

# SWE 632 - Design & Development of User Interfaces

Fall 2020



George Mason  
University

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Dr. Kevin Moran

V2S  
Tech Talk





# What is V2S?

- Framework for automatically recording and replaying test cases for mobile applications
- Input is a screen recording of a mobile app
- Output is a script that automatically reproduces the actions

Why would you use V2S?

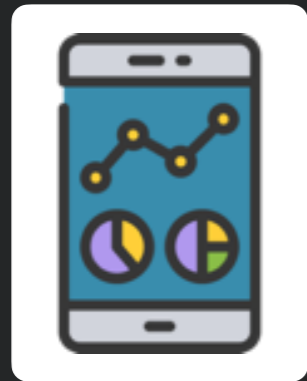




# Why Use V2S?

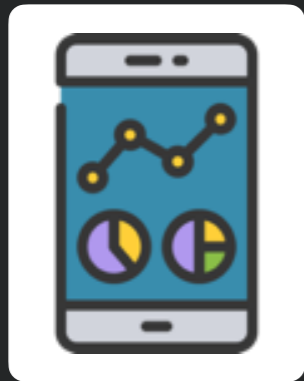
# Why Use V2S?

Understanding  
User Behavior



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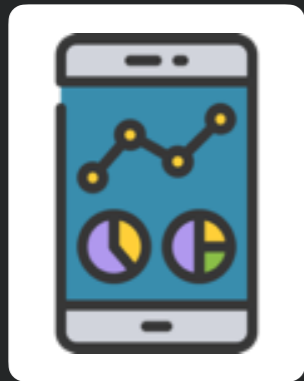


Crowdsourced  
Bug Reporting

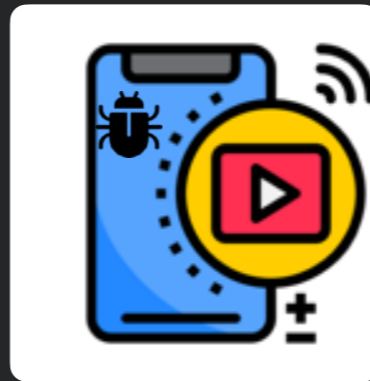


# Why Use V2S?

Understanding  
User Behavior



Crowdsourced  
Bug Reporting



Testing  
Comprehension



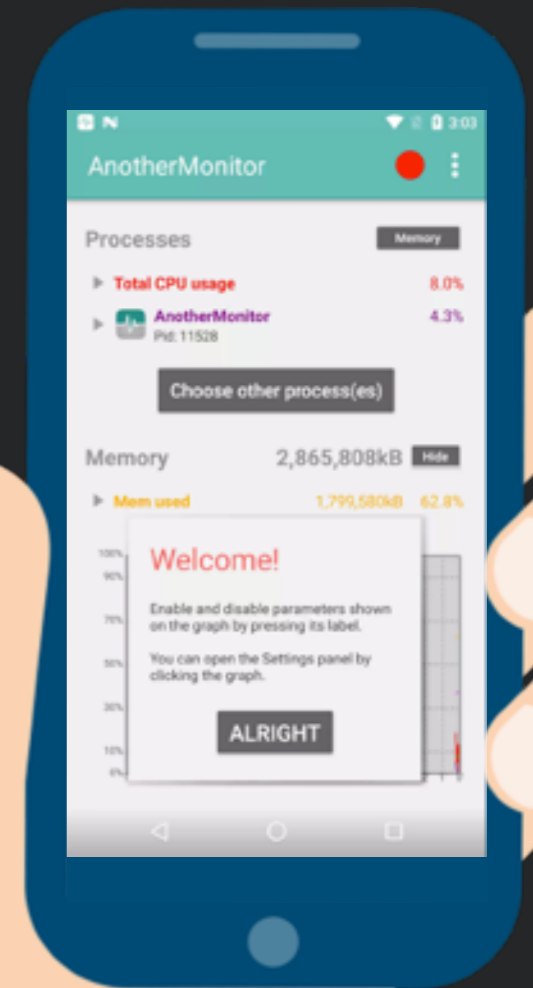
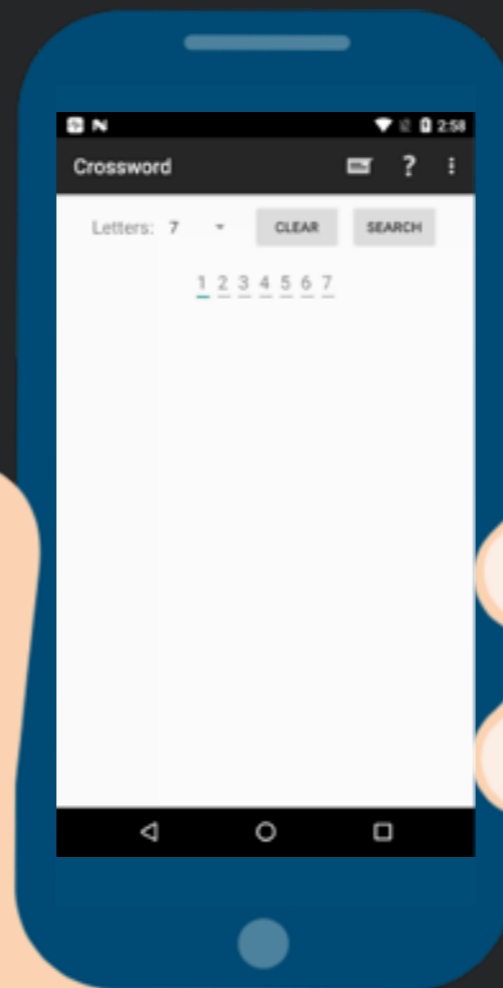
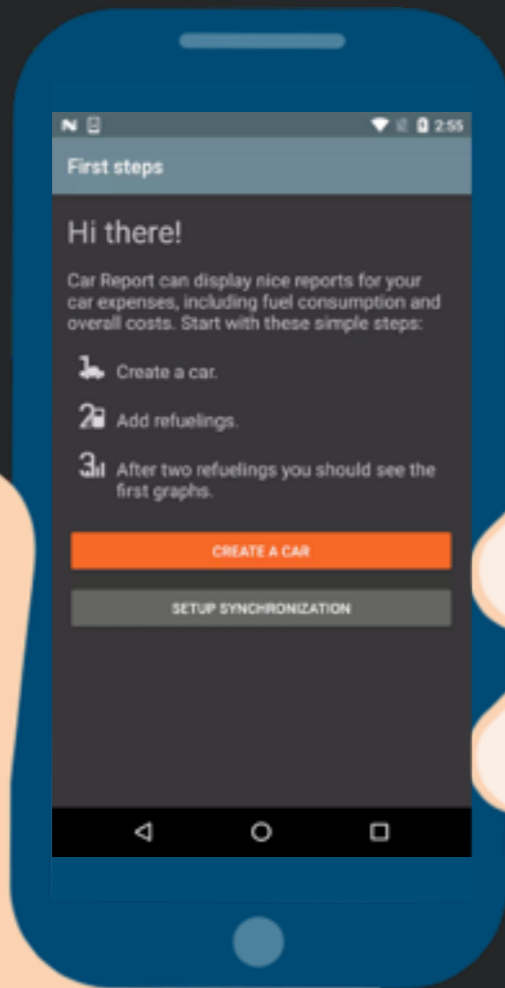


