

# PROJECT MAYA

Computer Vision  
Augmented Reality

Visual Assistant v.1.0

COMPUTER VISION TEAM  
11.30.2016

# OVERVIEW

Vision based recognition and augmented superimposing contents give more immersive and interactive experience between person and device . We leverage our most technology integrated Samsug Camera turns into a magic looking glass where the real world comes alive and allow us to take an advantage of new technologies.

We introduce advanced **Visual Assistant** which integrate state of art technologies to help you discover, share, and easy to create in the palm of your hand. And it can unlock new service experience including simplifies user interface, understands the context of the user and offer the user most appropriate and convenient suggestions and recommendations.

The computer vision, deep learning, processing capacity, 2D/3D graphic capturing and rendering, and real-time contextual information enable for user to discover and help make the world more open and connected around you immersively.

# VISUAL ASSISTANT











## Launcher Icon

Vision & layers concept are integrated into iconic eye imagery, and the color represents Samsung like and robotic or machine look and feel


# INTERACTION METHODS

## Overall Interaction

Primary interaction method **TAP & SWIPE**

| Interaction   |                           | Function      |
|---|---------------------------|---------------|
|   | Tap                       | Select        |
|  | Swipe Left/Right          | Change mode   |
|  | Swipe Down                | Dismiss       |
|  | Swipe Up                  | Change mode   |
|  | Double Tapping            | Change Mode   |
|  | Two Finger Double Tapping | Bring up Mode |
|  | Hold press                | Change Mode   |
|  | Two Finger Hold Press     | Bring up Mode |

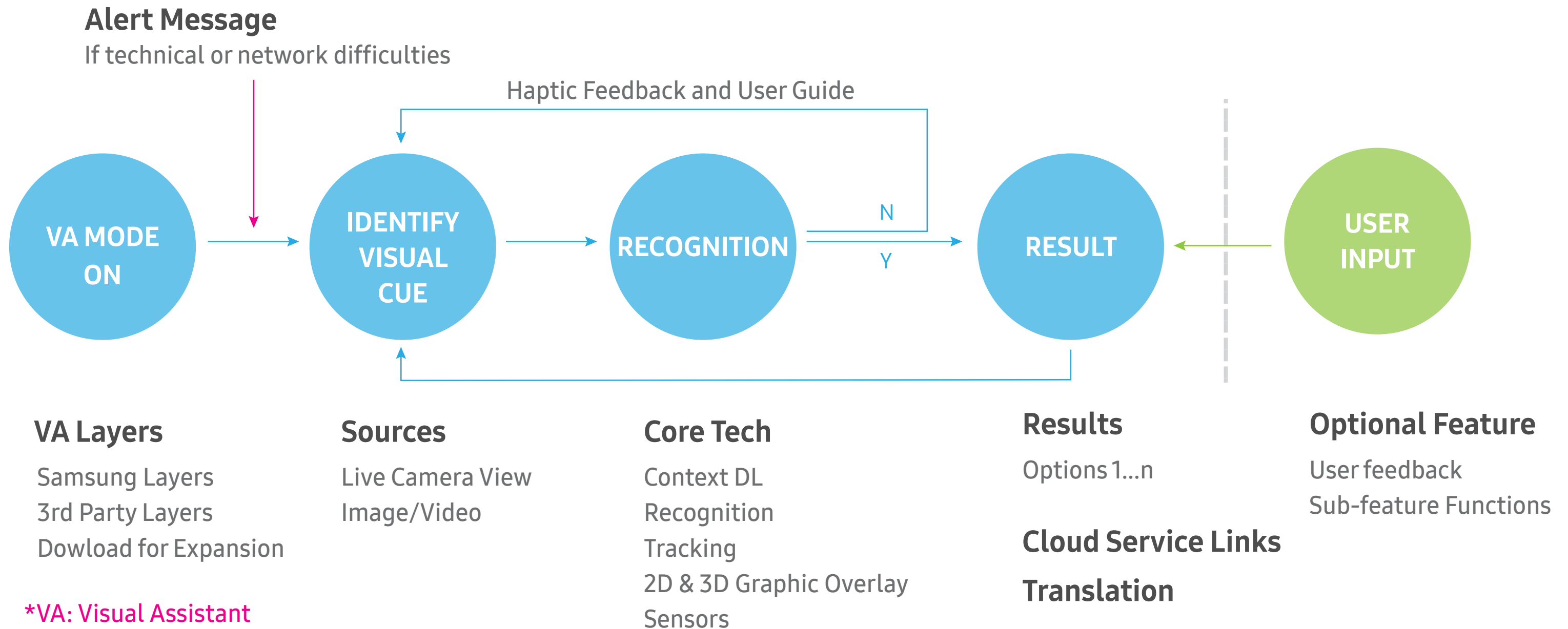
Secondary interaction method **USER DRAWING**

| Interaction  |                   | Function   |
|--|-------------------|--|
|  | Drawing by finger | Select area of observable visual field of the screen |

# USER FLOW

Wireframe

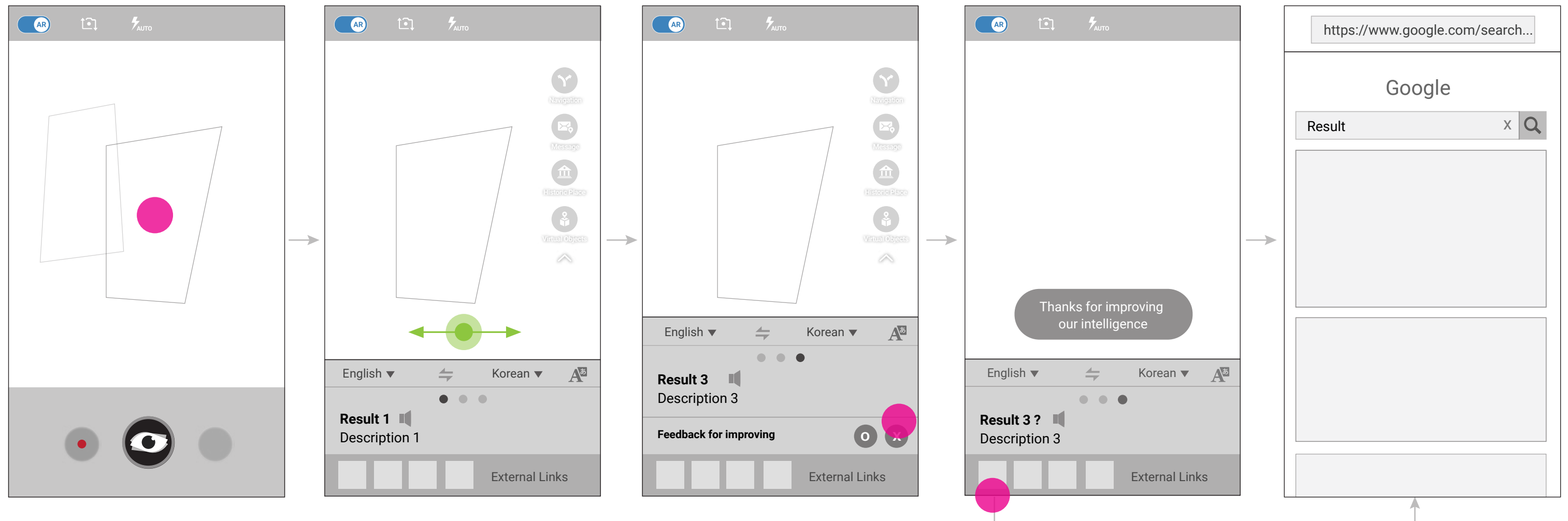
# PRIMARY FLOW



# RECOGNITION FLOW

Wireframe

## Results & User Feedback



### VA Mode On & Identify

Detect multi items from presented on-screen & perform user action for recognition

### Recognition & Results

Provide results, translation, sub-features for additional function and external service links for designated Item

### User Feedback

Having "Yes or No" user input system based on the result accuracy (when results goes below 30%)

### External Links

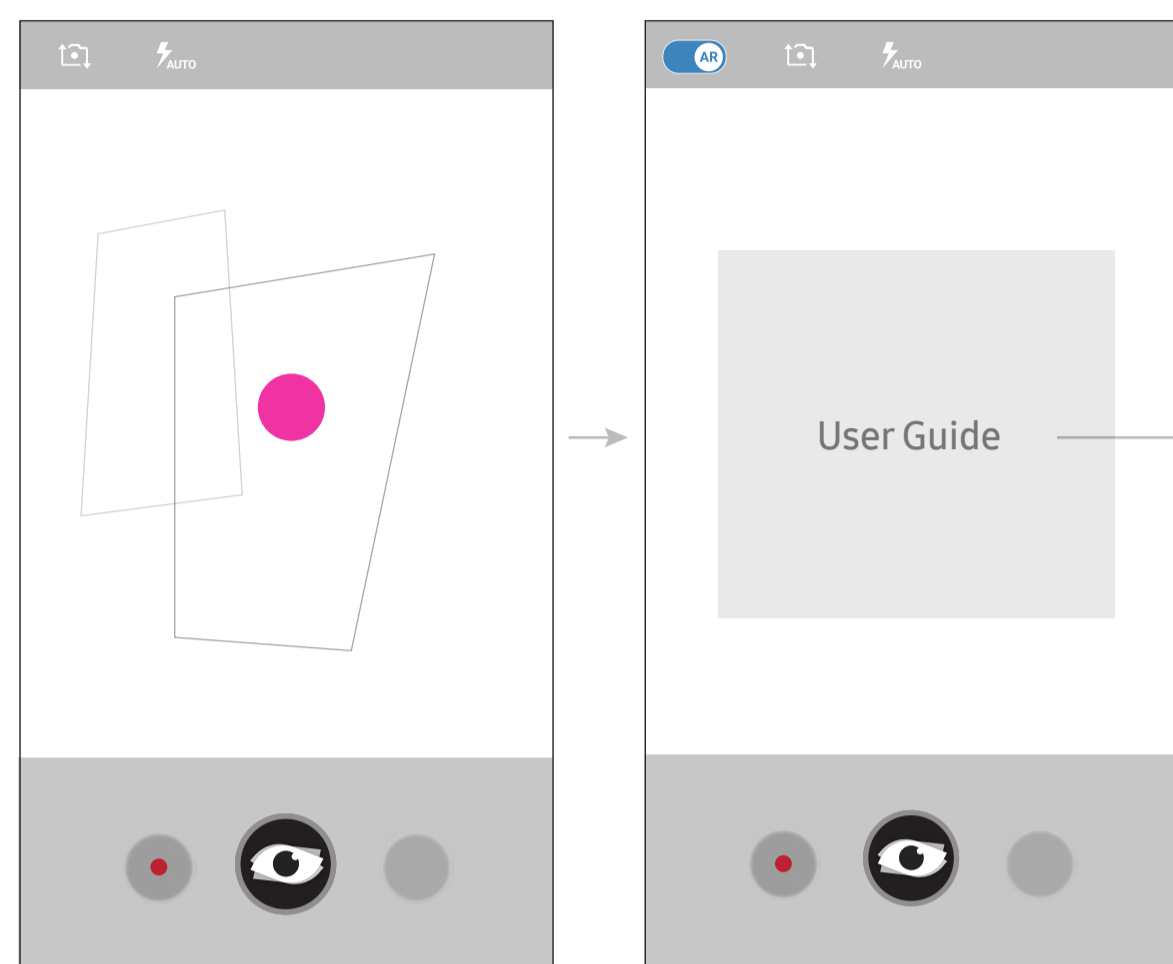
For further information

\*VA: Visual Assistant

# RECOGNITION FAIL FLOW

Wireframe

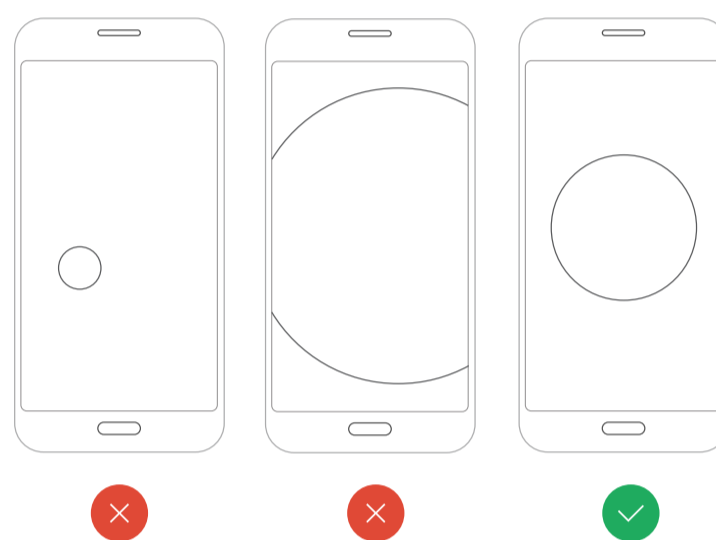
## Physical Condition Issues



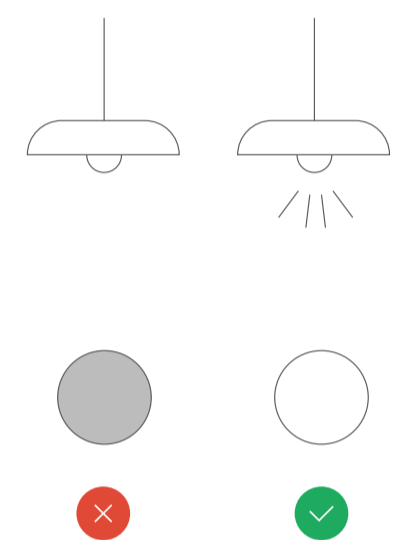
- Feedback is responsiveness of requested action is being carried out: Provide haptic feedback and user guide for re-trying

### Cases for the User Guide

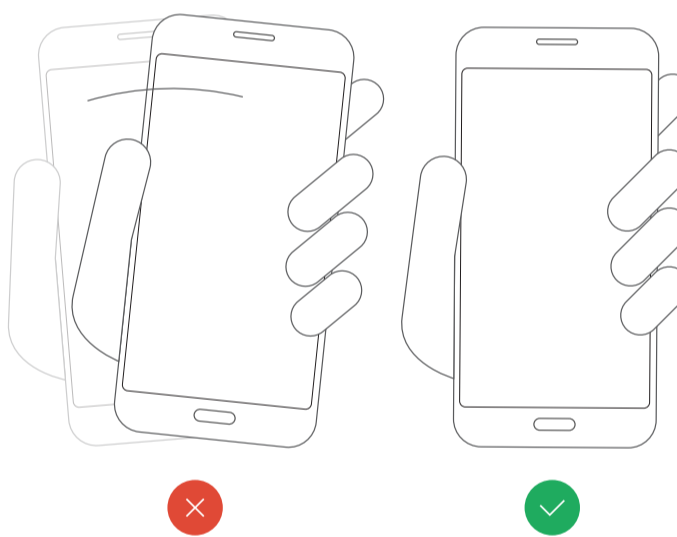
1. Place the entire object in the center



