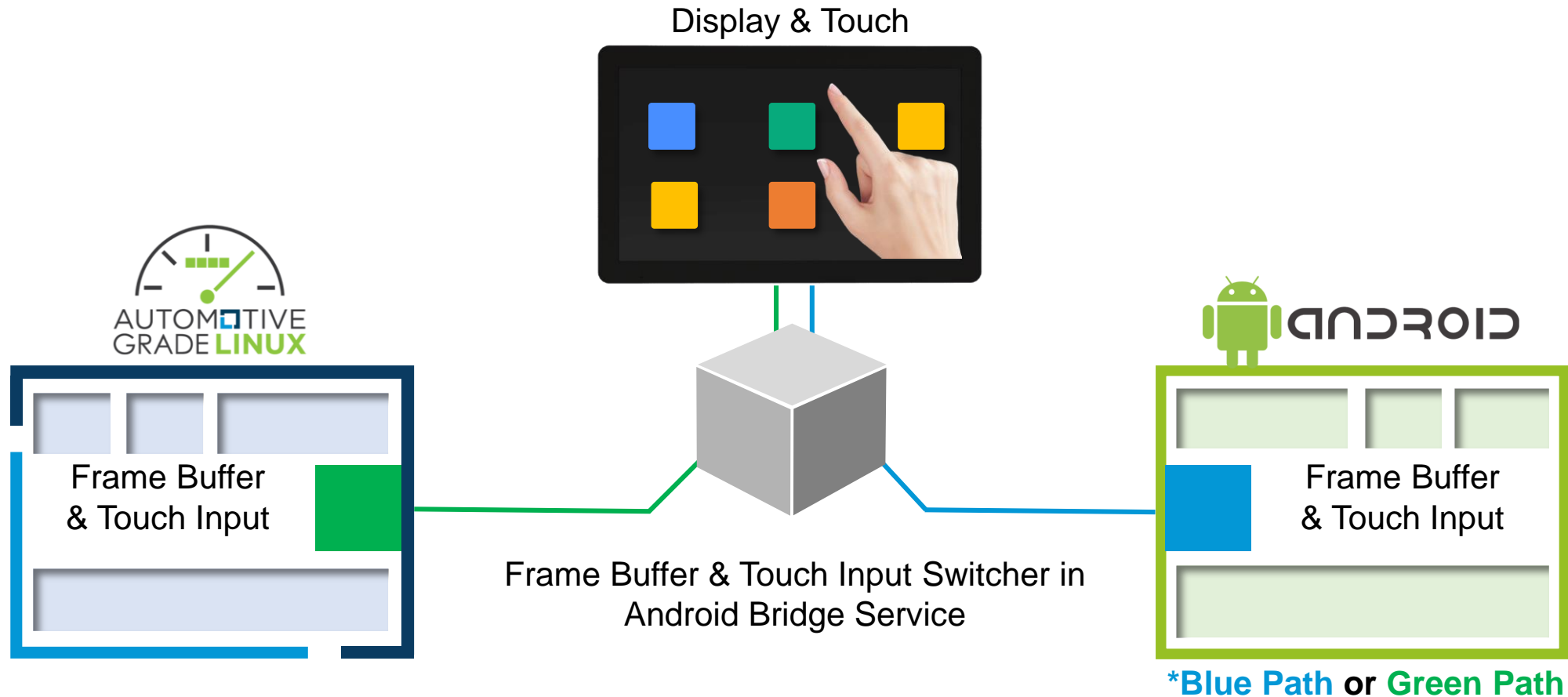


- Send install/uninstall command with apk path
- Rescan & update App List



# MAJOR DEVELOPMENTS (5)

Where does the display & touch control?







# MAJOR DEVELOPMENTS (6)

## Blocking USB and Network



Remove USB Functions(MTP, ADB, etc.) from Android System  
(Preventing collision with AGL)