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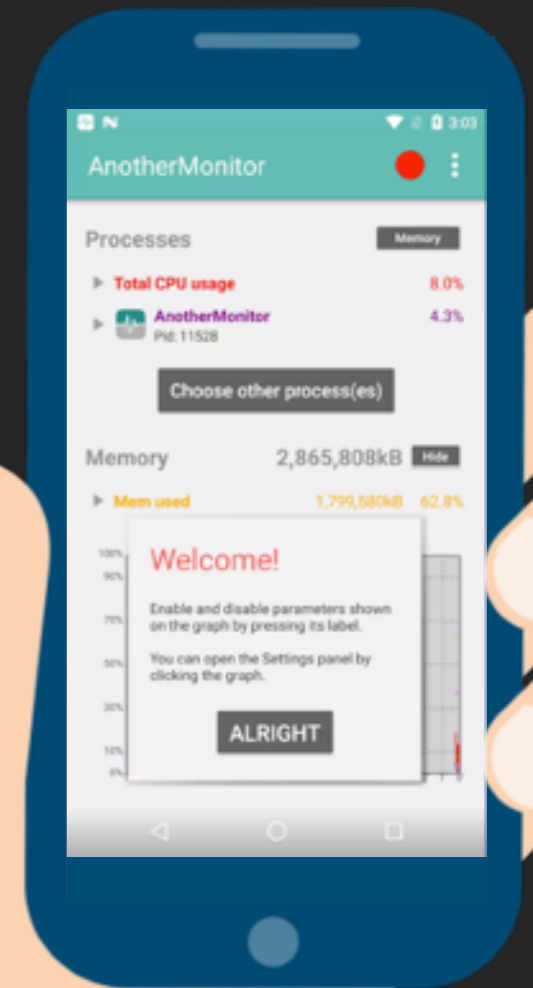
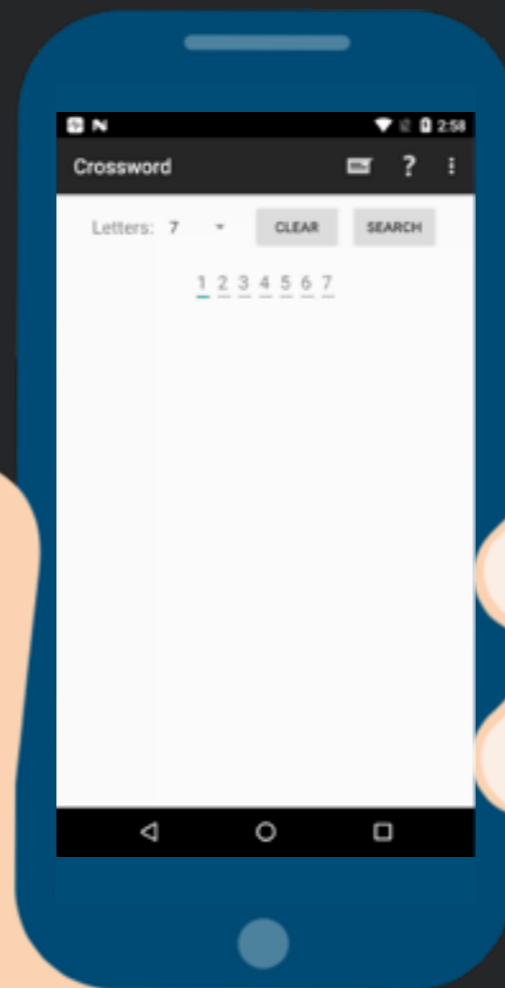
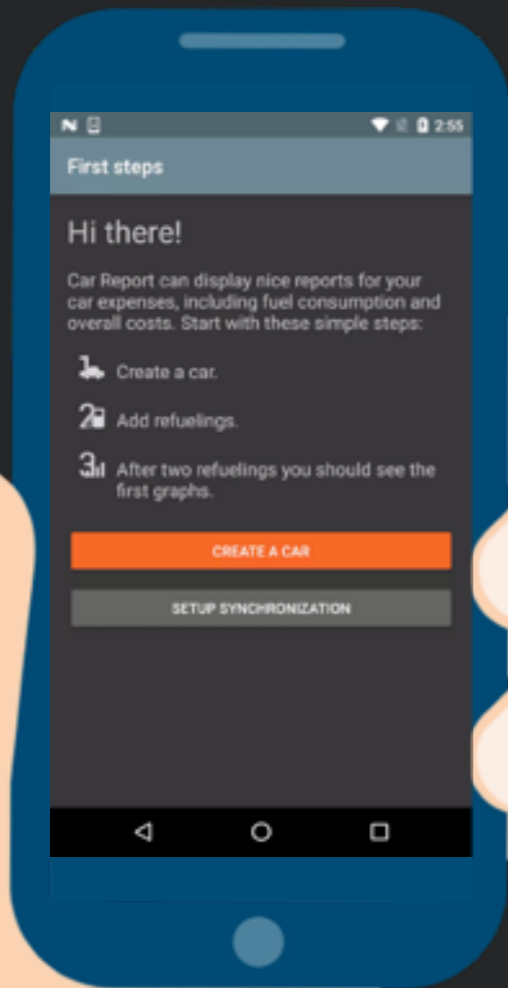




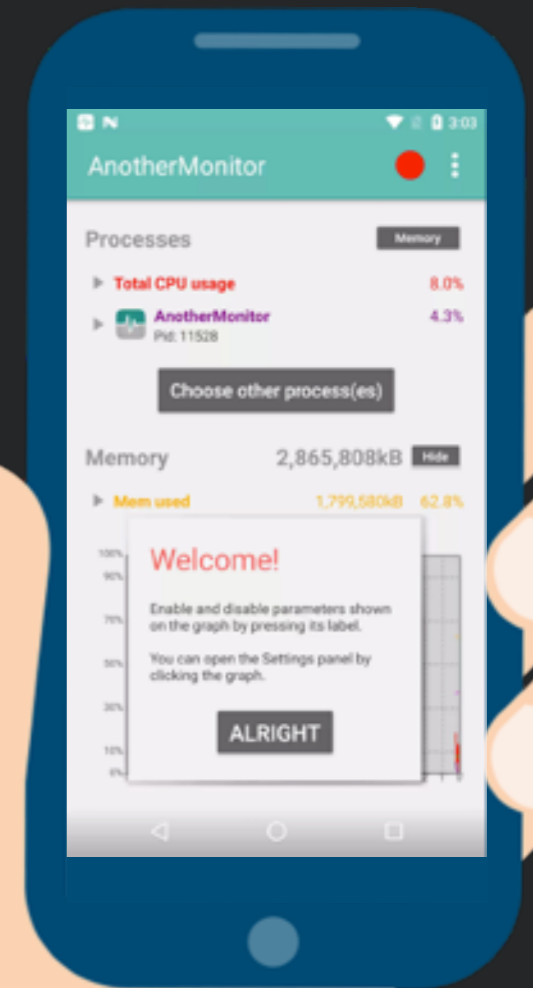
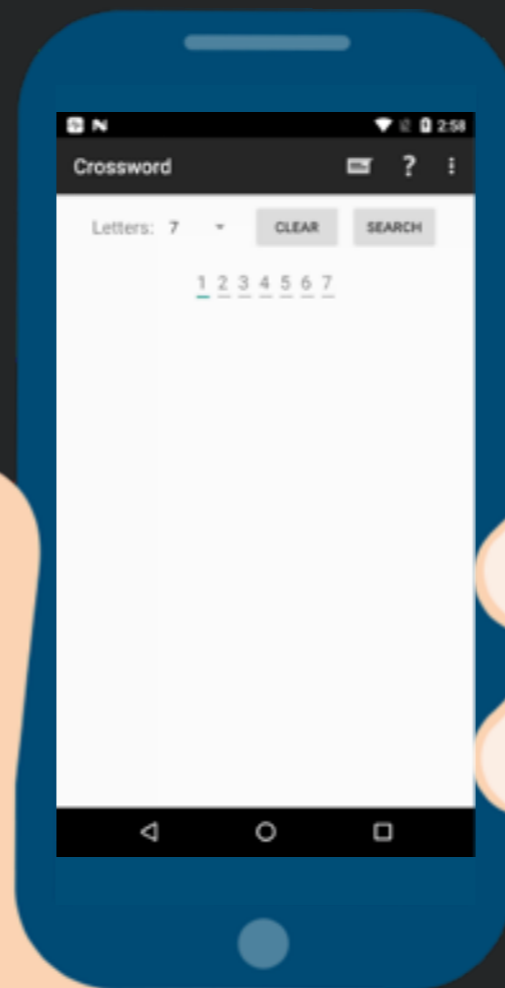
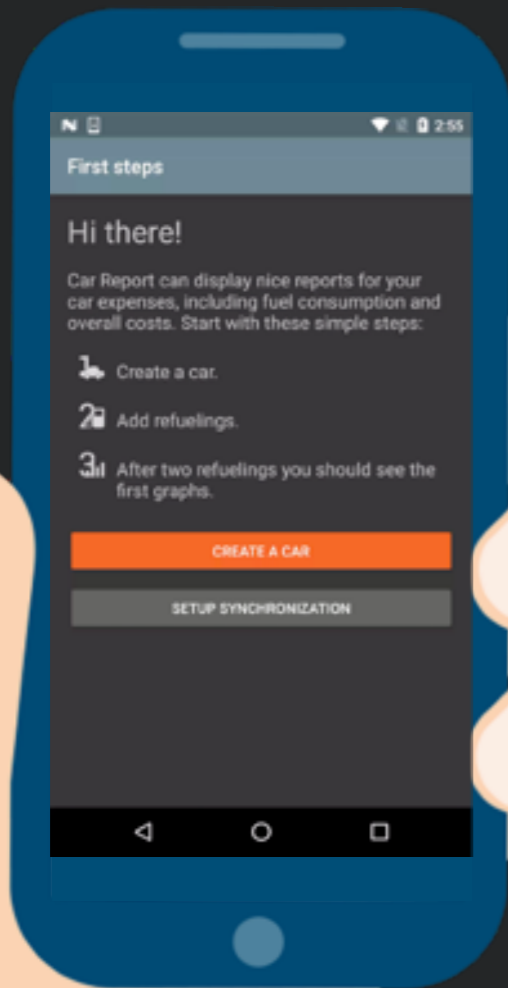
# Why Use V2S?