2. Sufficient lighting



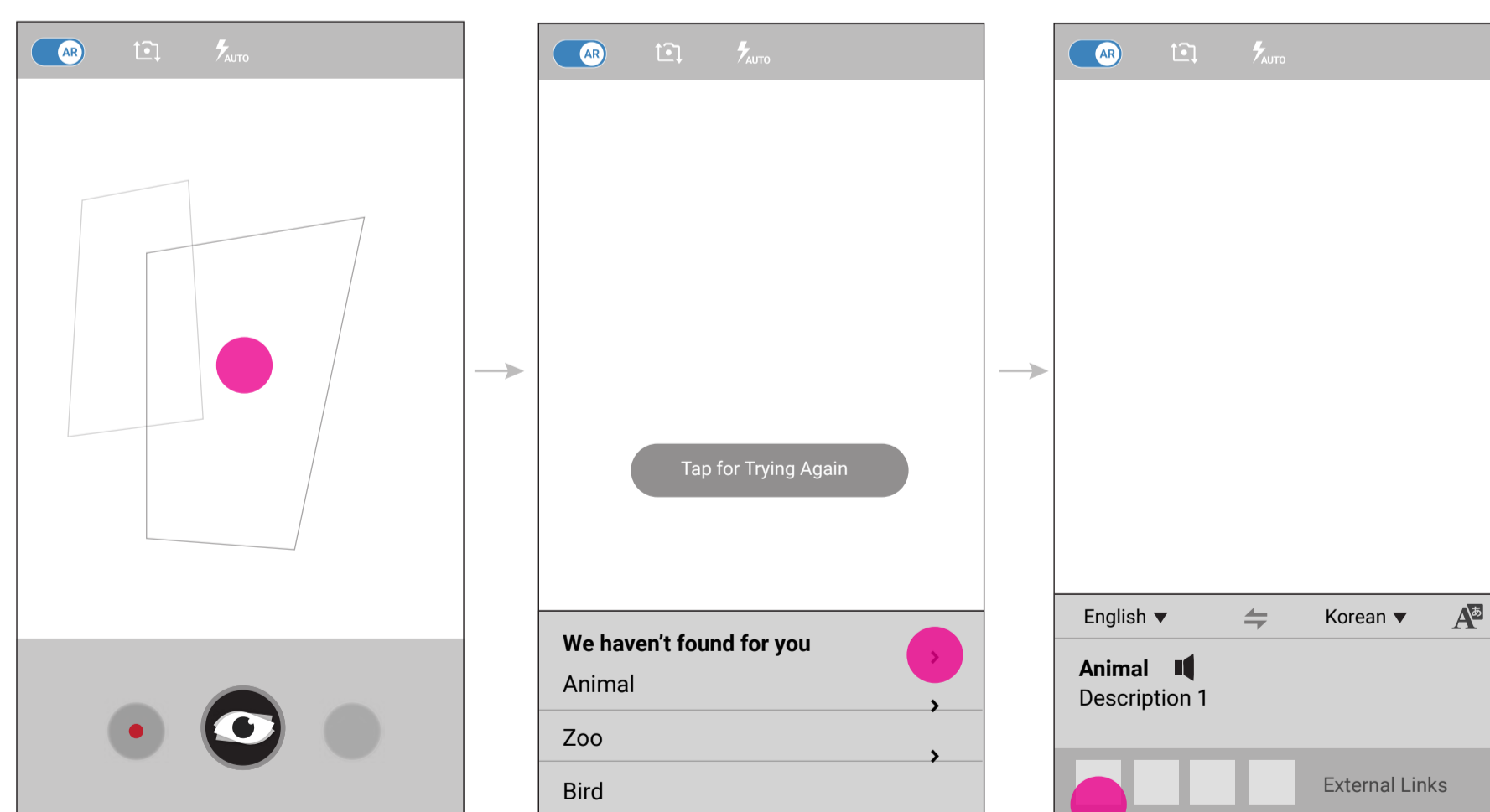
3. Hold your phone steady



**VA Mode On & Identifying**  
Recognition fail

**Fail Feedback**  
Provide haptic feedback & user guide on pop up screen

## No Results Acquired



- Although no results, it is important to present similar expected UI in a way, in order not to have question the reliability or trustworthiness

**AR Mode On**  
Physical condition fine but, Recognition failed

**Fail Feedback**  
Provide haptic feedback for paying attention & categorized keyword for consistent experience

\*VA: Visual Assistant

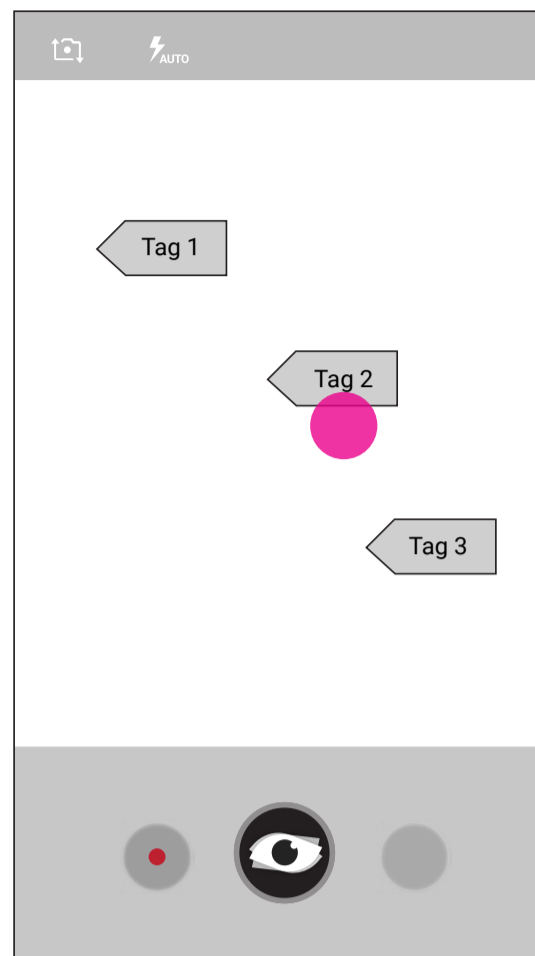


# IDENTIFYING & SELECTION

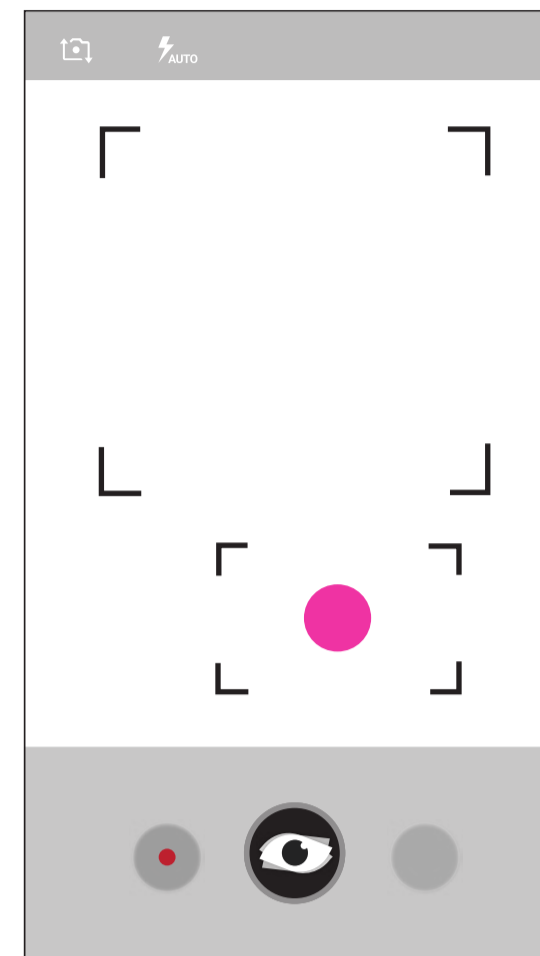
## Multiple Identifying Cases

### Case 1 Tag or Bounding Box

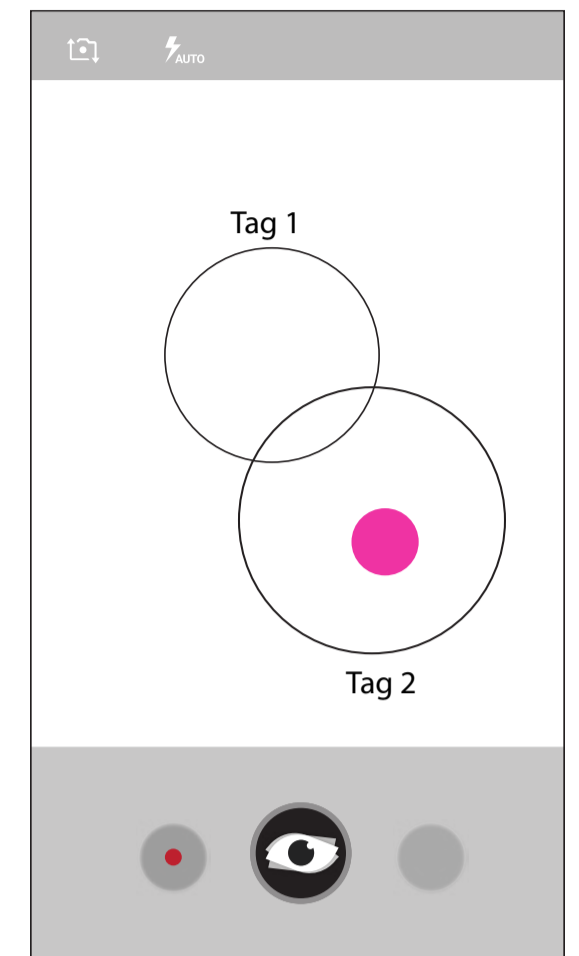
- Propose various appearance of indicator like labeling or bounding box for identified multiple items
- User select one of items by tapping to see the results



Tag



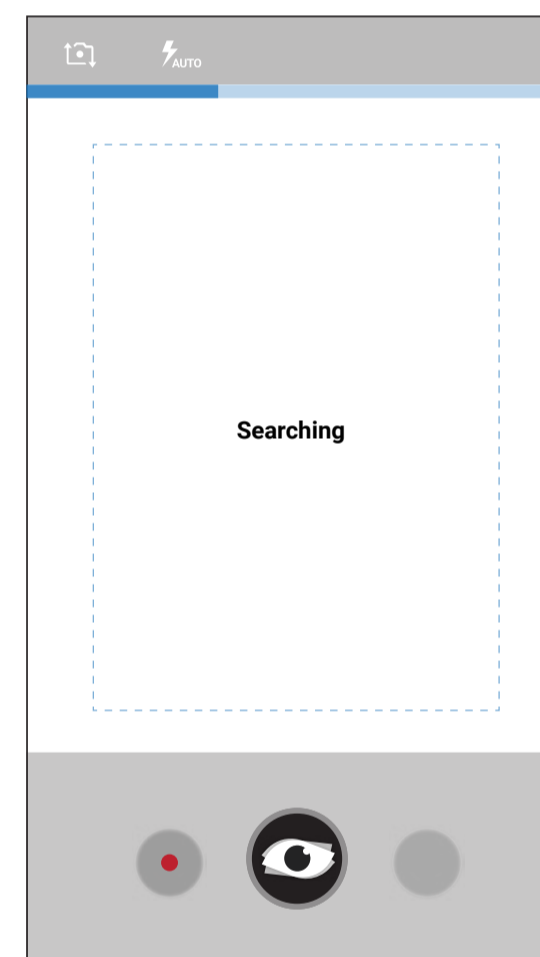
Bounding Box



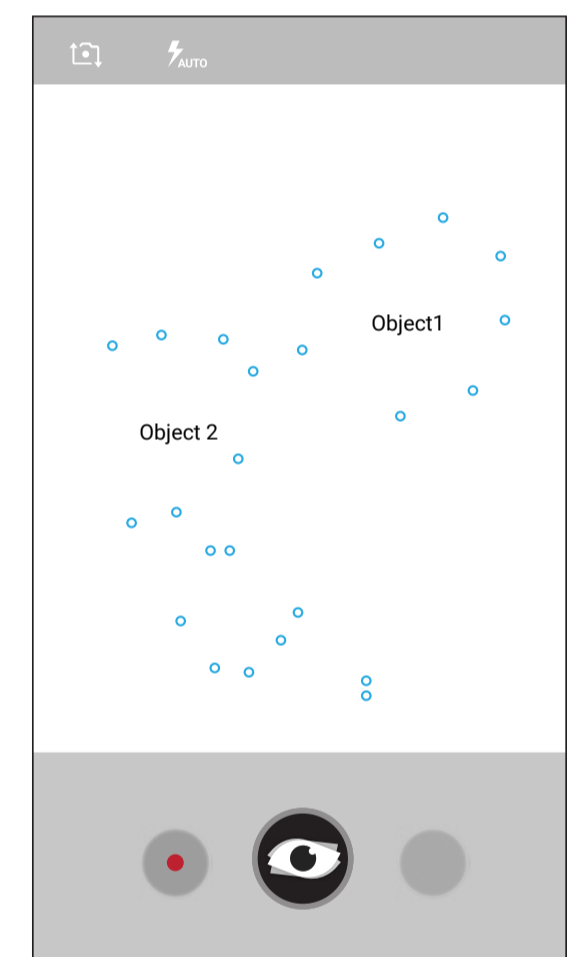
Bounding Box & Tag

### Case 2 Auto Recognition (no user selection)

- Immediate auto identifying for multiple items within invisible boundary area when Visual Assistant turn on
- Show identifying state in visualization



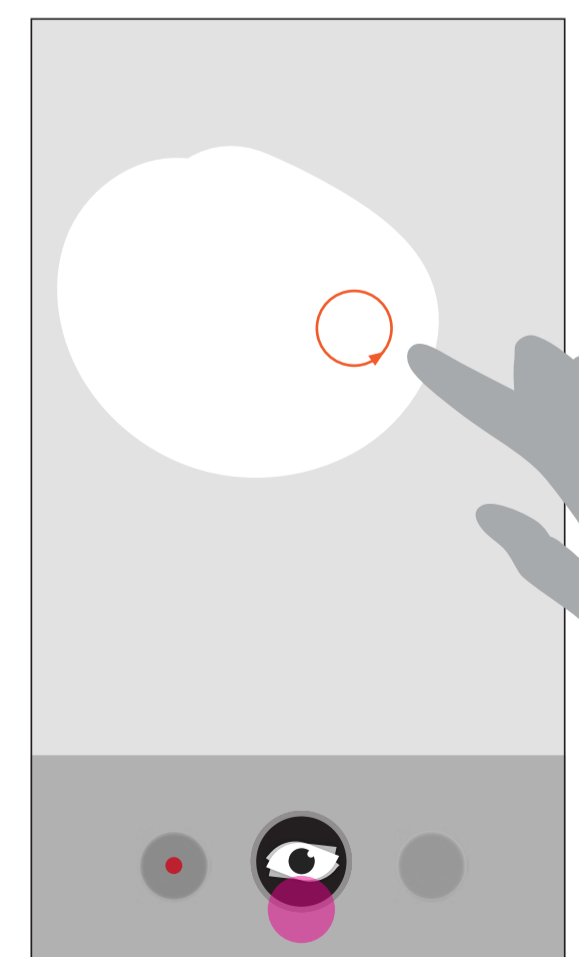
Animated line  
Visualization for identifying state



Blinking dots  
Blinking dots on item to identify

### Case 3 Selection by Drawing

- Rely on user drawing action in live camera view or after picture taken
- Dimmed screen indicates whether the action is valid in current view of screen