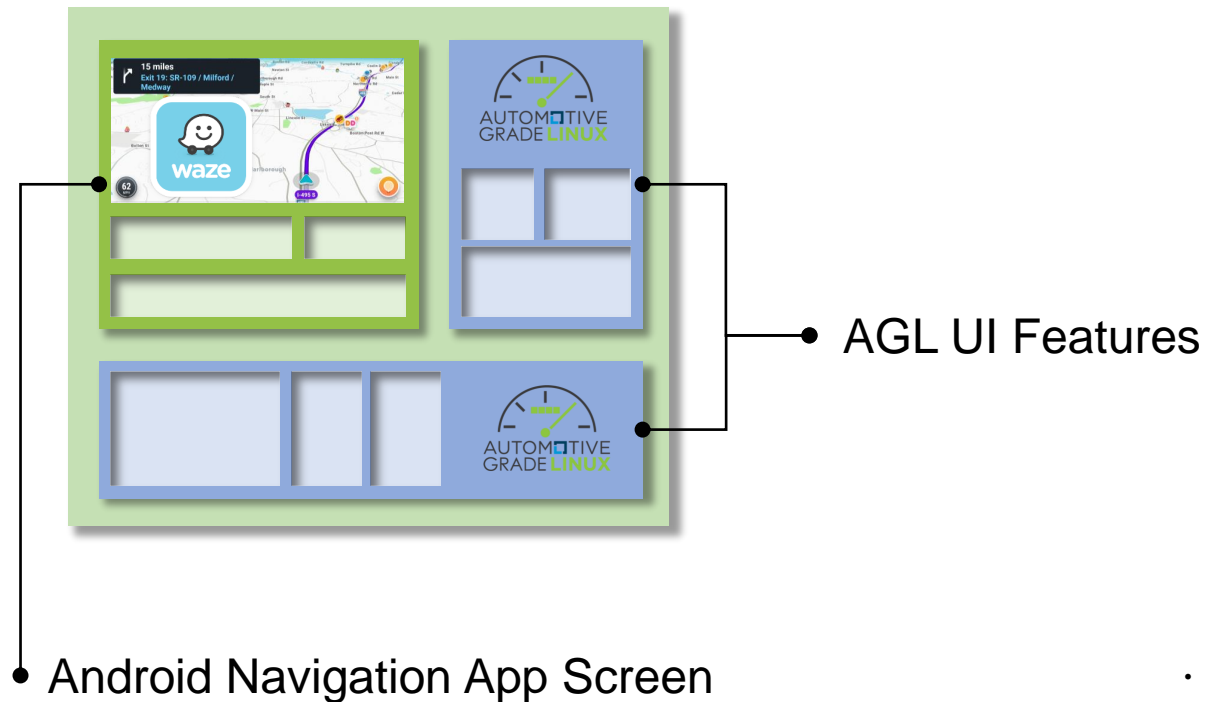
Remove WiFi & Network Initializations From Android System  
(Preventing collision with AGL)



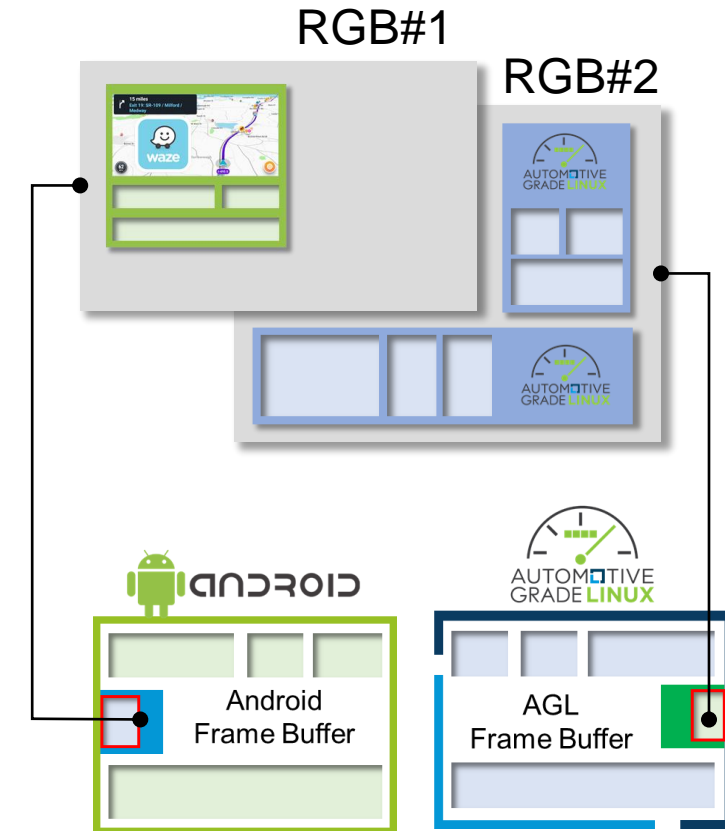
# REMAINING WORKS (1)