# Why Use V2S?



# Why Use V2S?



# How Does V2S Work?

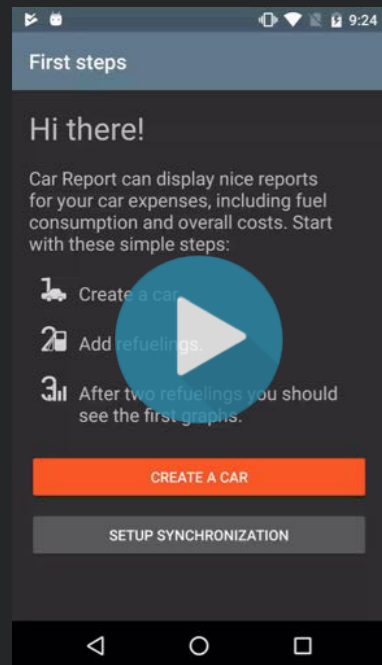


# The V2S Approach?



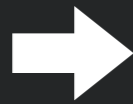
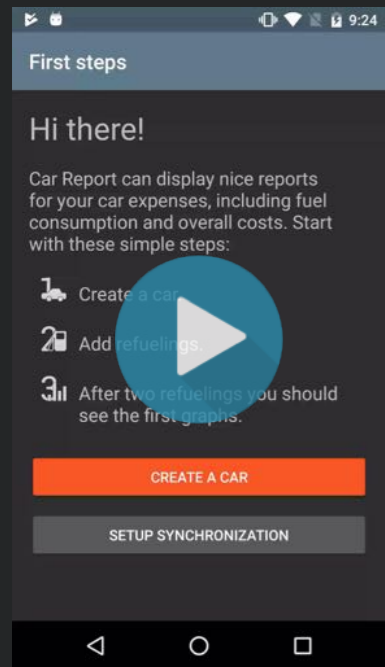


# Phase I: Touch Detection



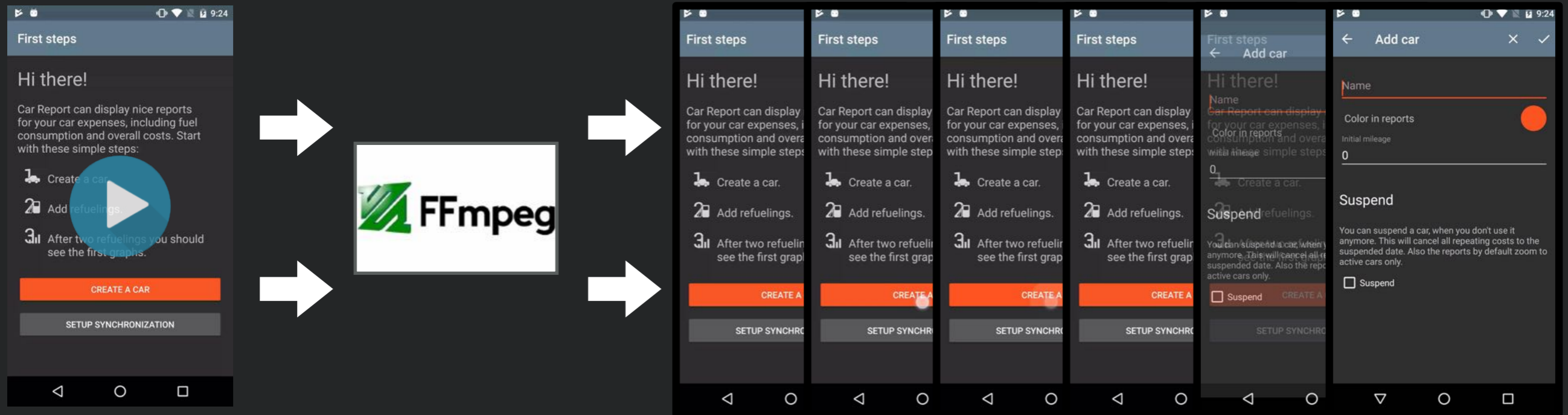


# Phase I: Touch Detection





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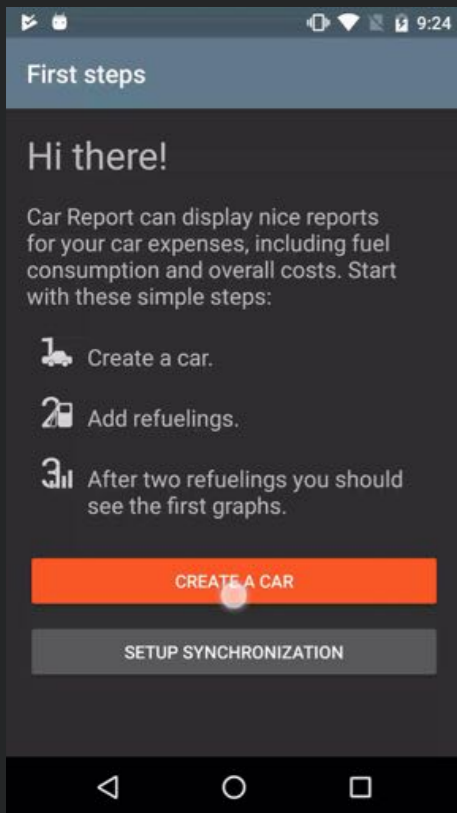