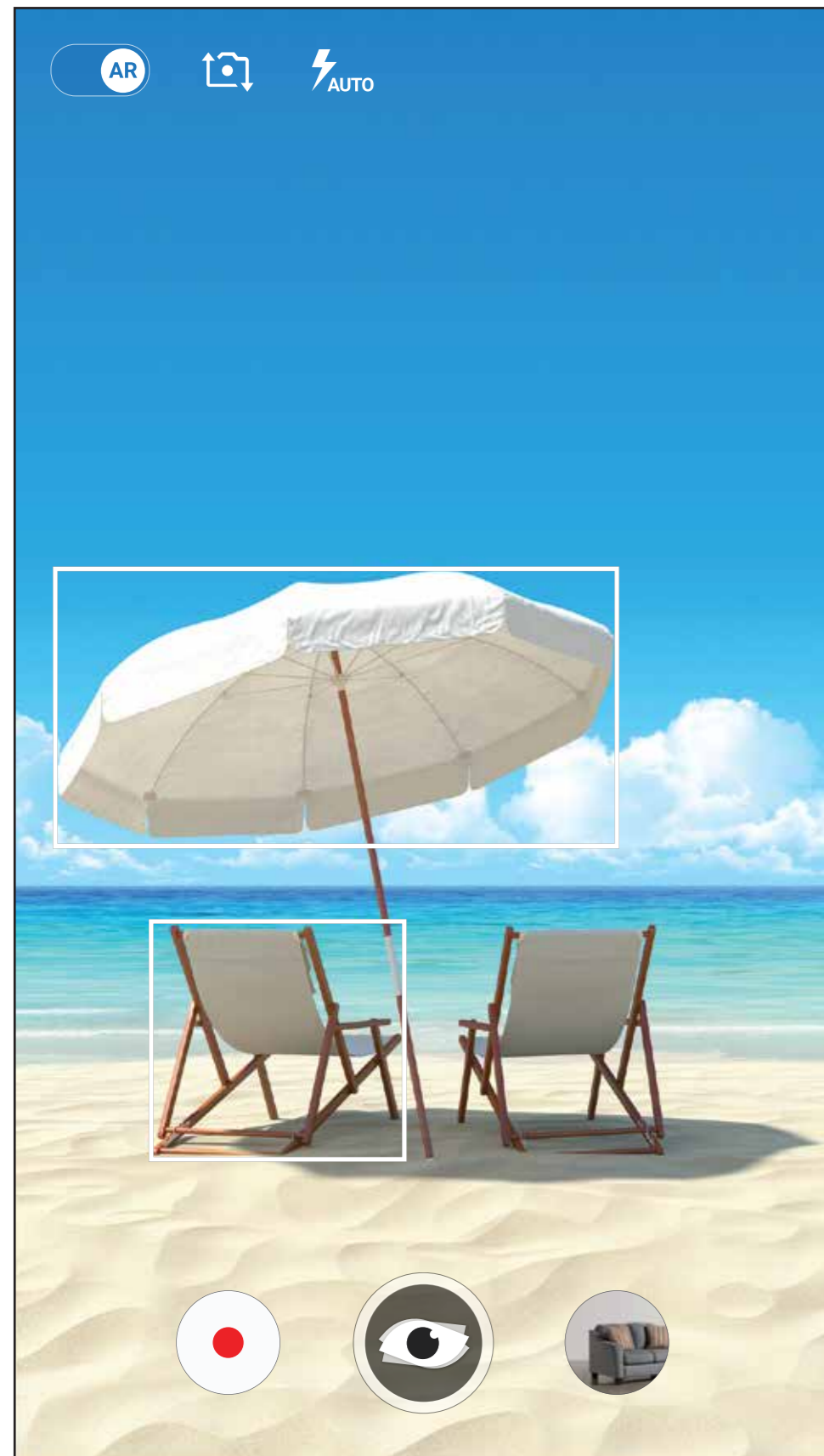


Drawing by user hand  
Selected by user drawing

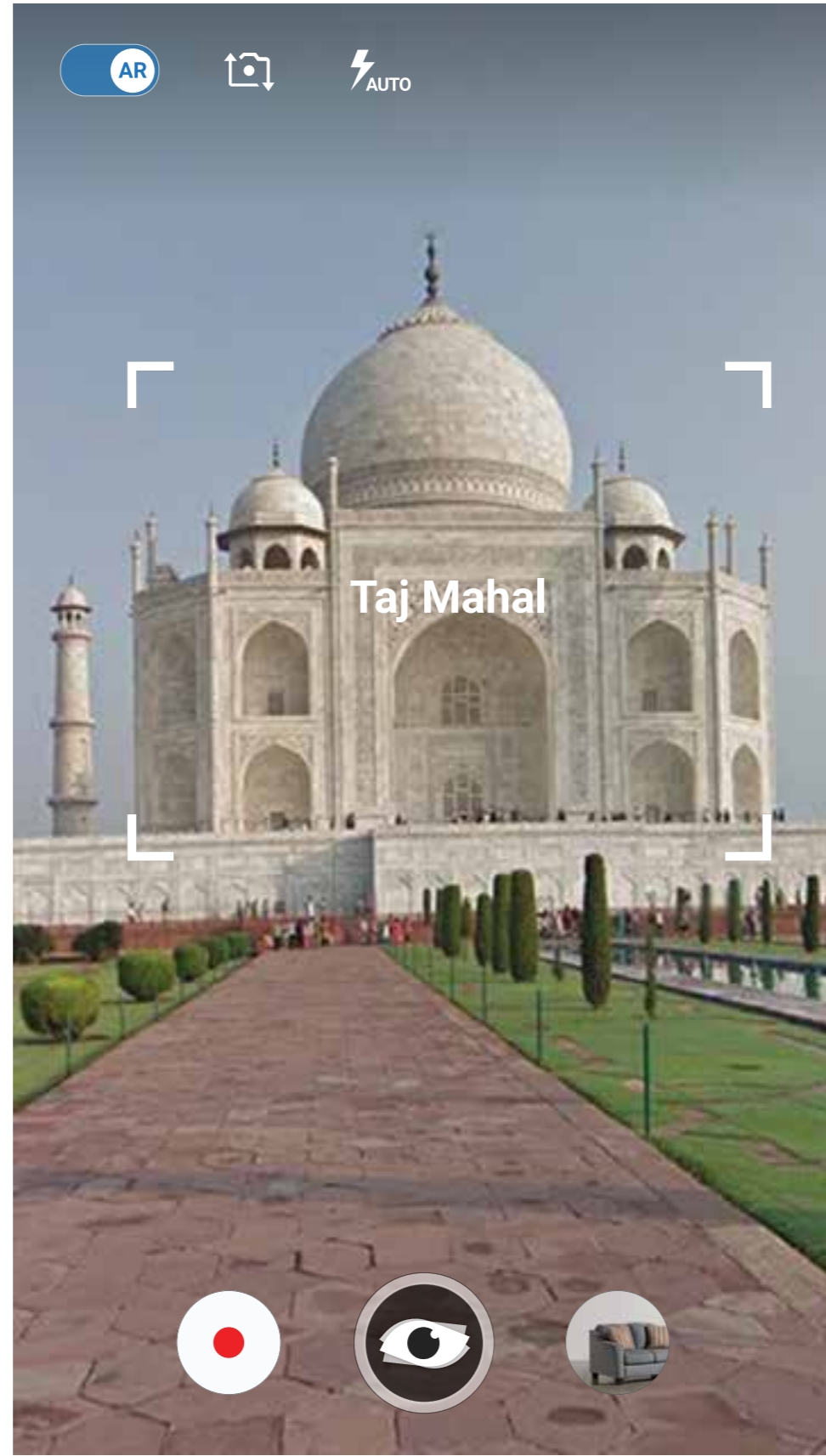
\*VA: Visual Assistant

# Identify & Selection

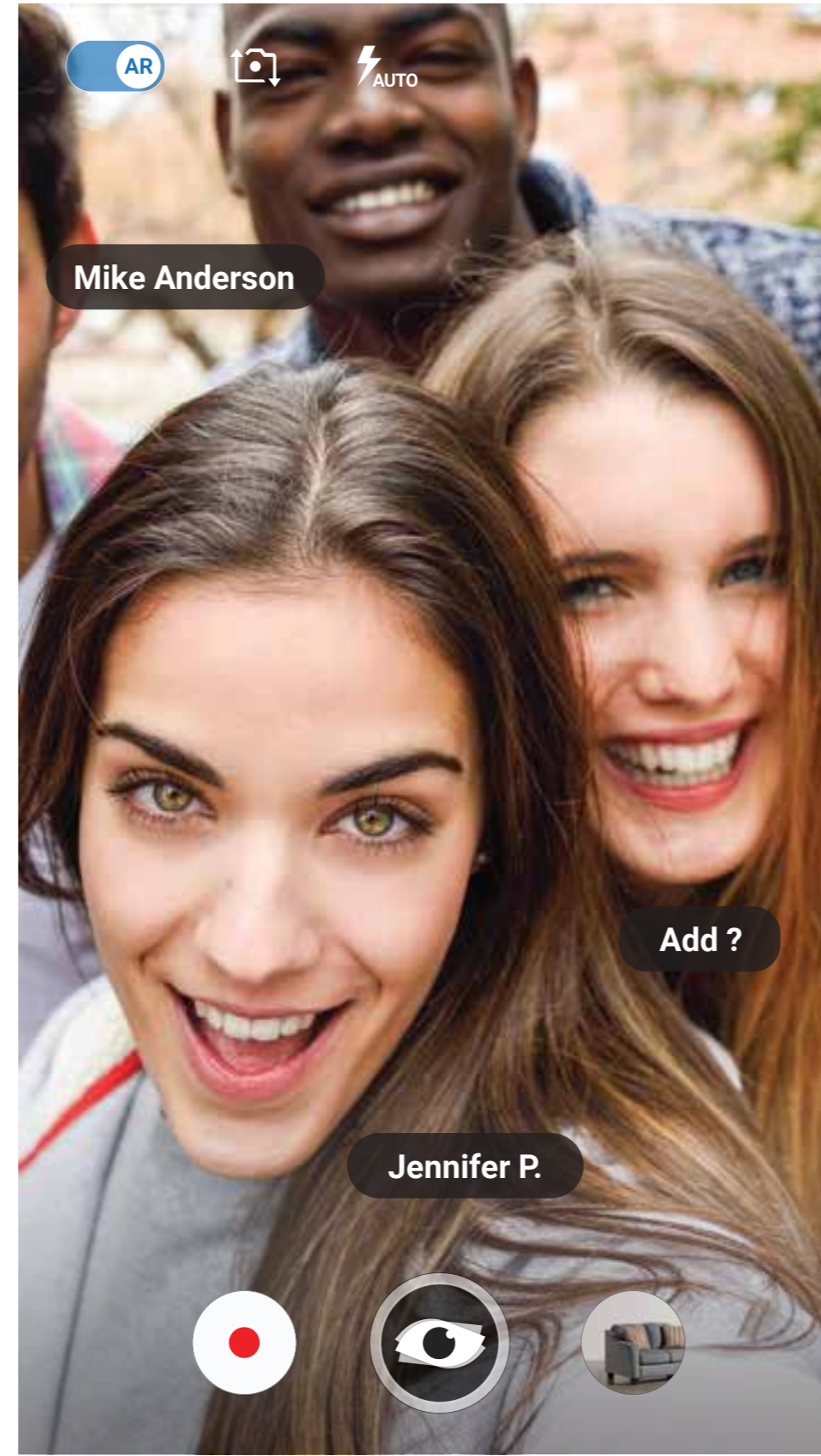
Case 1



Bounding Box



Bounding Box with Tag



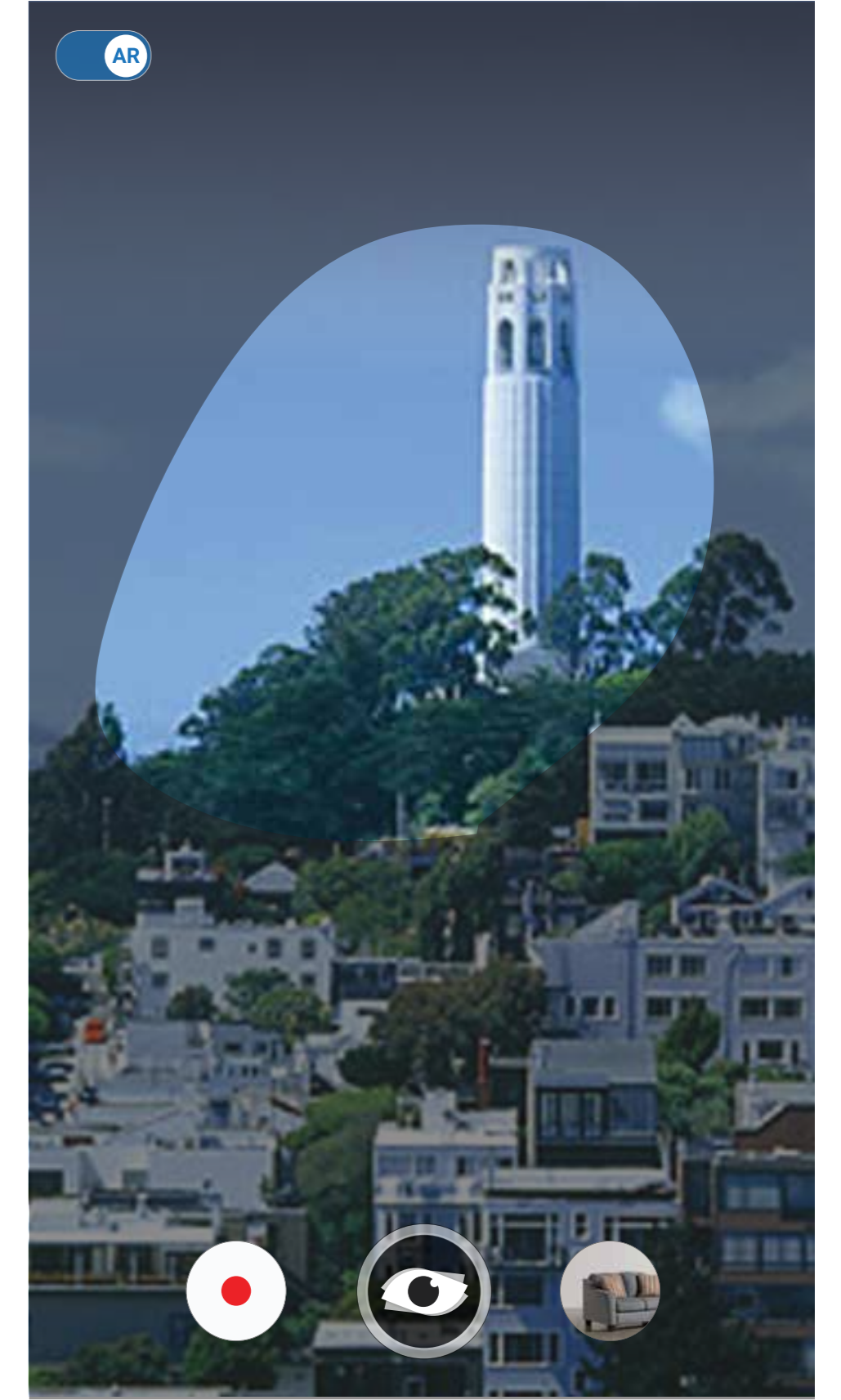
Tag

Case 2



Auto Identifying

Case 3



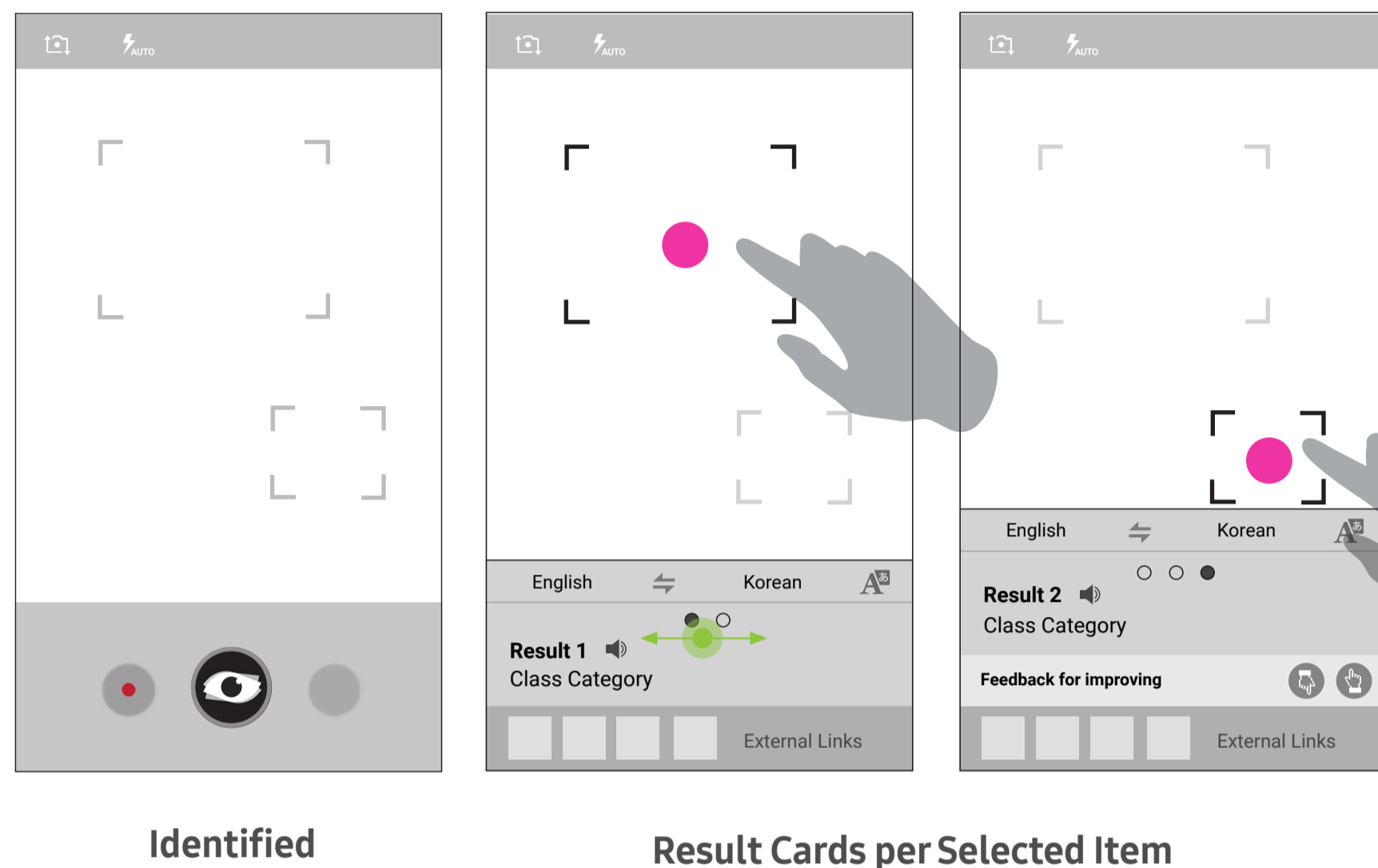
Hand Drawing Selection

# SELECTION & RESULT

Cases for result triggering

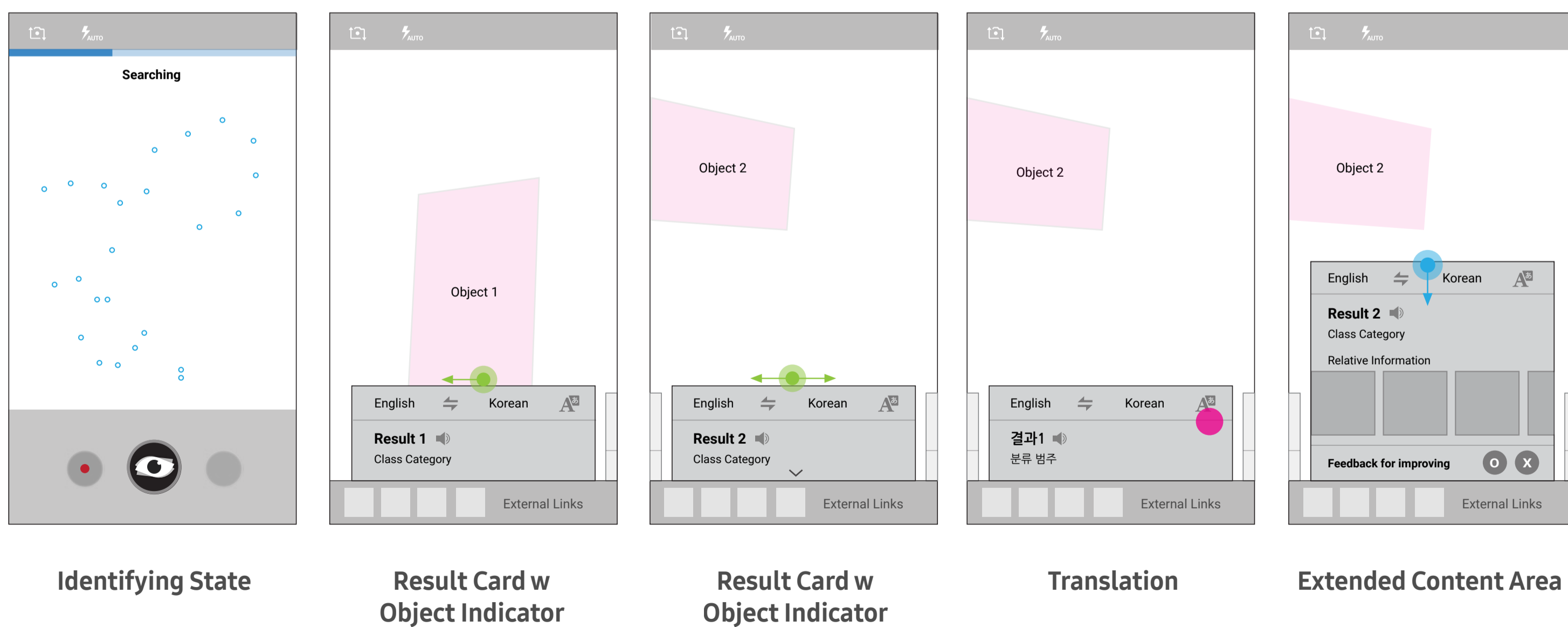
## Case 1 Result by user selection

- Multi-results per selected item