## Android Overlay

- Overlay Android Screen on AGL Screen for AVN



## II. Technical description



- Use hardware with 2 or more RGB layers  
→ Features with hardware dependencies

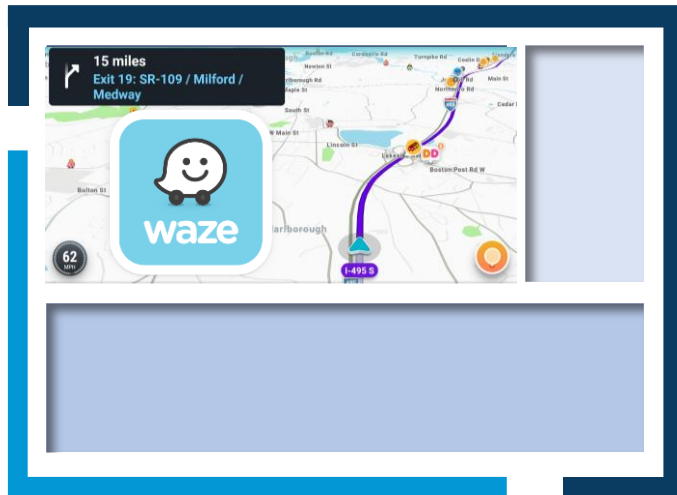


## REMAINING WORKS (2)

### II. Technical description

#### Android Streaming

- MJPEG Streaming From Android



AGL UI & Using only one RGB Layer



Screen Capture & Streaming

Why mjpeg?