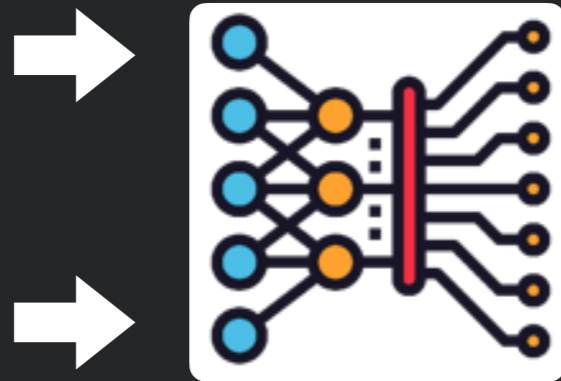
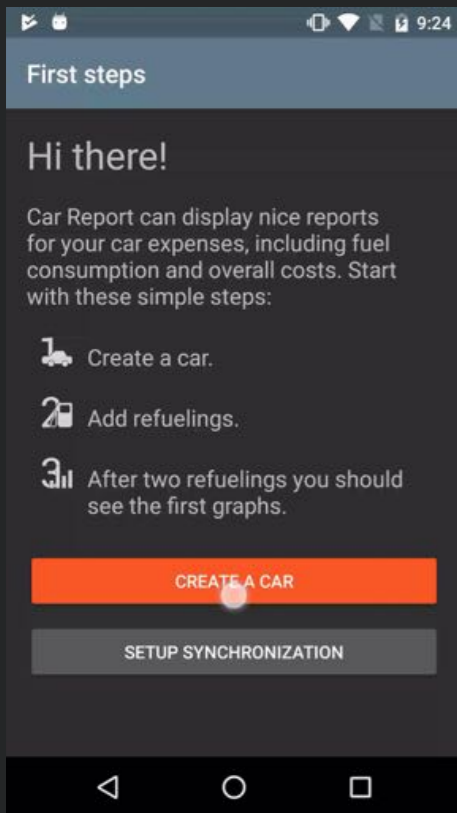
# Phase I: Touch Detection

## Faster-RCNN Object Detection Network



# Phase I: Touch Detection

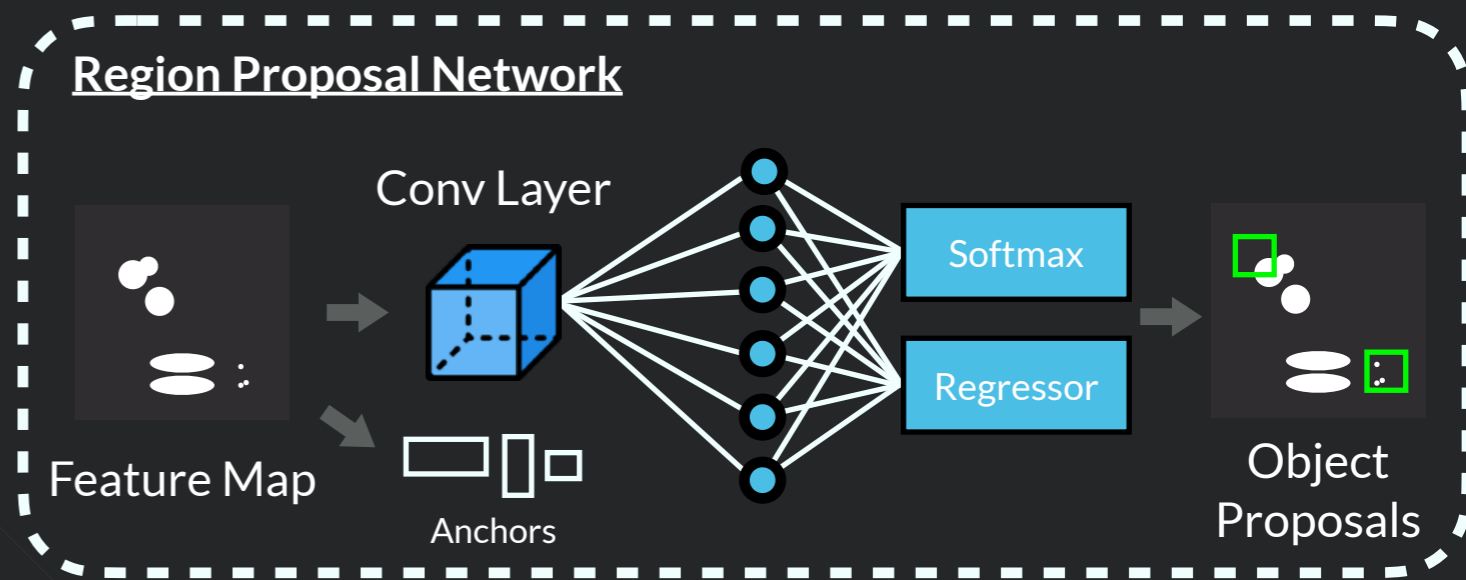
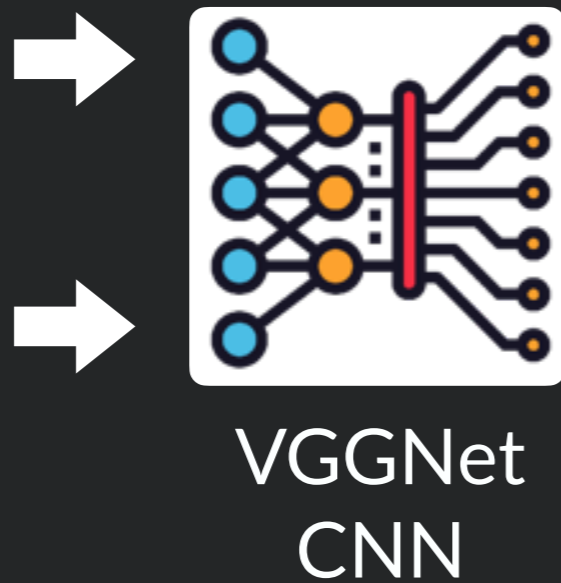
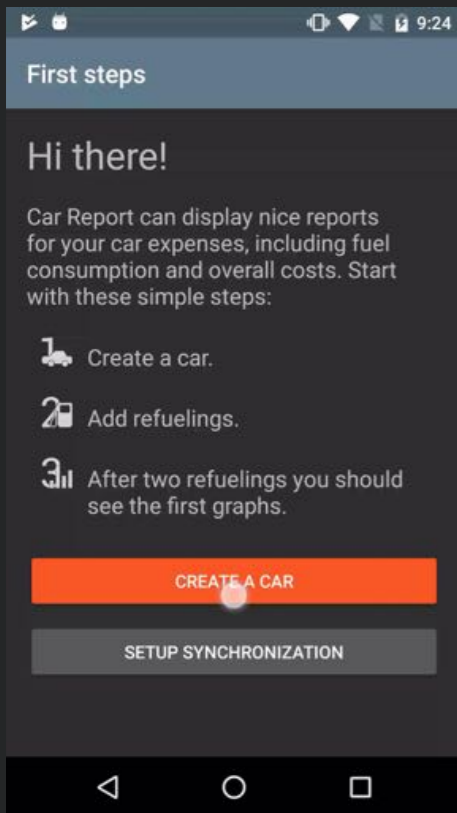
## Faster-RCNN Object Detection Network