- Low accuracy result comes with feedback question



## Case 2 Automatic Recognition & Result with Indicator (no user selection)

- Auto searching and identifying on screen items without user selection
- Result comes along with indicator simultaneously on the screen



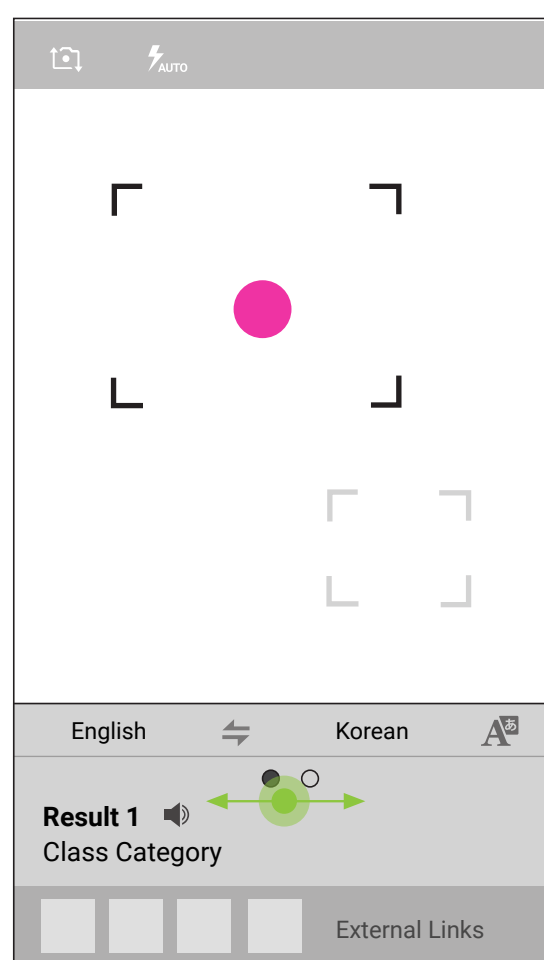
# RESULT INTERFACE

Interface Variation

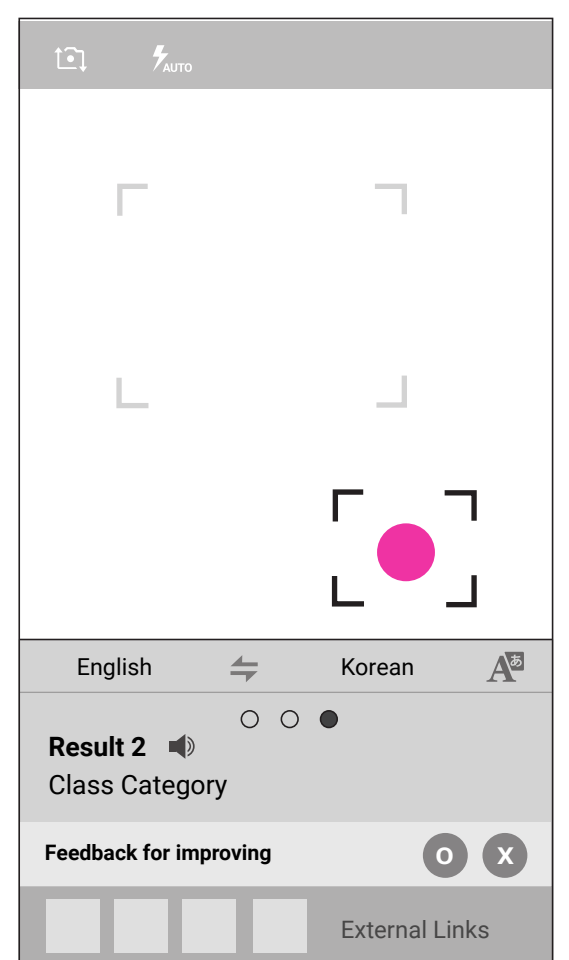
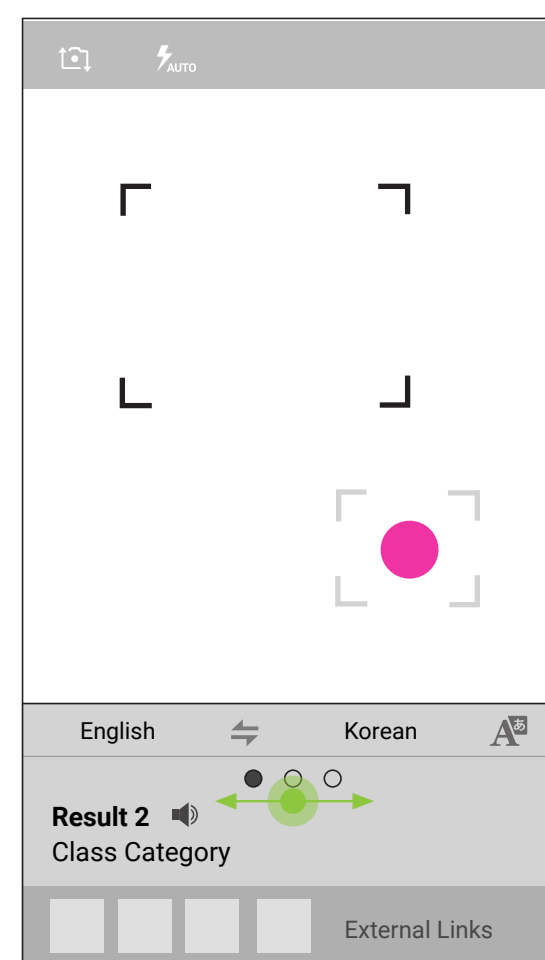
## Variation 1

### Multiple result per selected item

- One selected item can have multiple results
- Horizontally browse multi-result cards
- Dismiss by swiping down