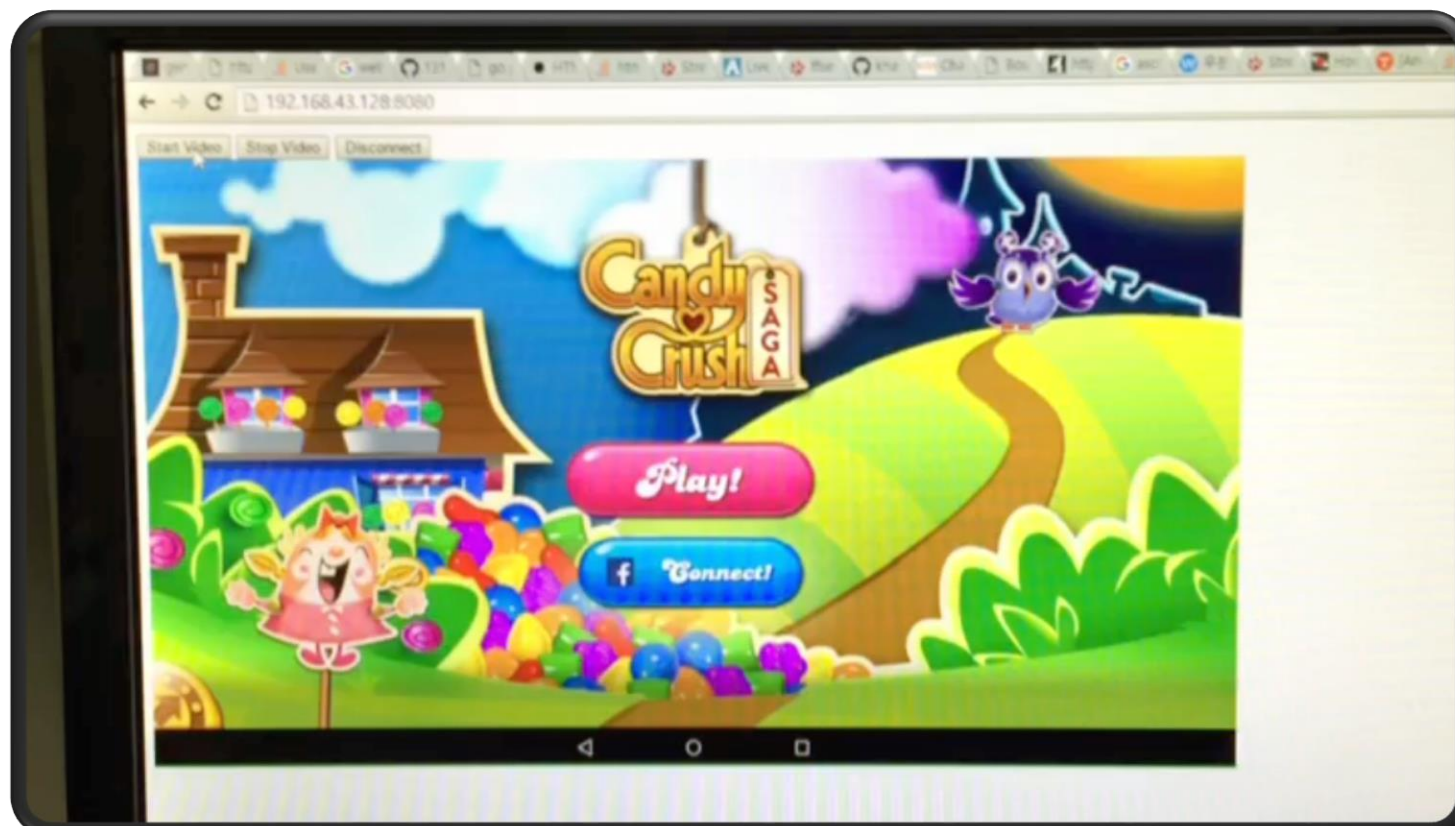
→ Minimize delay due to video encoding



## REMAINING WORKS (3)

### Android Streaming

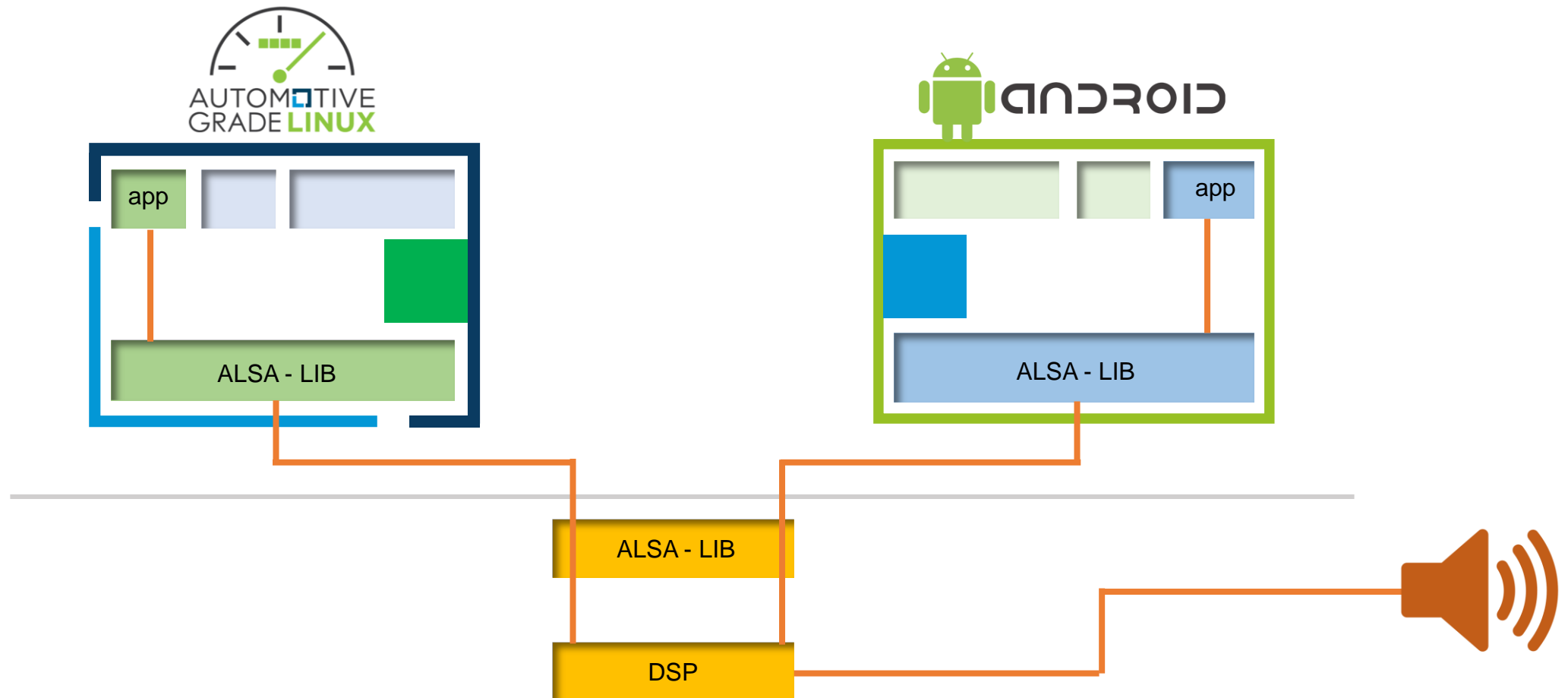
- Prototyping is complete





# REMAINING WORKS (4)

## Audio Mixing (Hardware)





## REMAINING WORKS (5)

### More I/O Switching or Isolations



USB



Audio



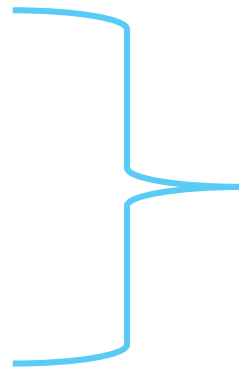
WiFi



Bluetooth



And Multi Container System



Can be applied differently depending on use case



Issues : Multi – Binder (Tested)  
: Multi – Display, Audio, Touch ...