VGGNet  
CNN

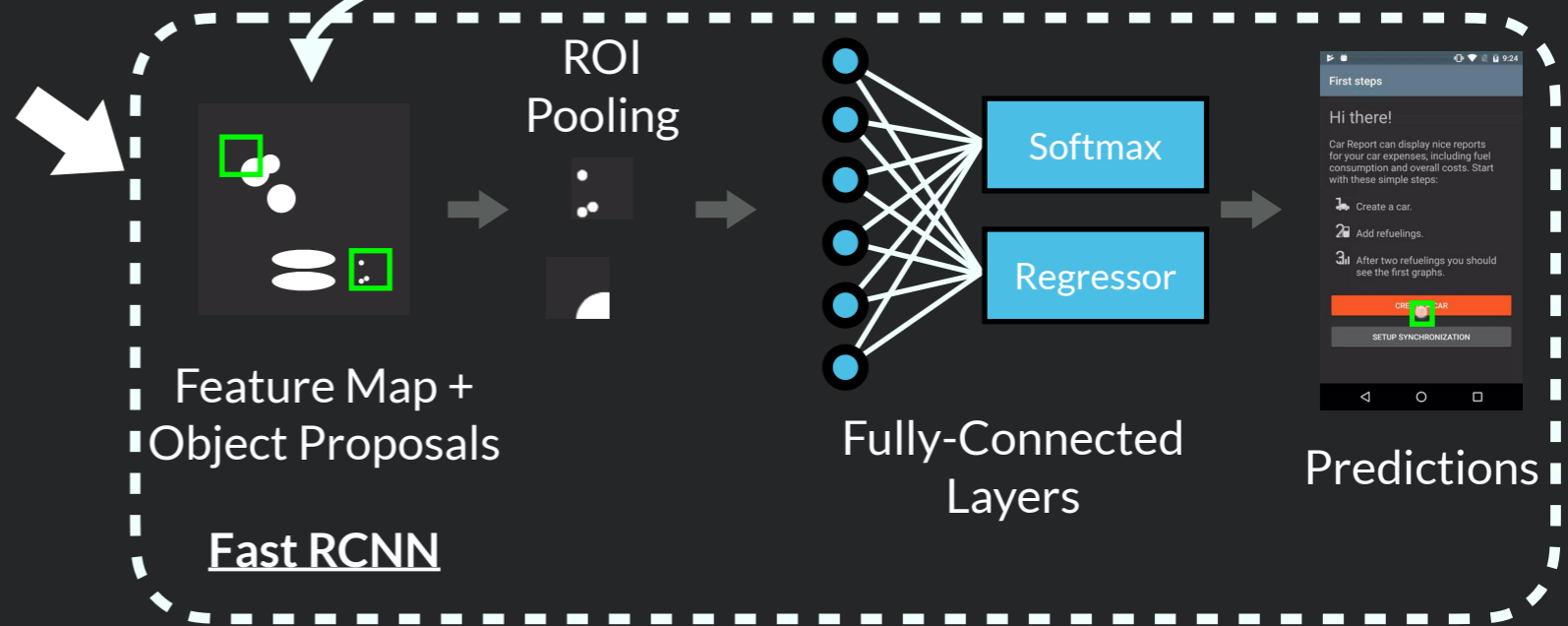
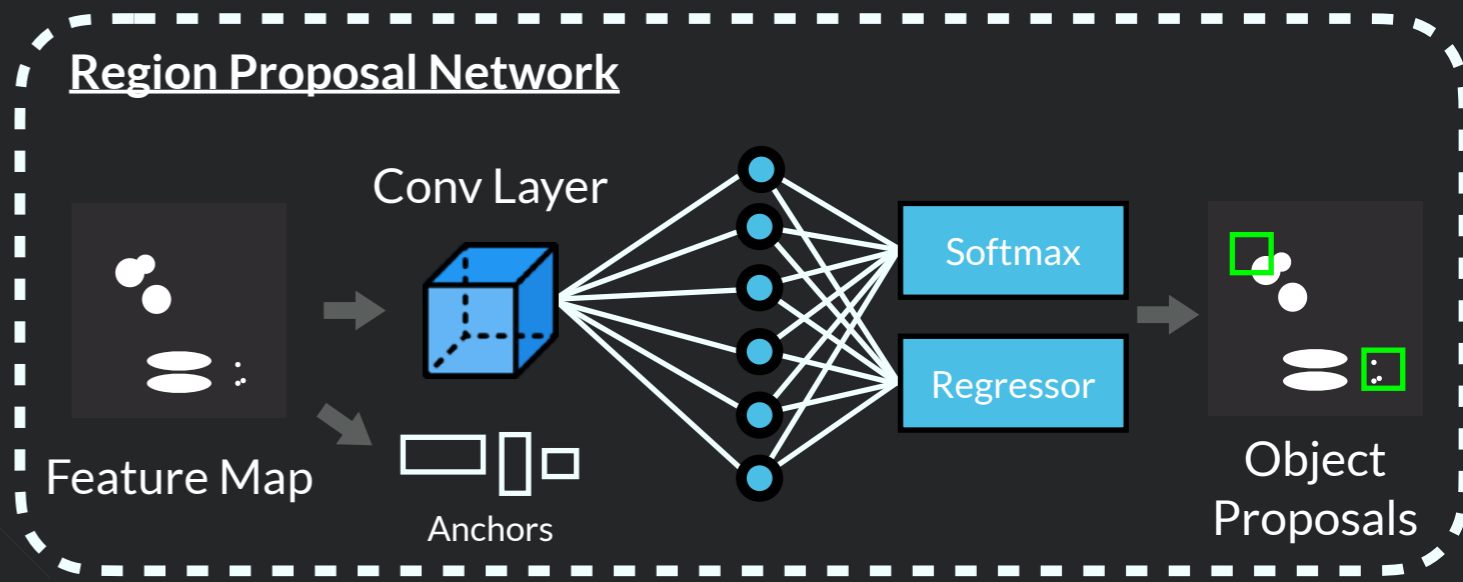
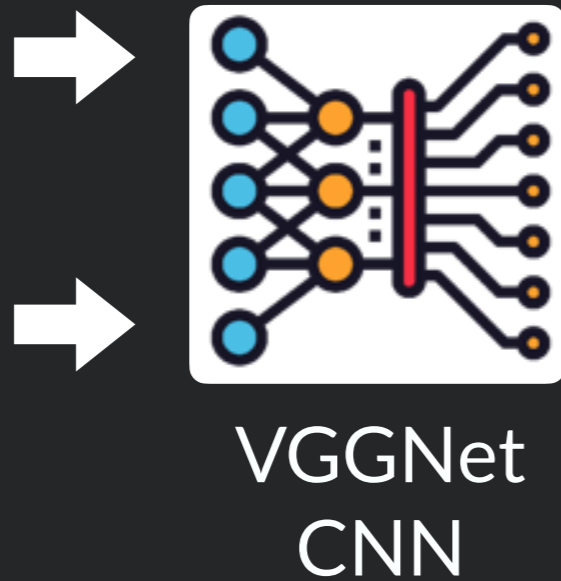
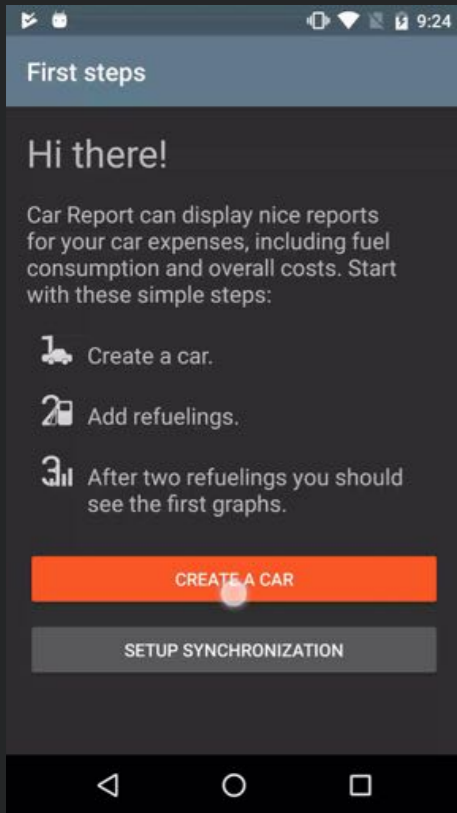
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# Phase I: Touch Detection