Multiple Result per One Selected Item  
Swipe left/right interface

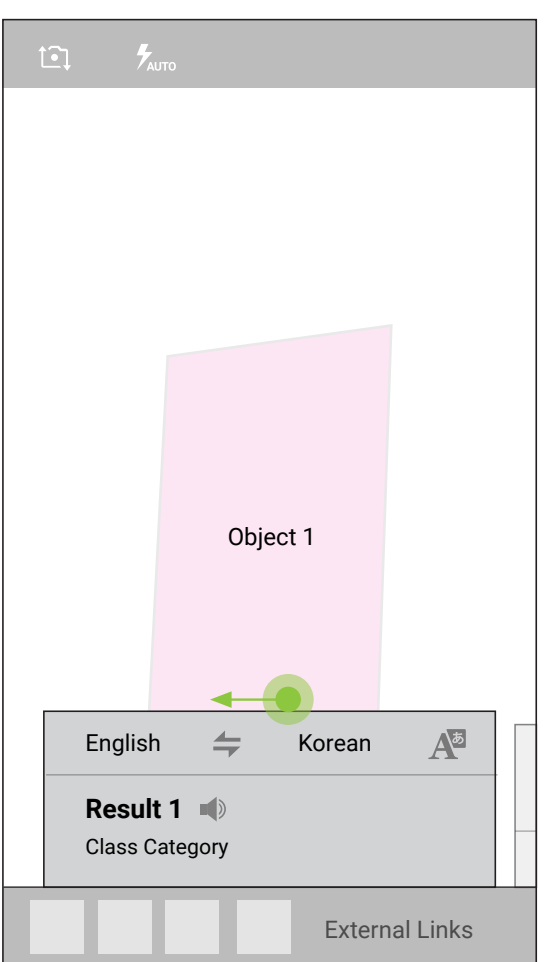


User feedback when low accuracy result

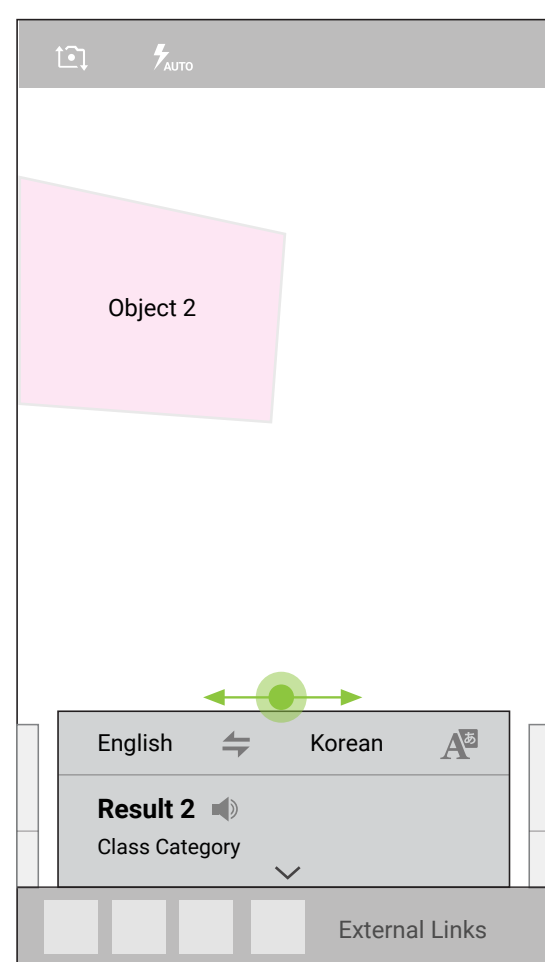
## Variation 2

### Result with Indicator

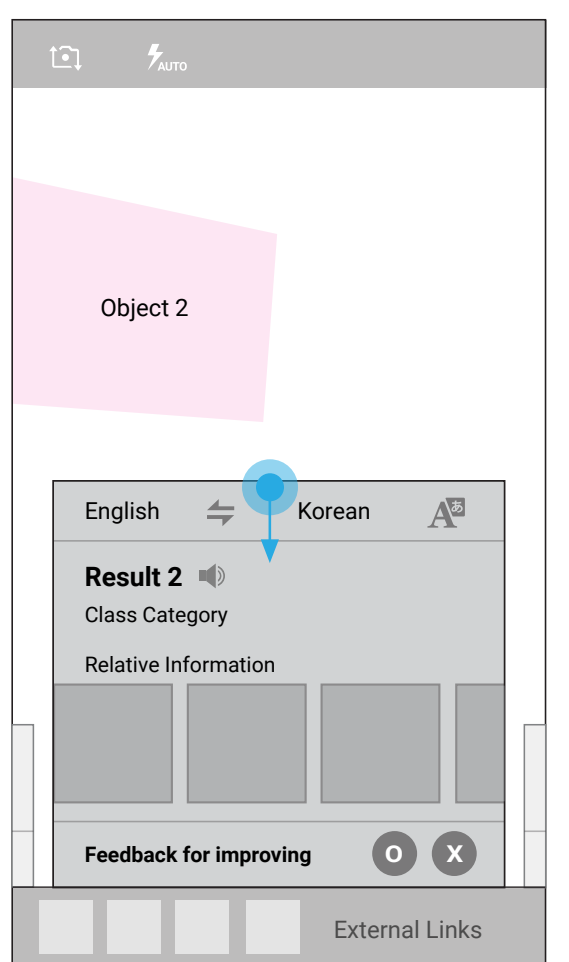
- Each result card displays with indicator on screen
- Multiple result cards browse by swiping left/right



Result Card w Object Indicator



Result Card w Object Indicator



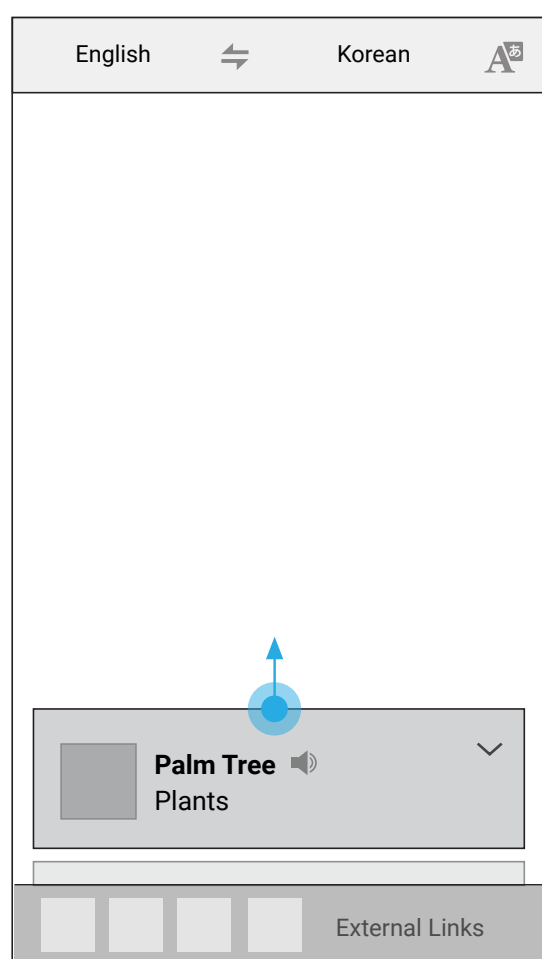
Extended Content Area

## Variation 3

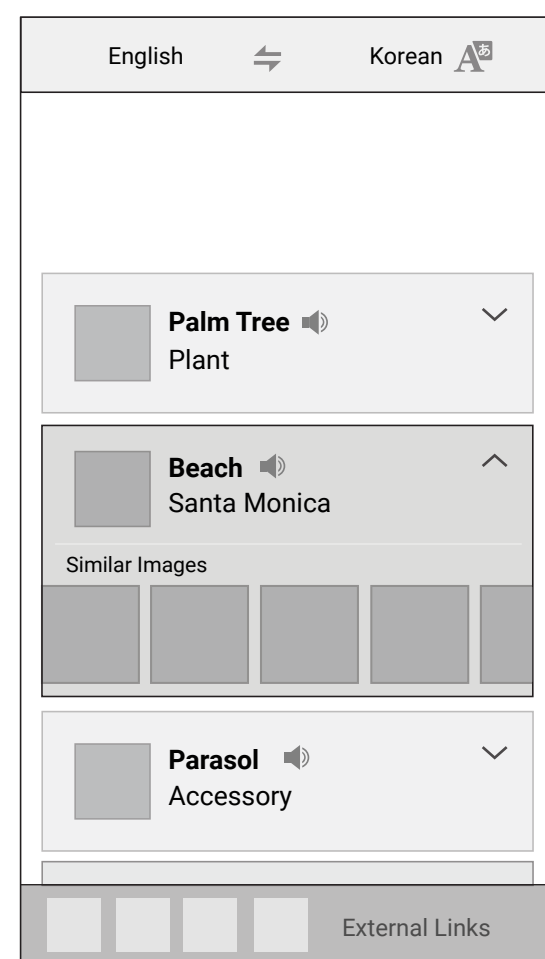
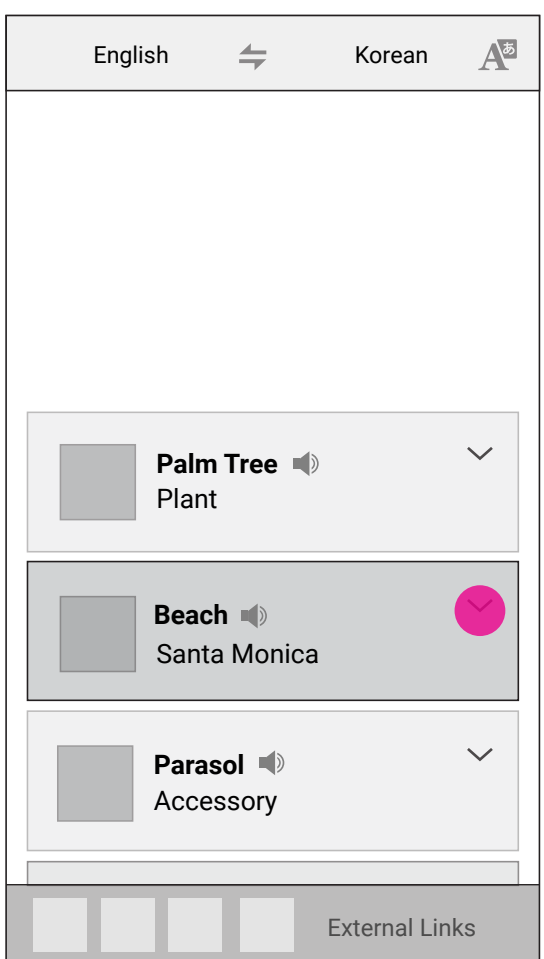
### Result with Relative Image

- Separate result cards with relative image
- Each card can be extended for more contents

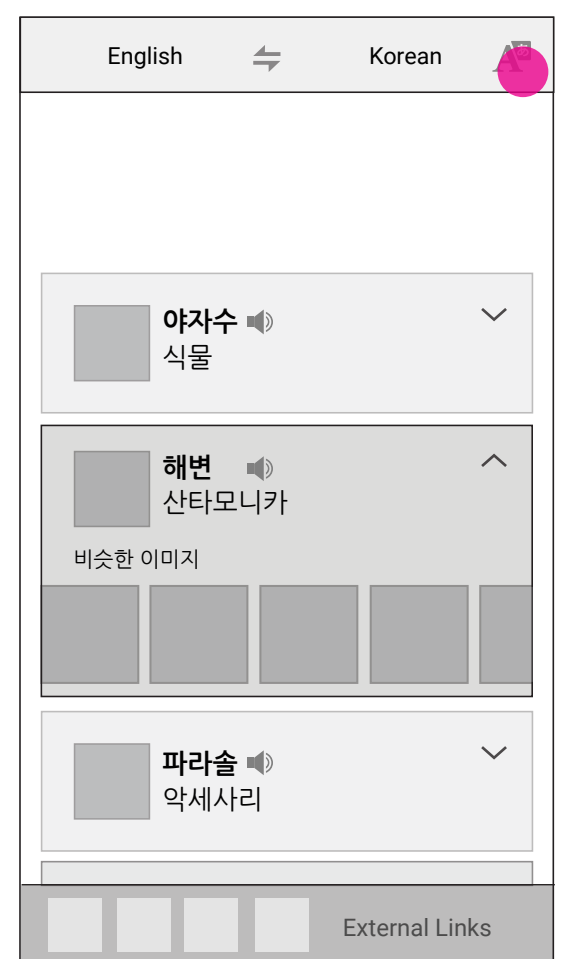
- Vertically browse multi-result cards
- Dismiss by swiping down



Result Card with Relative Image



Extended Card for More Contents

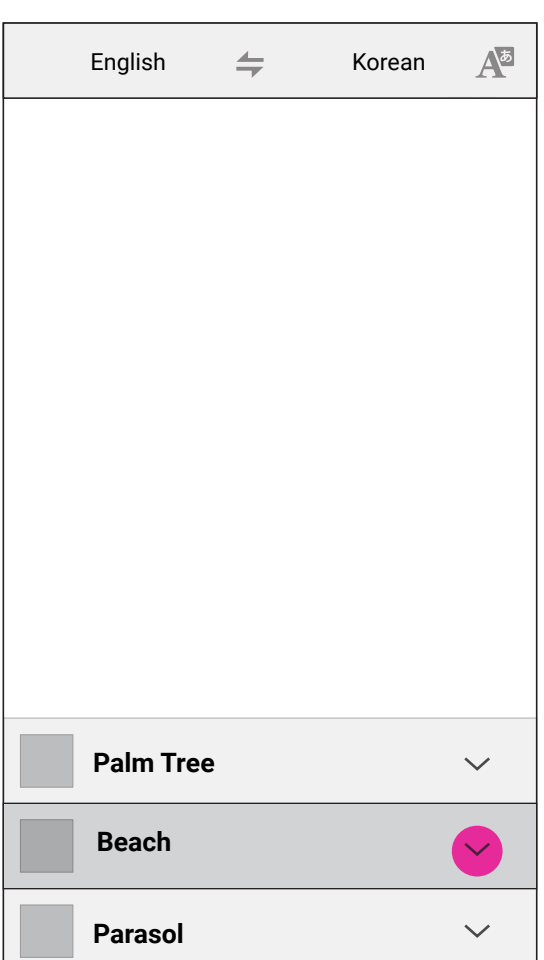


Translation Separate from Result Card

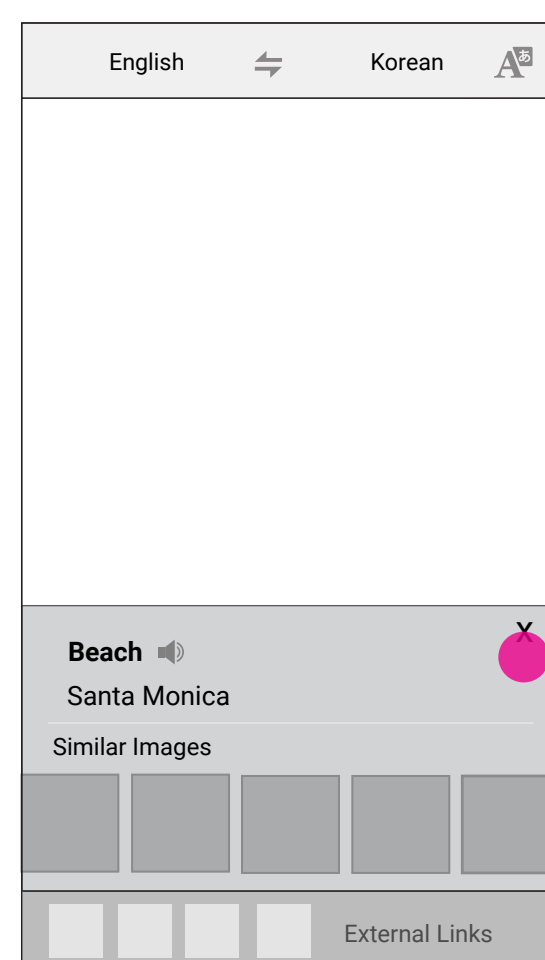
## Variation 4

### Simplified result card

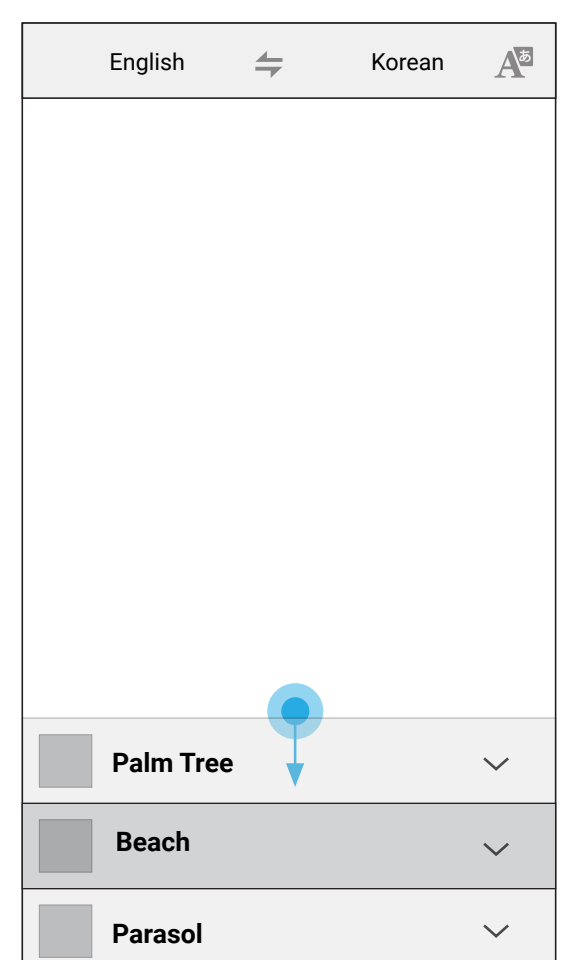
- Simplified multi-results at a glance
- Contents area can be extended for more information