Currently, sequential boot-up process is required.

ex) Android 0 → Android 1 → ...



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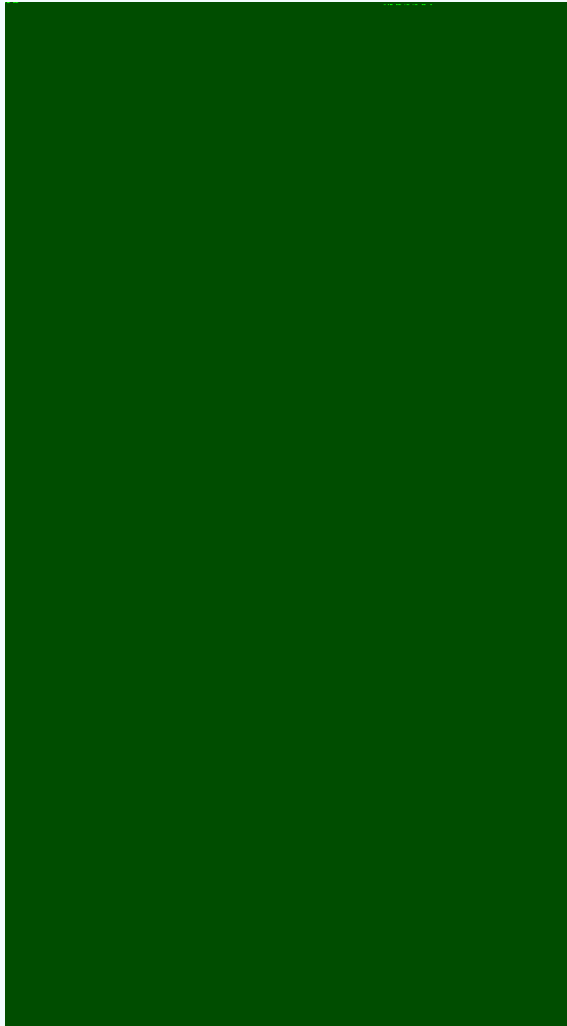
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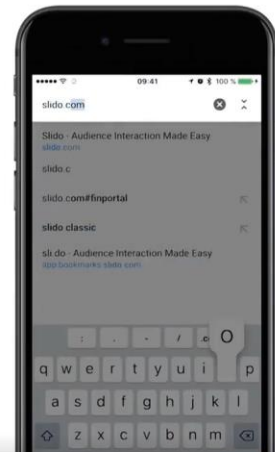
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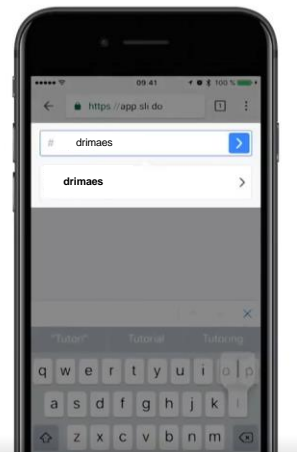
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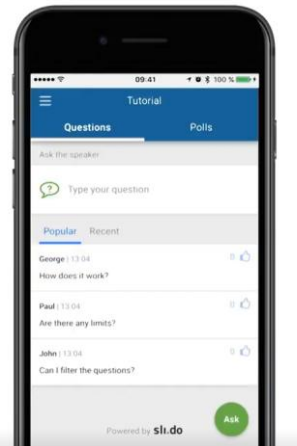
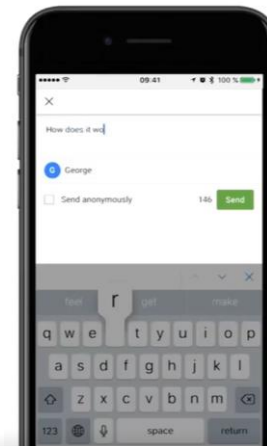
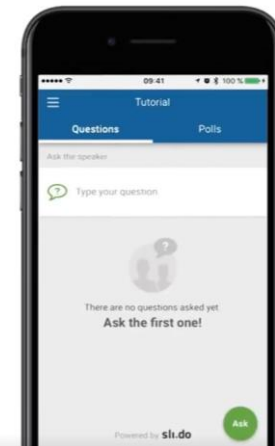
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Join with event code  
**#drimaes**



Type your question







# OPEN DISCUSSION

## III. Discussion

Thank you