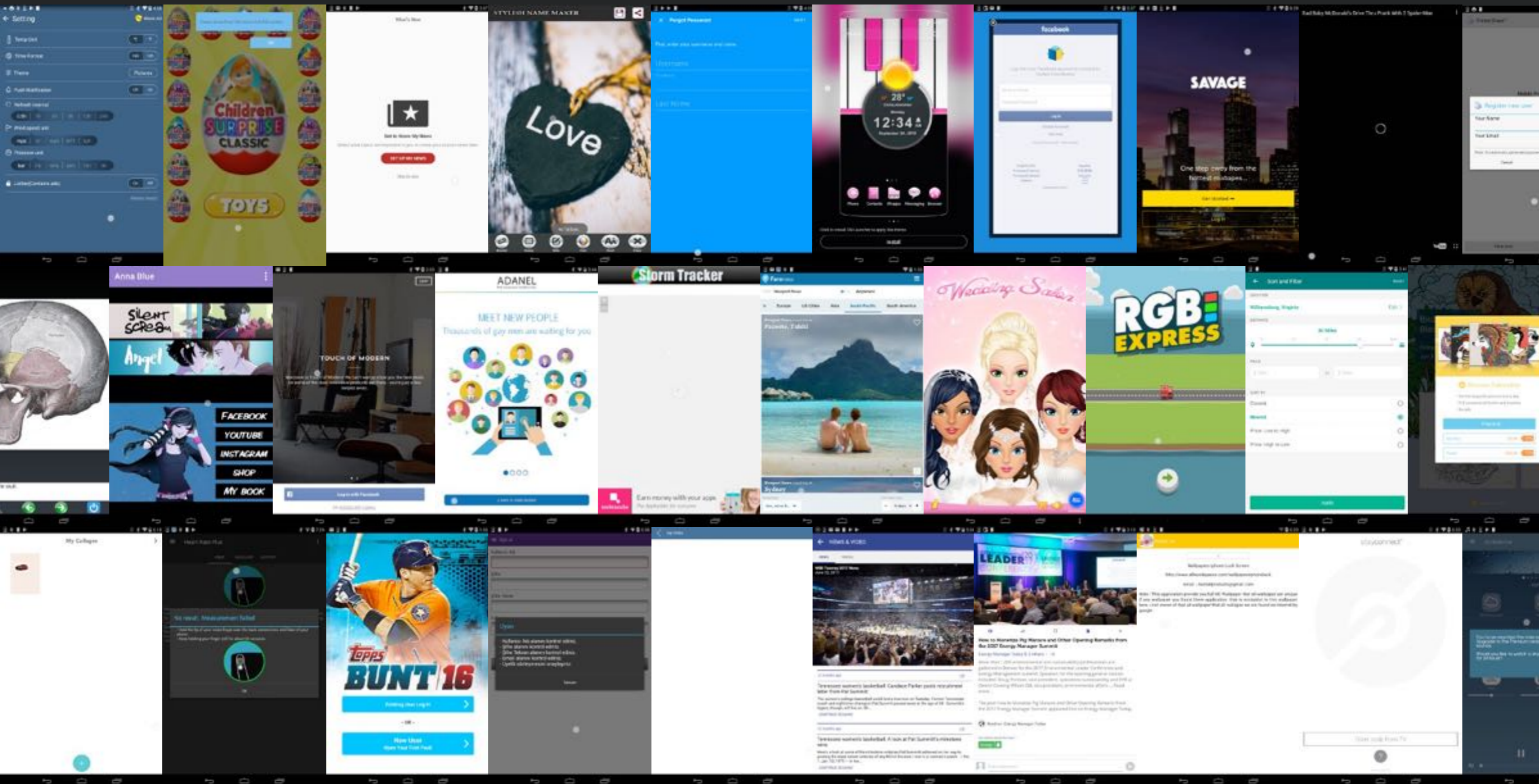
## Faster-RCNN Object Detection Network







# Phase I: Touch Detection



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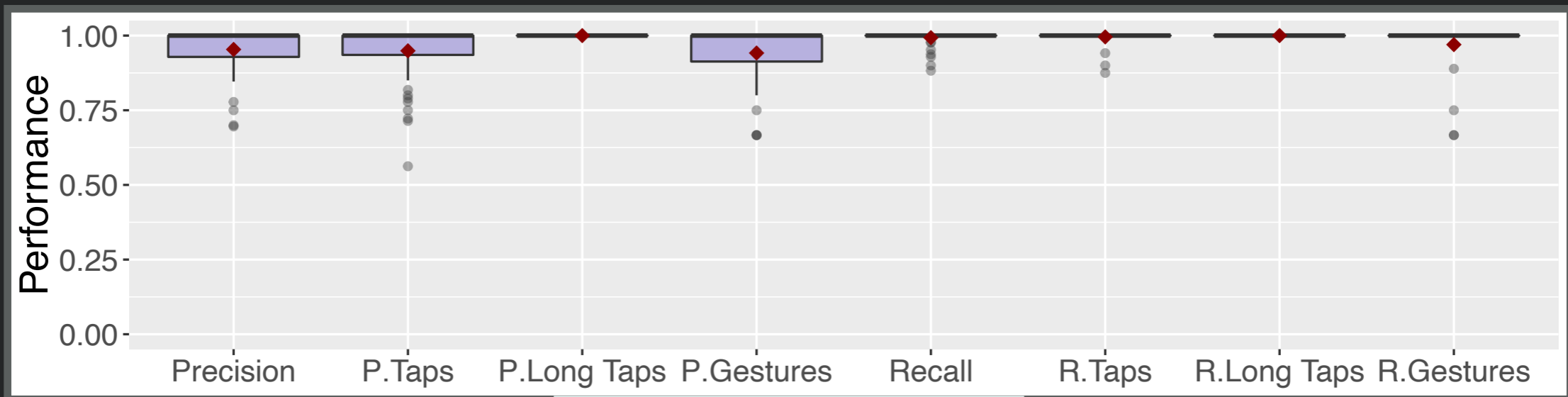
# Accuracy of V2S