Results



Extended Card for more Contents

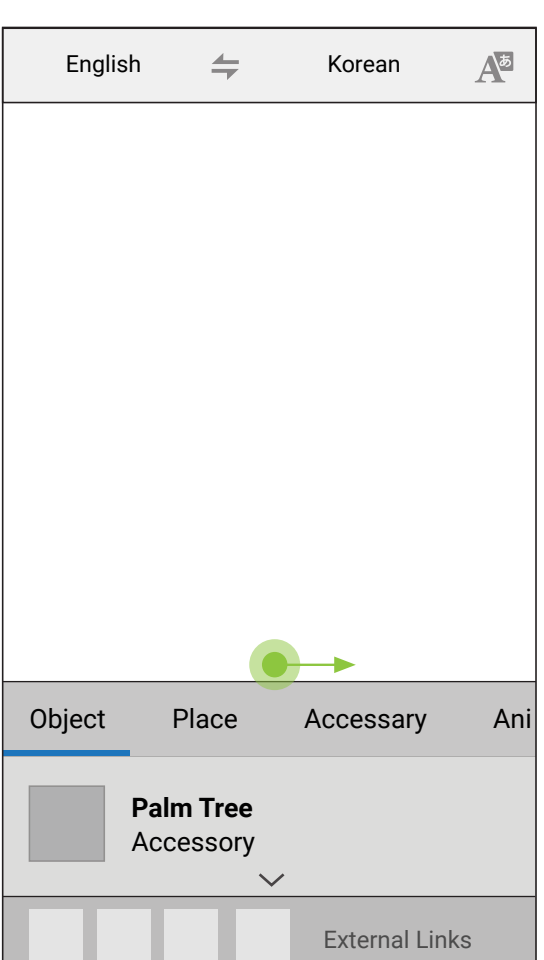


Back to Previous Screen

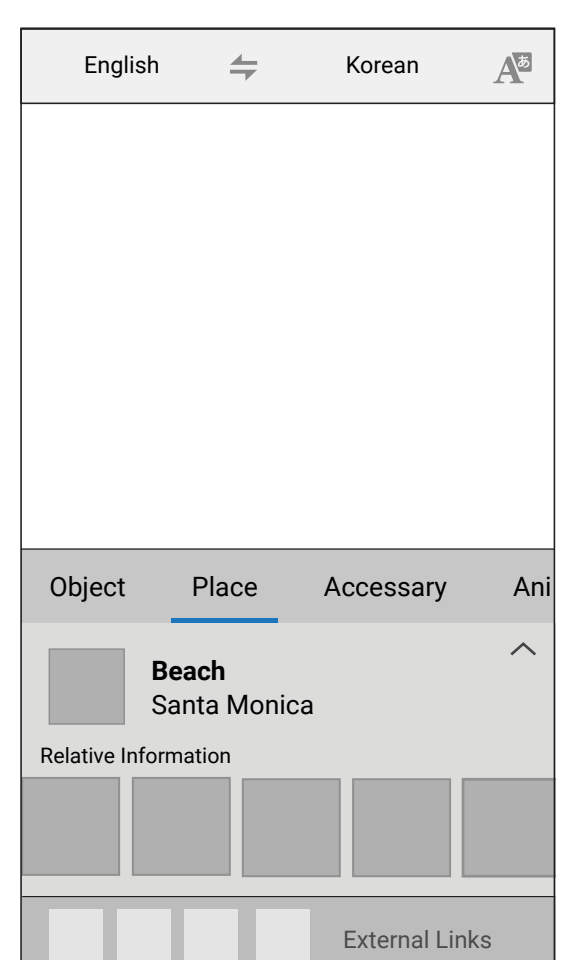
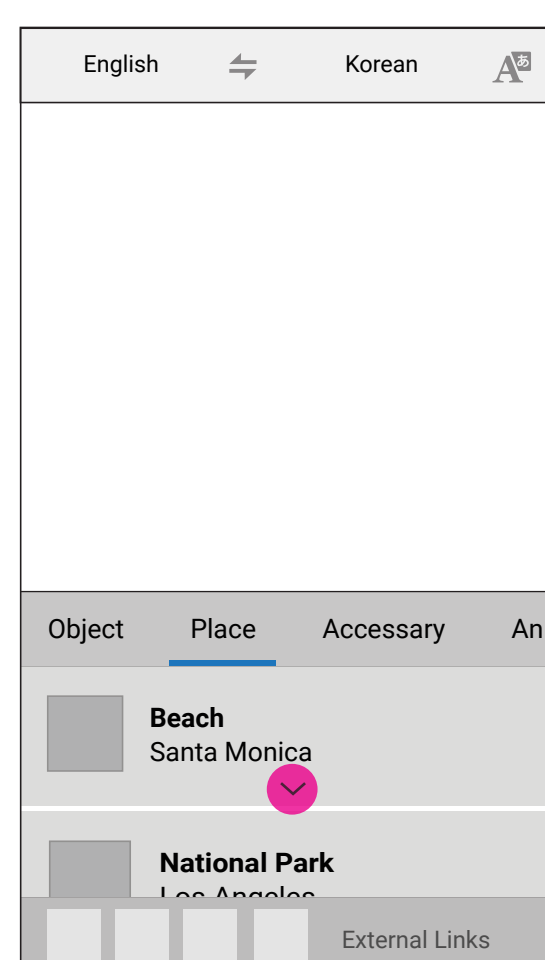
## Variation 5

### Class Categorized Results

- Results are sorted by class category label
- Multi-result cards display vertically per each class label
- Each card can be extended for more contents



Sort by Category Label



Extended Content Area

# PICTURE TAKEN FLOW

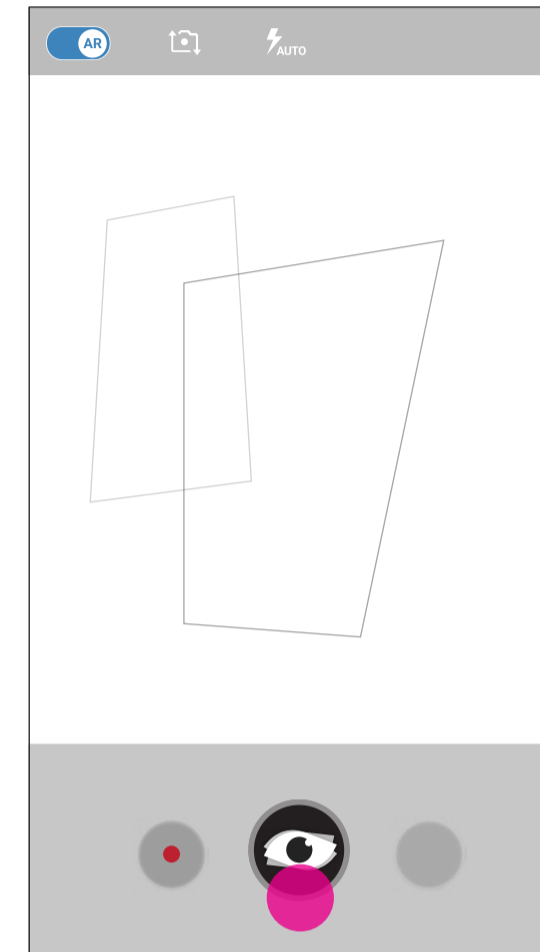
Flow for AR Enabled Picture

## Taking Picture

- User can take AR enabled picture
- Voice also can trigger of picture taking

## Screenshot

- Screenshot including augmented contents can share with



### Taking Picture

Tapping VA Icon leads to take picture of screen view



### Screenshot

Tapping Sharing icon leads to take screenshot of augmented screen view

## AR Enabled Pictures in Gallery

- Place Icon on AR enabled pictures in Gallery thumbnail view to make a distinguish from
- Thumbnail view can be categorized and layed out by specific title



Object



Text



Sign



Scene



Face



QR Code



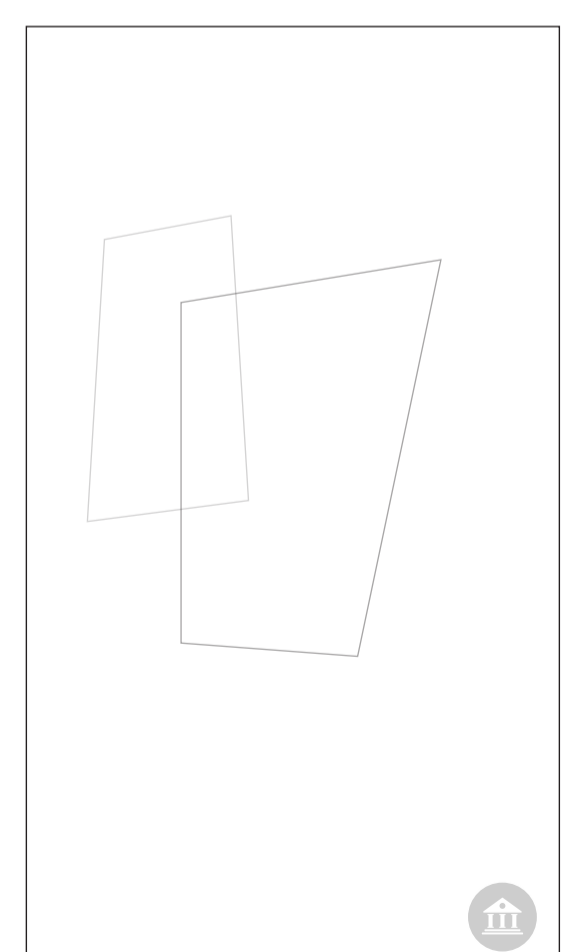
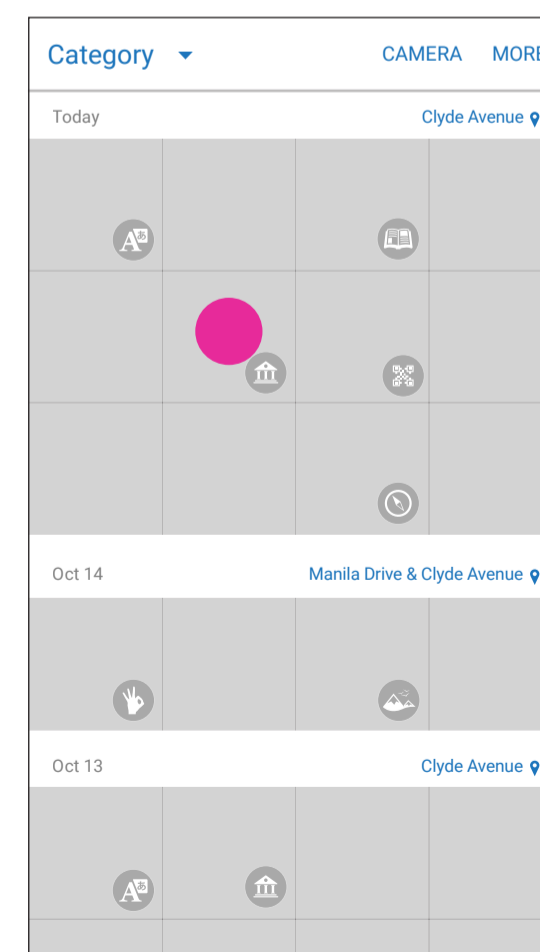
Media



Location

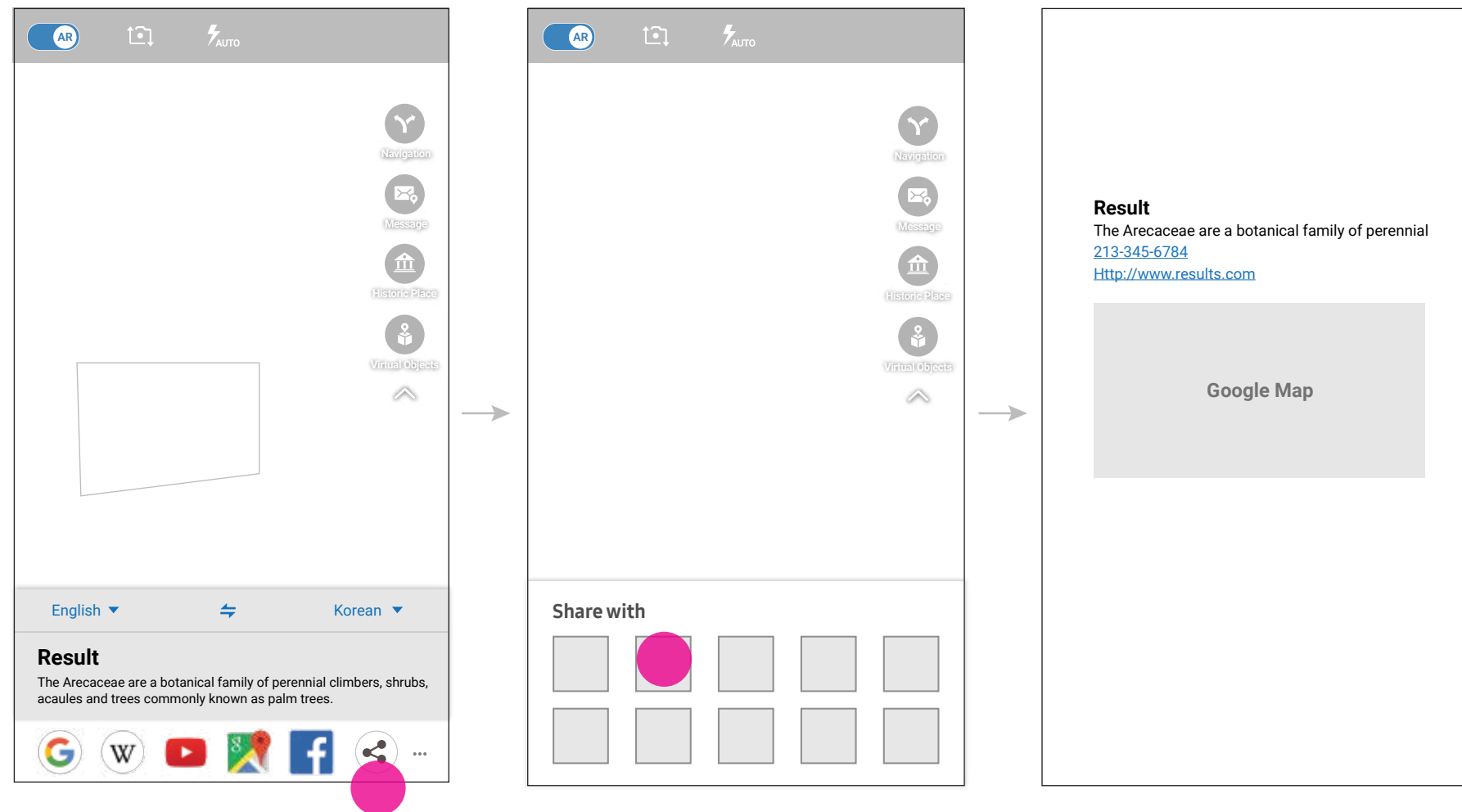


Historic Place



# SHARING FLOW

## Flow for Augmented Content Sharing



### Tap 'share' icon

Take a screenshot including augmented contents by tapping share icon

### Share context-aware Info

Provide contextual information which is any relevant information regarding search result