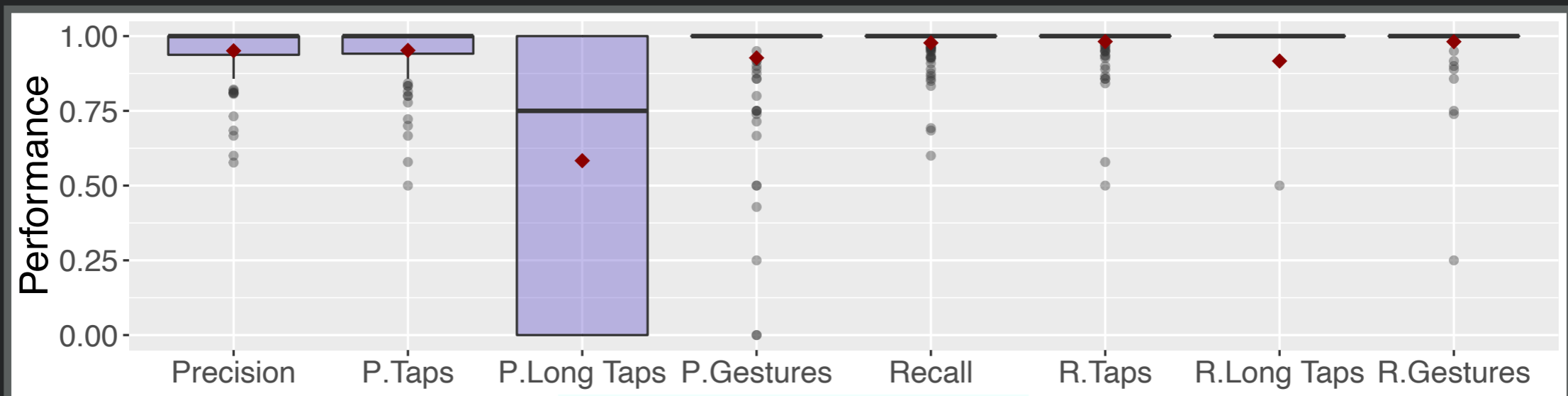


# Accuracy of Replay

## Scenario Replay Precision & Recall



Controlled Study



Popular Apps



# Accuracy of Replay

## Scenario Replay Precision & Recall

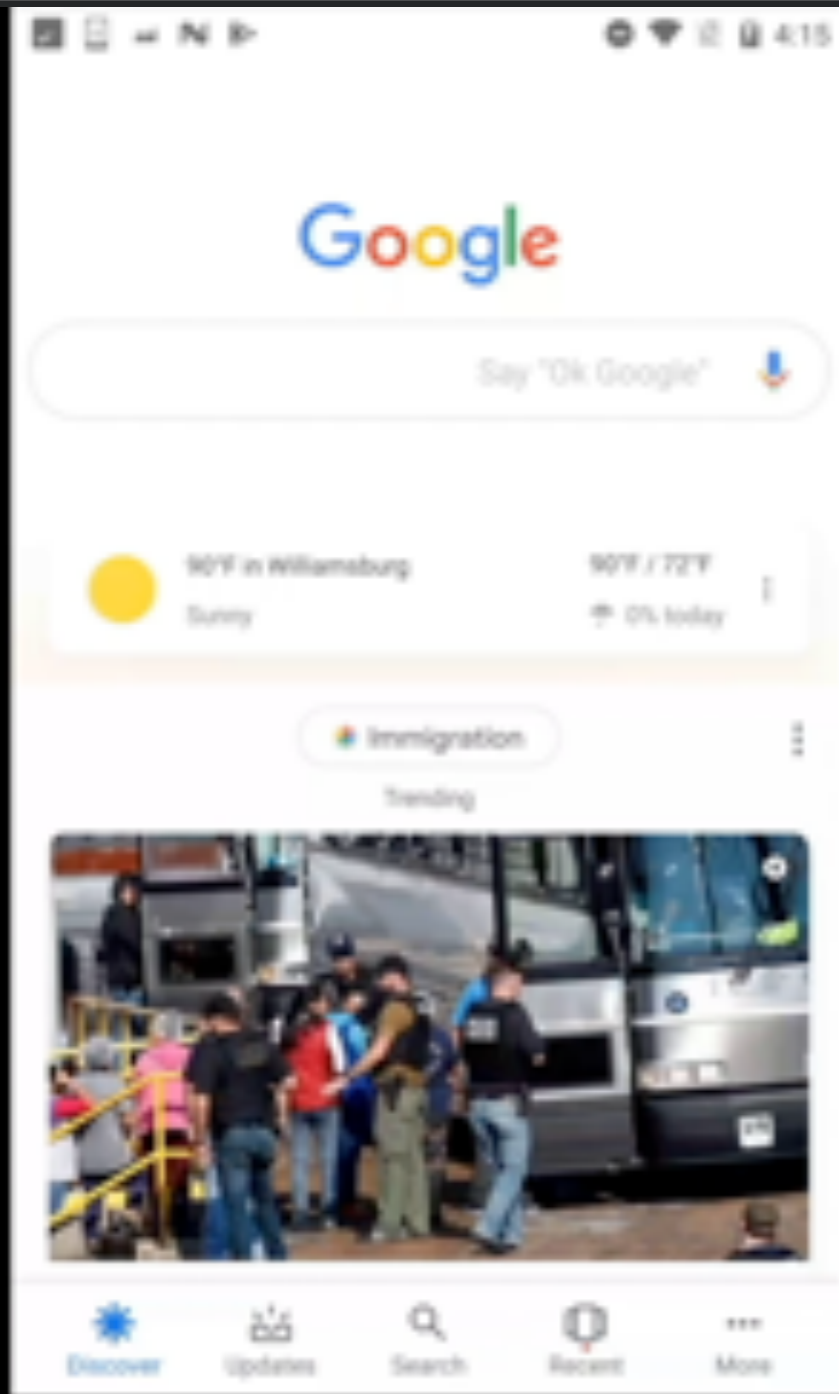
Overall, precision and recall are ~95% and ~98% respectively.

# Demo of V2S

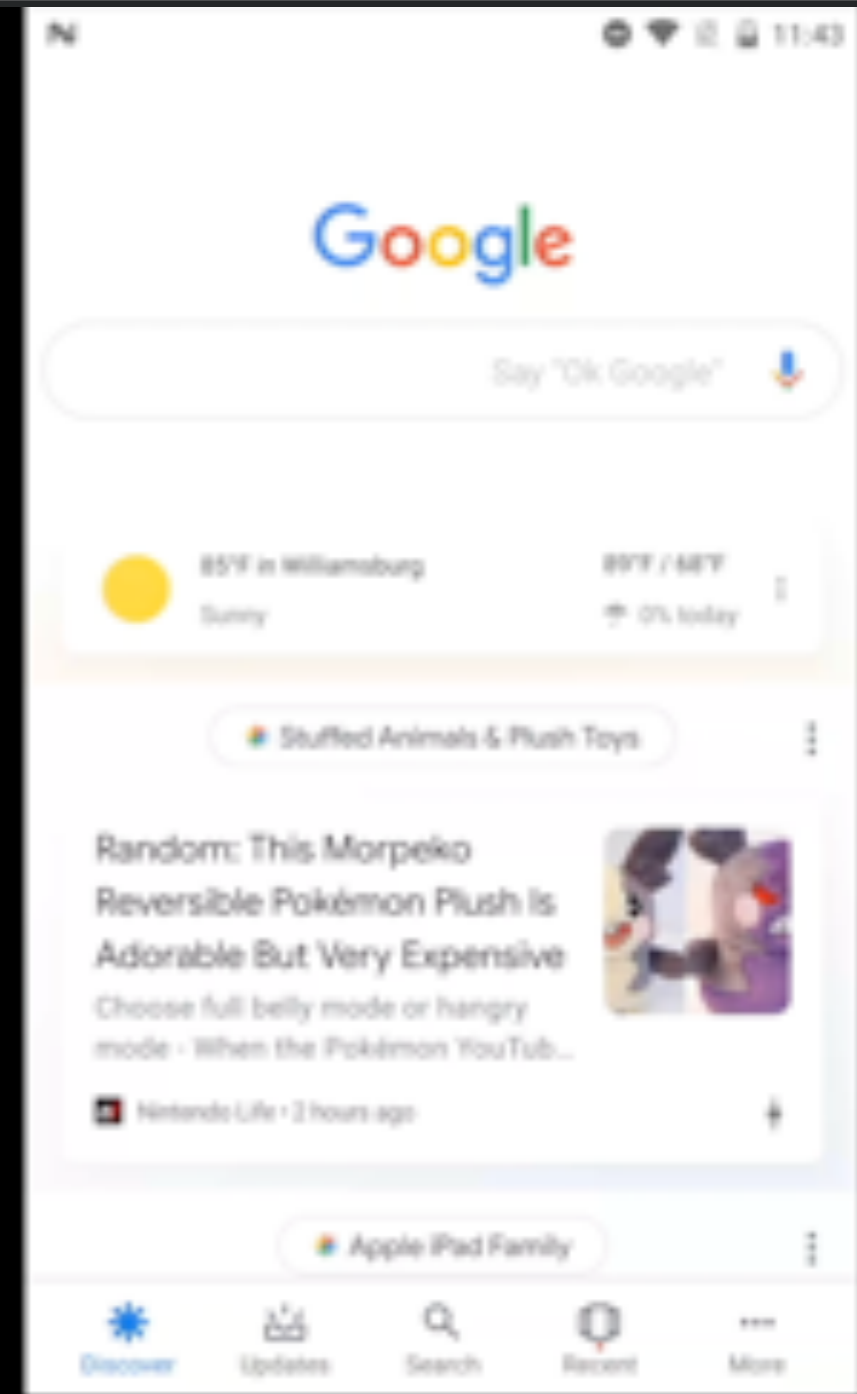




# Accuracy of Replay



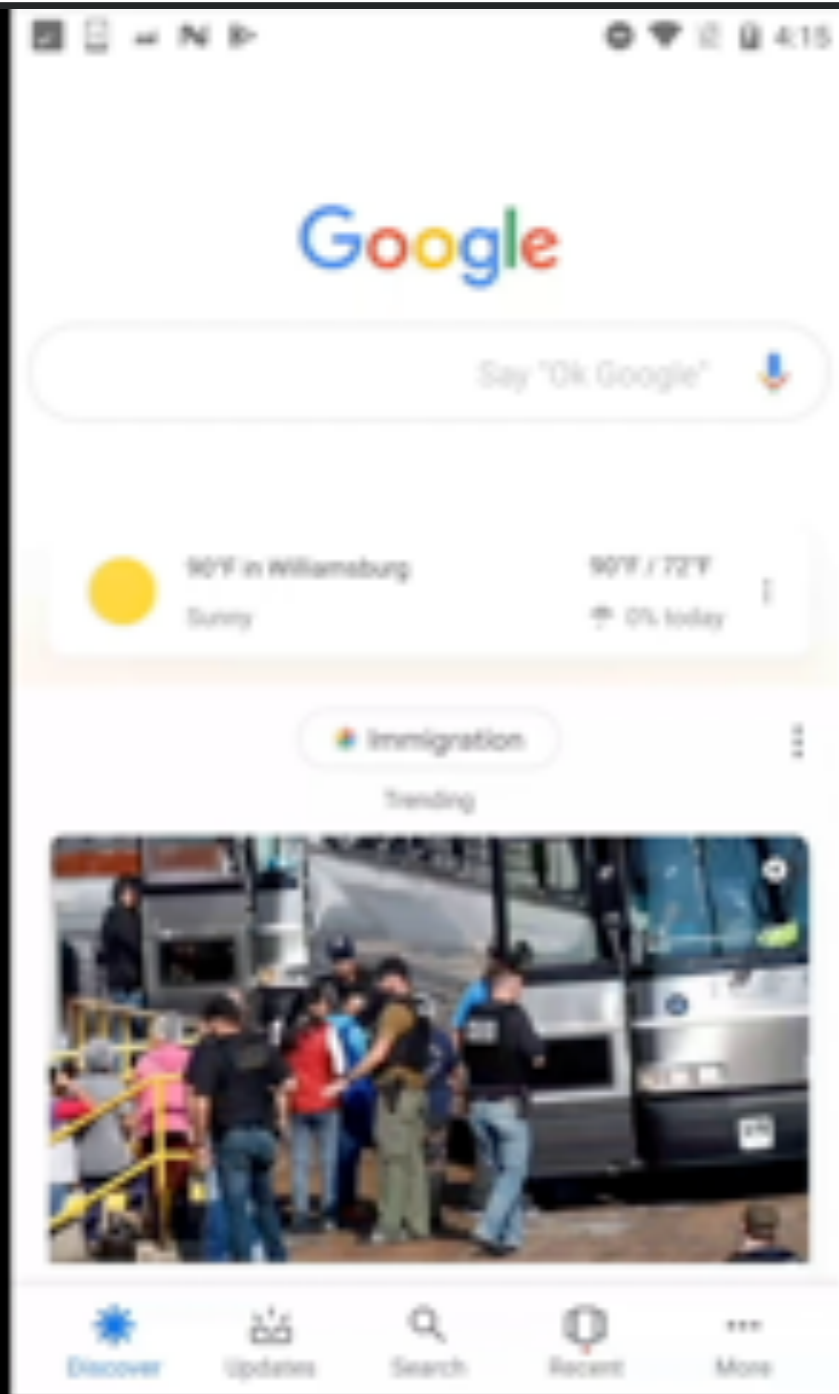
ORIGINAL



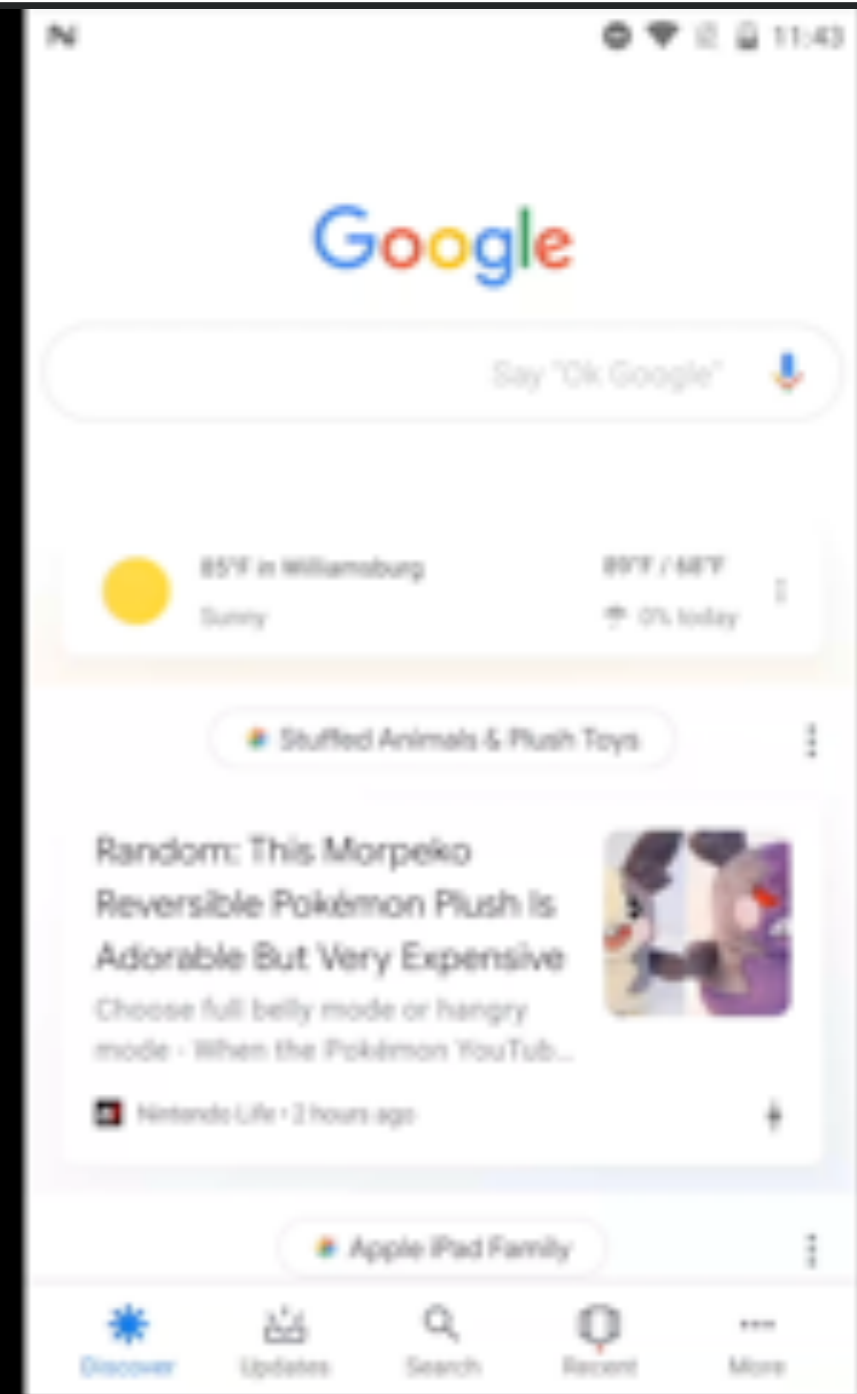
GENERATED



# Accuracy of Replay



ORIGINAL



GENERATED

# Technology Status

- Originally published as a paper at ICSE 2020
  - ***Won best paper award***
- Available as an open source tool: [https://gitlab.com/SEMERU-Code-Public/Android/video2scenario/-/tree/master/python\\_v2s](https://gitlab.com/SEMERU-Code-Public/Android/video2scenario/-/tree/master/python_v2s)



# Competitors/Alternatives

- Sikuli: Image based test automation
  - Very fragile test cases
- ReRAN: Requires rooted device connection
  - Tests can be difficult to collect
- AirTest: Requires Unity Game engine and Rooted Device
  - More applicable for certain types of game testing



# Summary

- Enables record and replay of mobile devices for testing, bug reporting, etc
- Requires only a video file as input
- Able to replay nearly 100% accurately (still being improved)
- Works best for apps with Deterministic behavior (e.g. no games)