# MAIN NAVIGATION

# MAIN NAVIGATION






Mode Change

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## Visual Assistant Mode

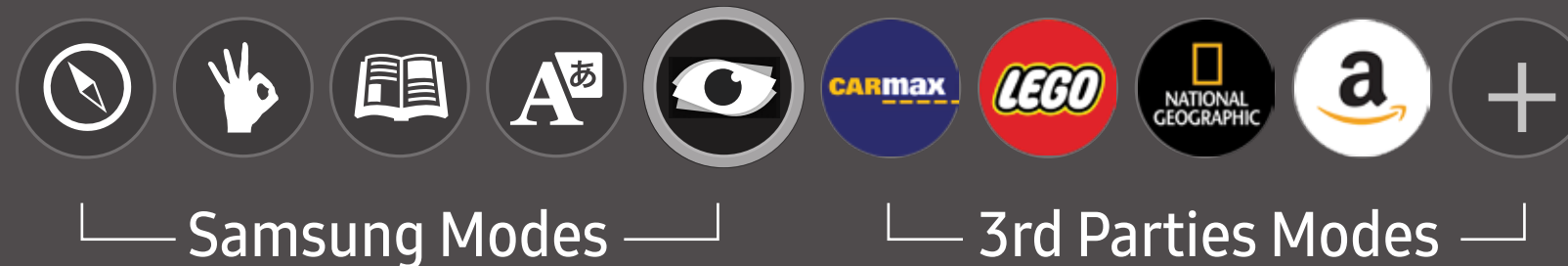
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### Samsung Mode (Default)

-  **Magic Lens:** Object, Scene, Text, Bar Code
-  **Text:** Text, Bar Code
-  **Media:** 2D Image, Text, QR Code
-  **Sign:** Face Expression, Hand/Body Gesture
-  **Location:** Compass, Landmark

### 3rd party Mode (Downloadable)

-  **Download:** Samsung Sub-features, 3rd Party Layers





MAIN NAVIGATION

**INTERFACE OPTIONS**

# ON/OFF SWITCH

From Camera App

MAIN NAVIGATION  
INTERFACE OPTIONS

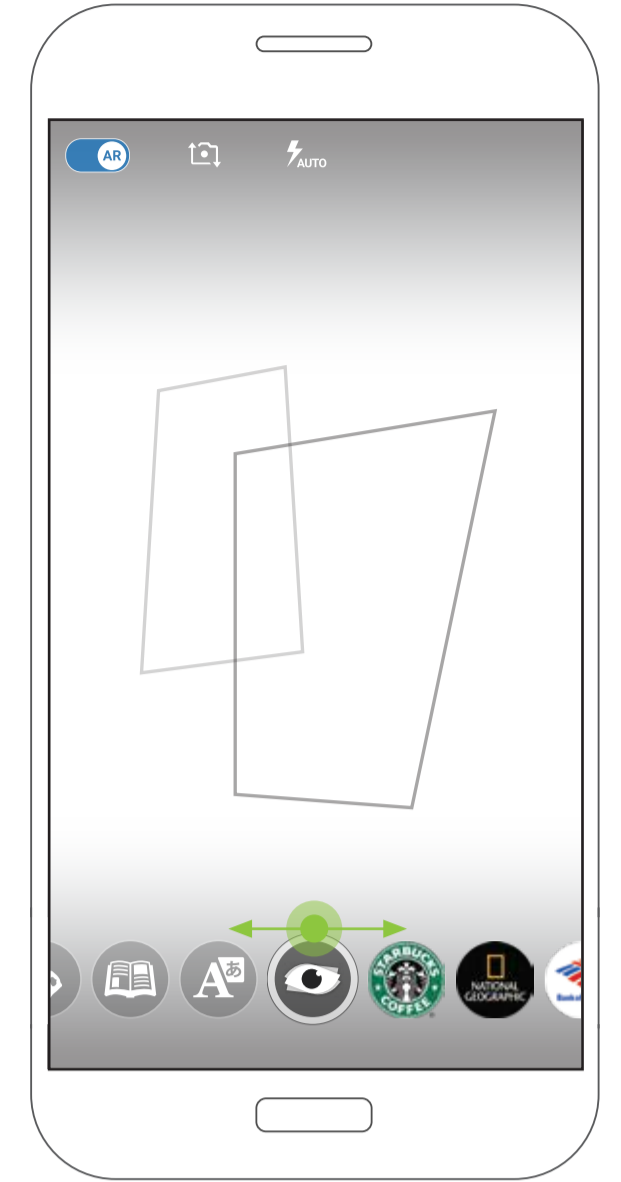
## CASE 1

### Simple Switch

- Leverage common switch interface for easy perception and usage to turn on and off
- Visual Assistant mode prompt display in linear way to swipe left or right for changing mode



Camera

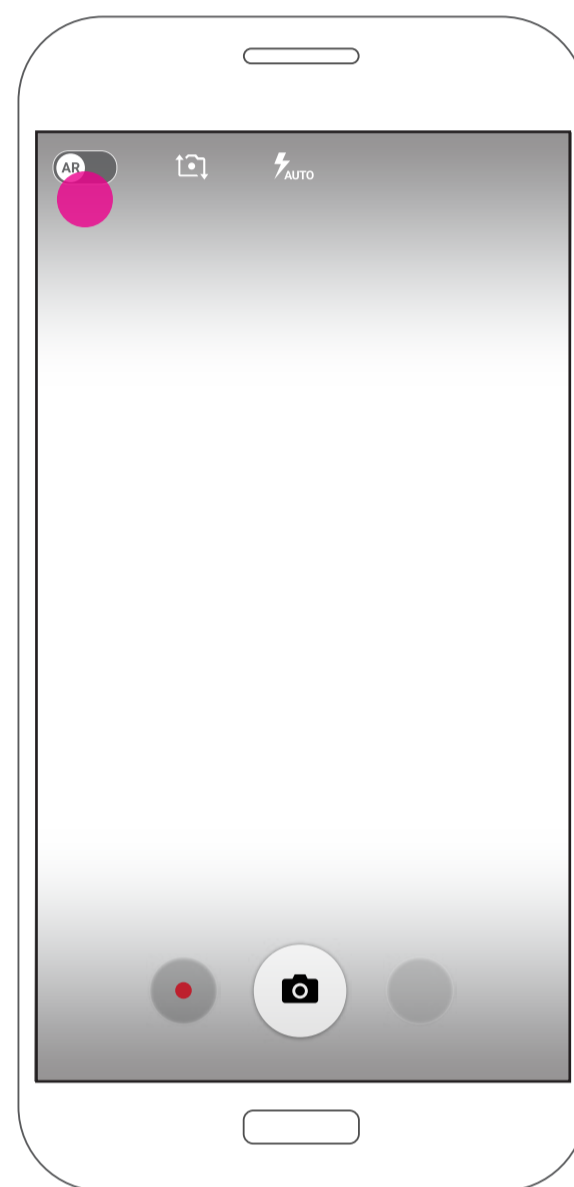


Visual Assistant with Mode

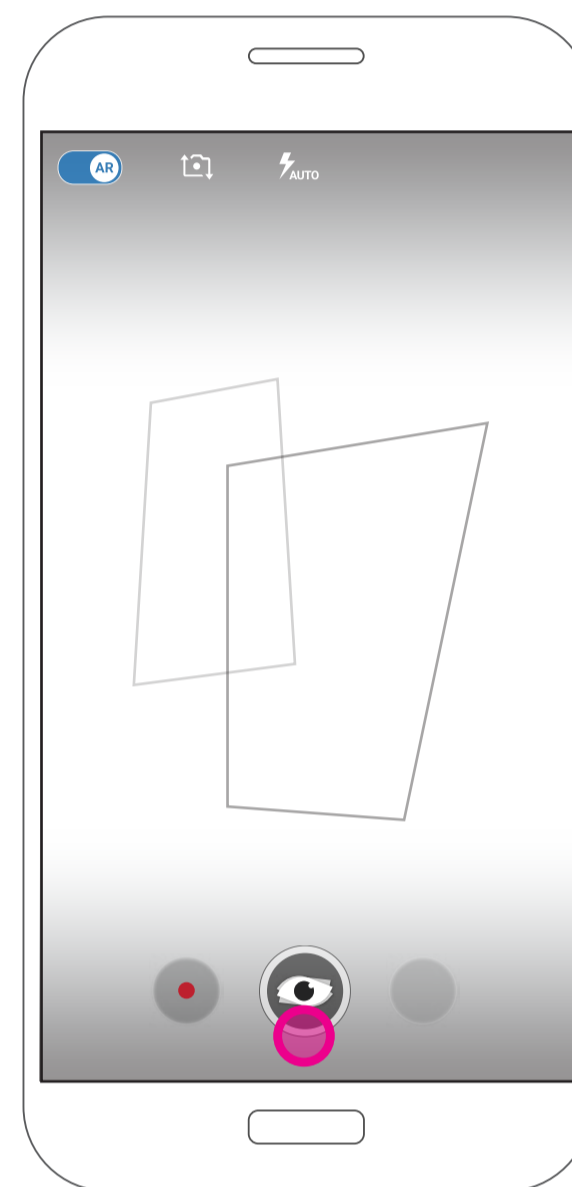
## CASE 1-1

### Simple Switch

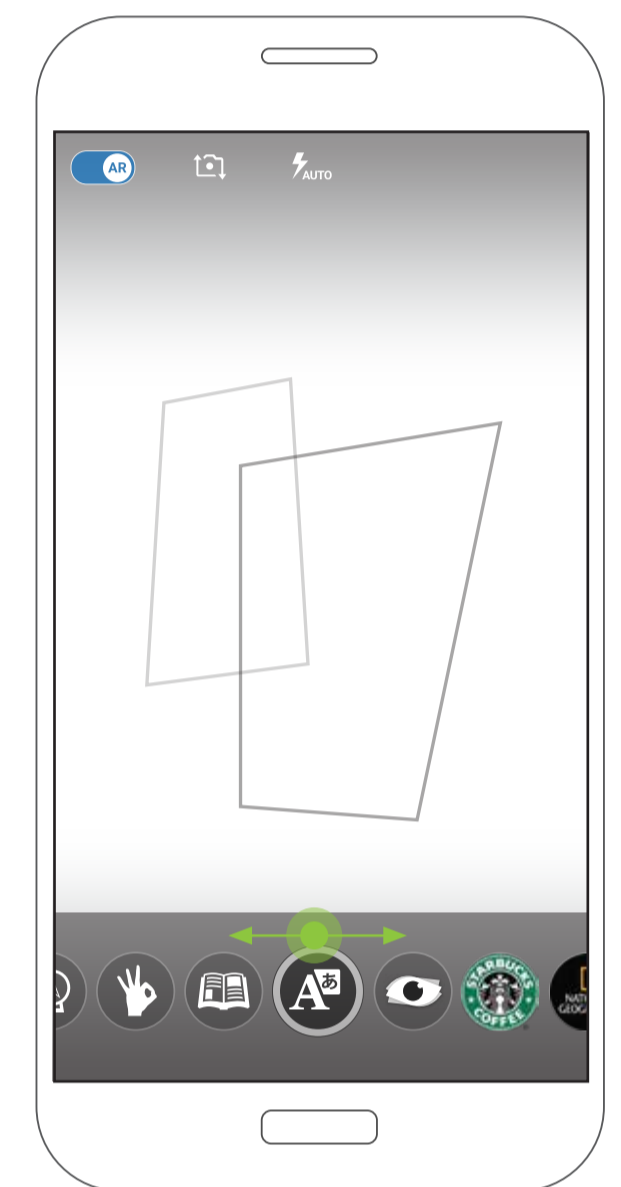
### Interface Variaton



Camera



Visual Assistant

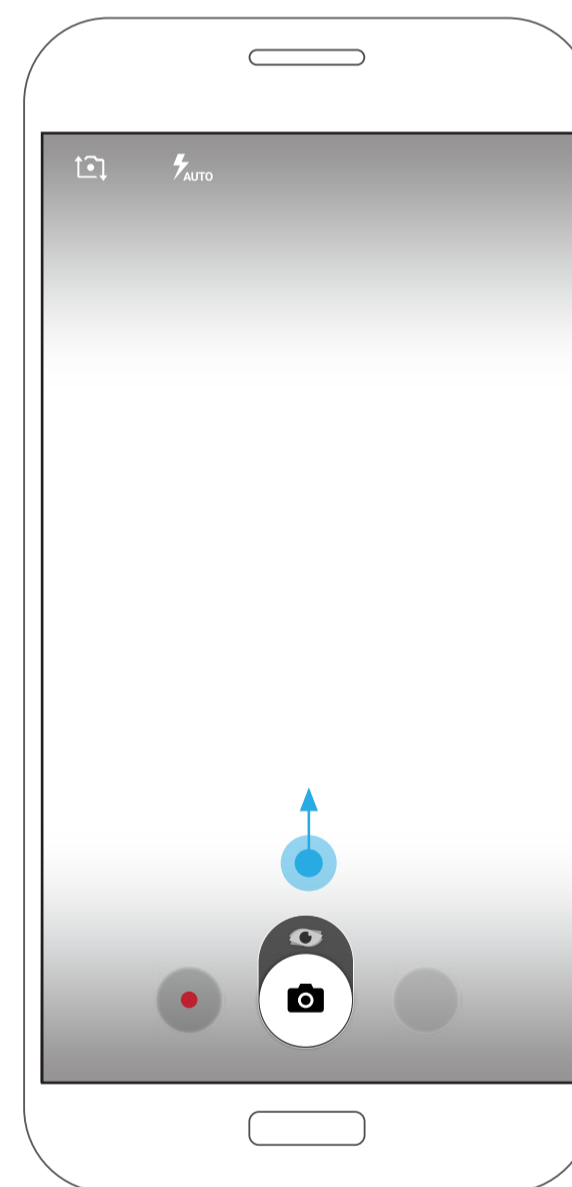


Visual Assistant with Mode

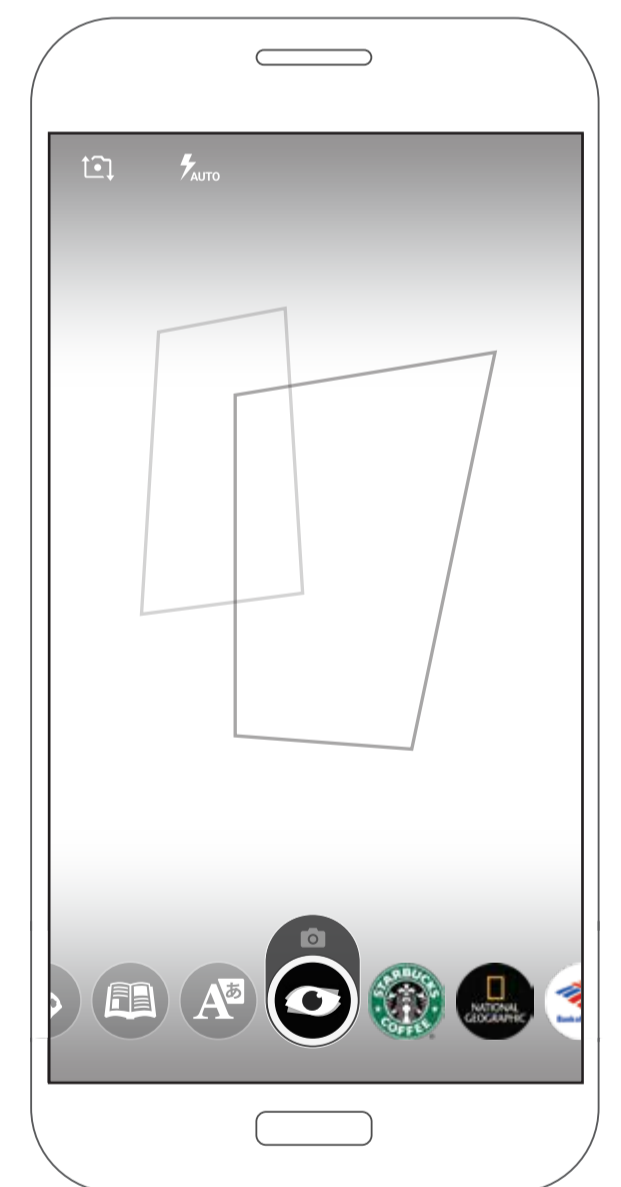
## CASE 2

### Integrate Visual Assistant and Camera Icon

- Swipe up from Camera icon to turn on visual Assitatnt
- Visual Assistant mode display in linear way for easy browsing mode



Camera

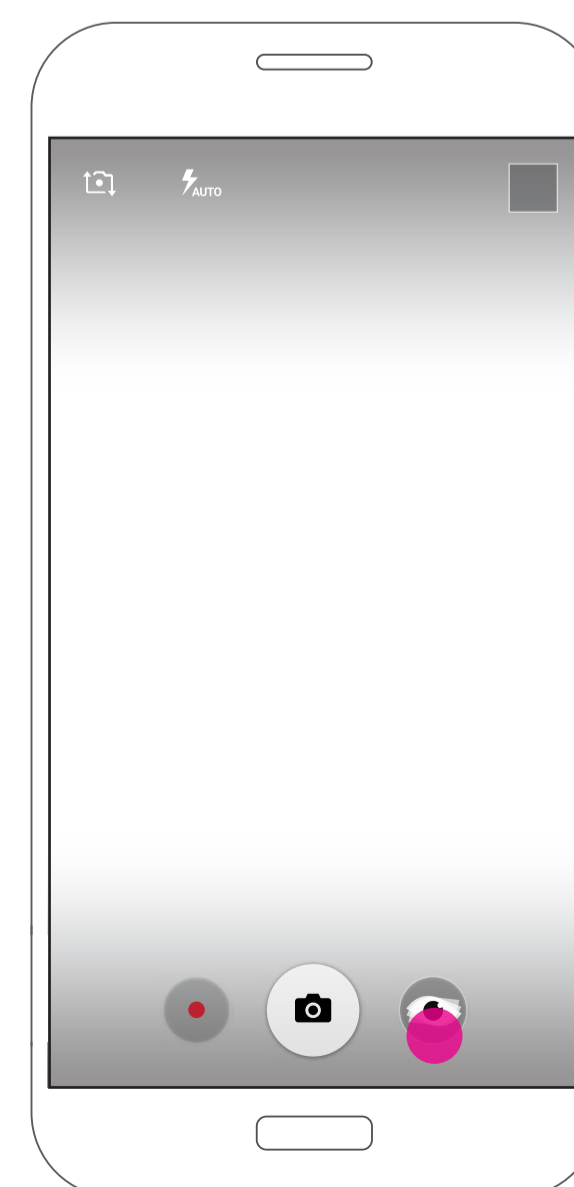


Visual Assistant with Mode

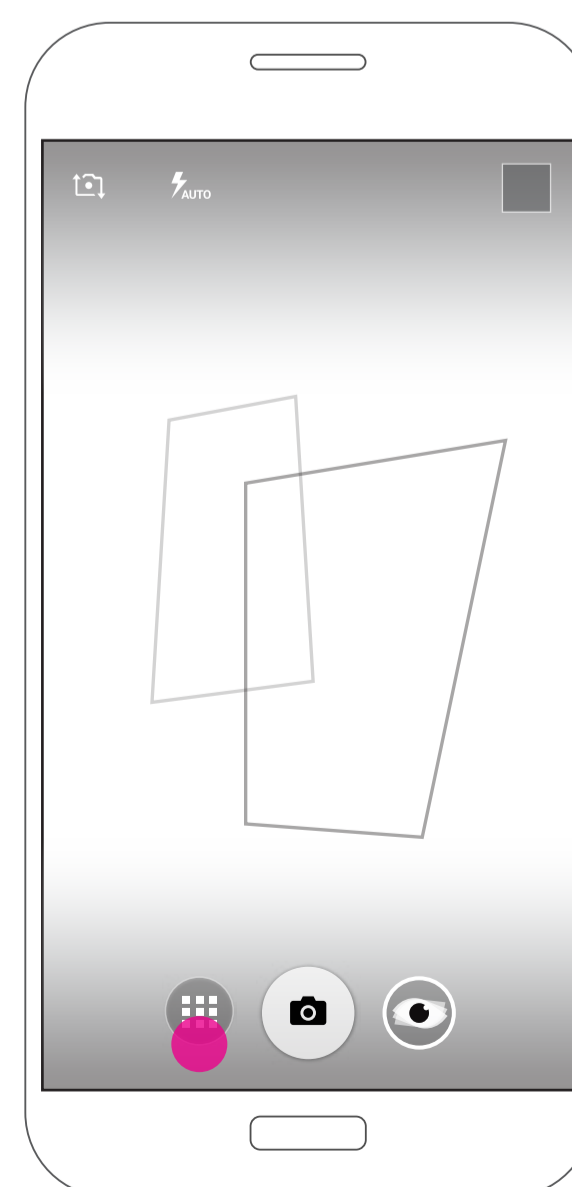
## CASE 3

### Visual Assistant as a function on camera

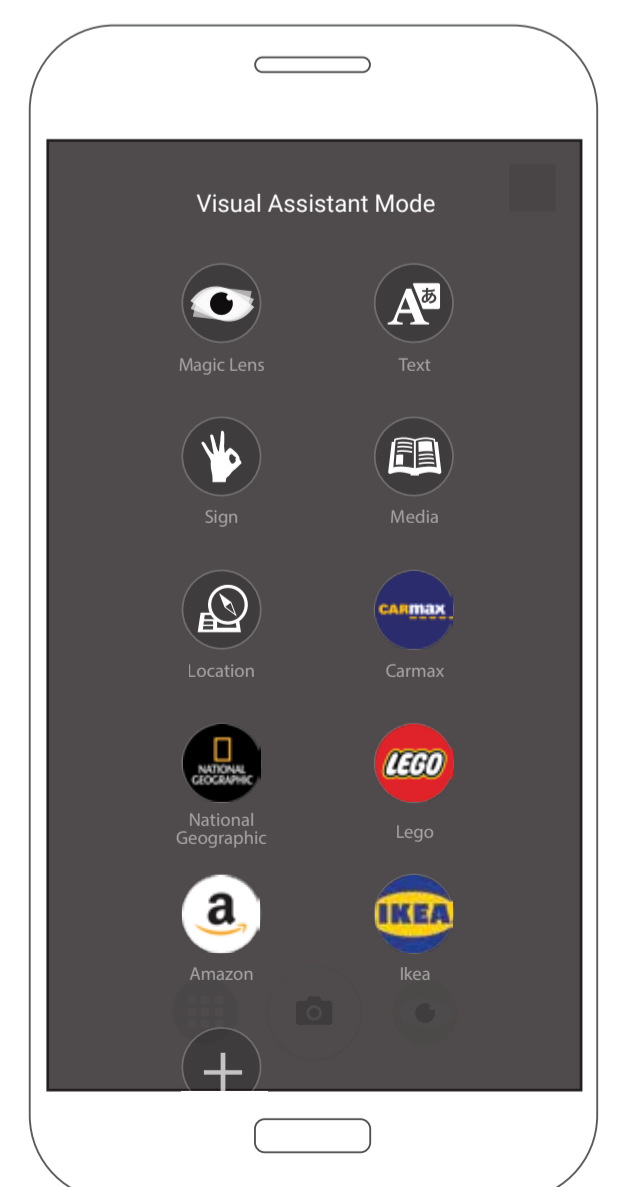
- Visual Assistant icon for turning on/off
- Visual Assistant menu icon brings all Visual Assistant Mode



Camera



Visual Assistant



Visual Assistant Mode

On/Off Switch

Entry Case 1



Camera Mode



Visual Assistant Mode

Entry Case 2



Camera Mode

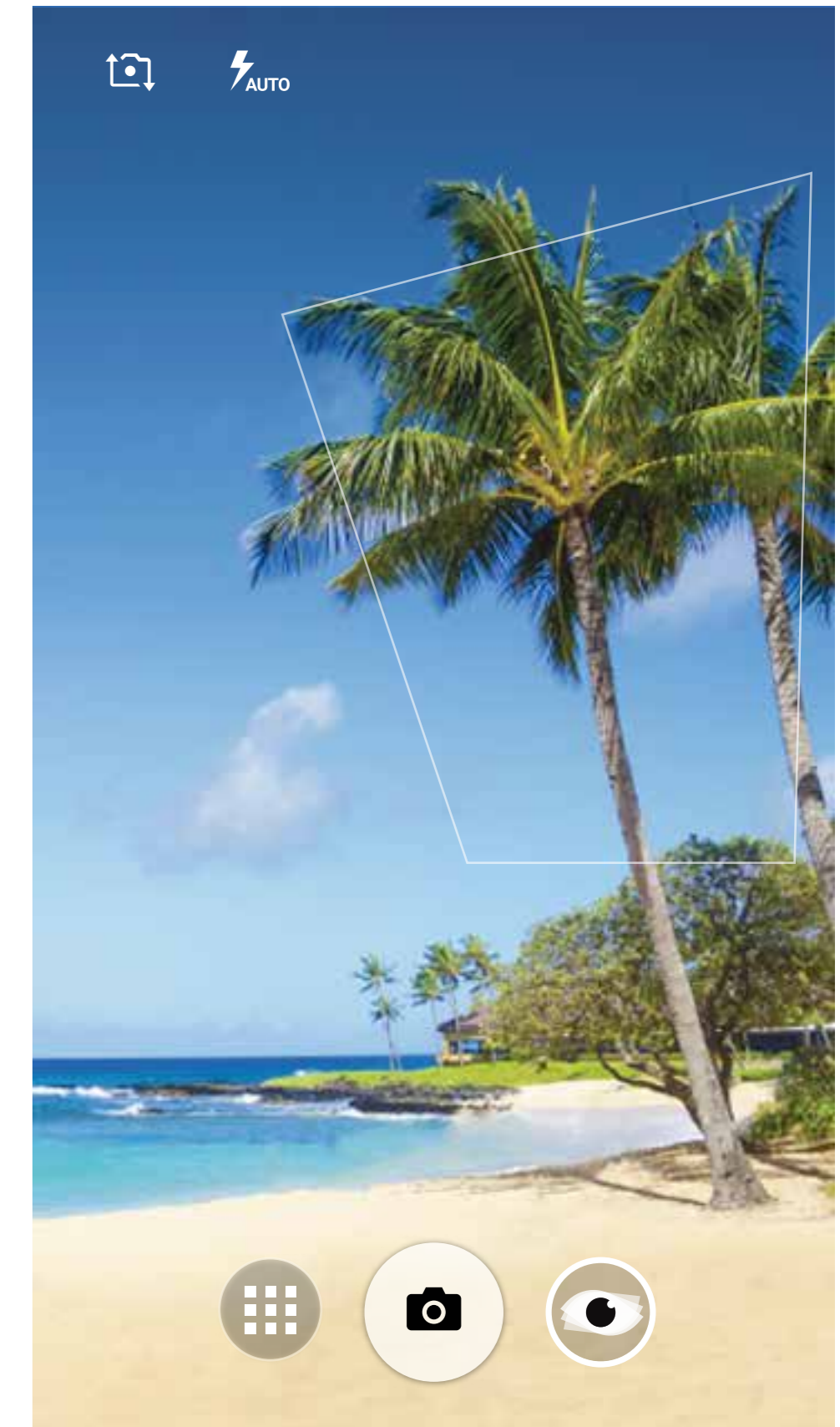


Visual Assistant Mode

Entry Case 3



Camera Mode



Visual Assistant Mode

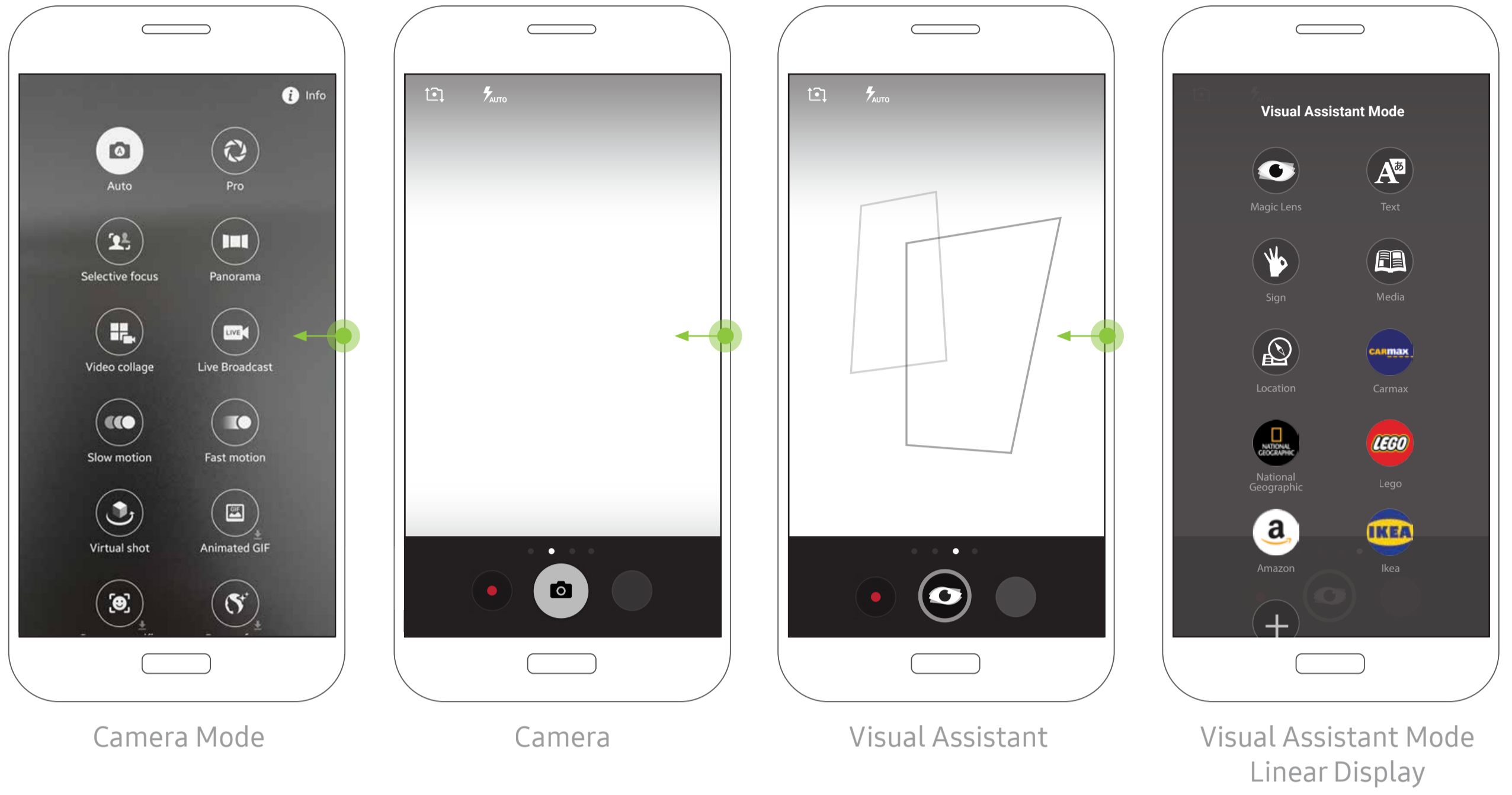
# SCREEN SWAP

From Camera App

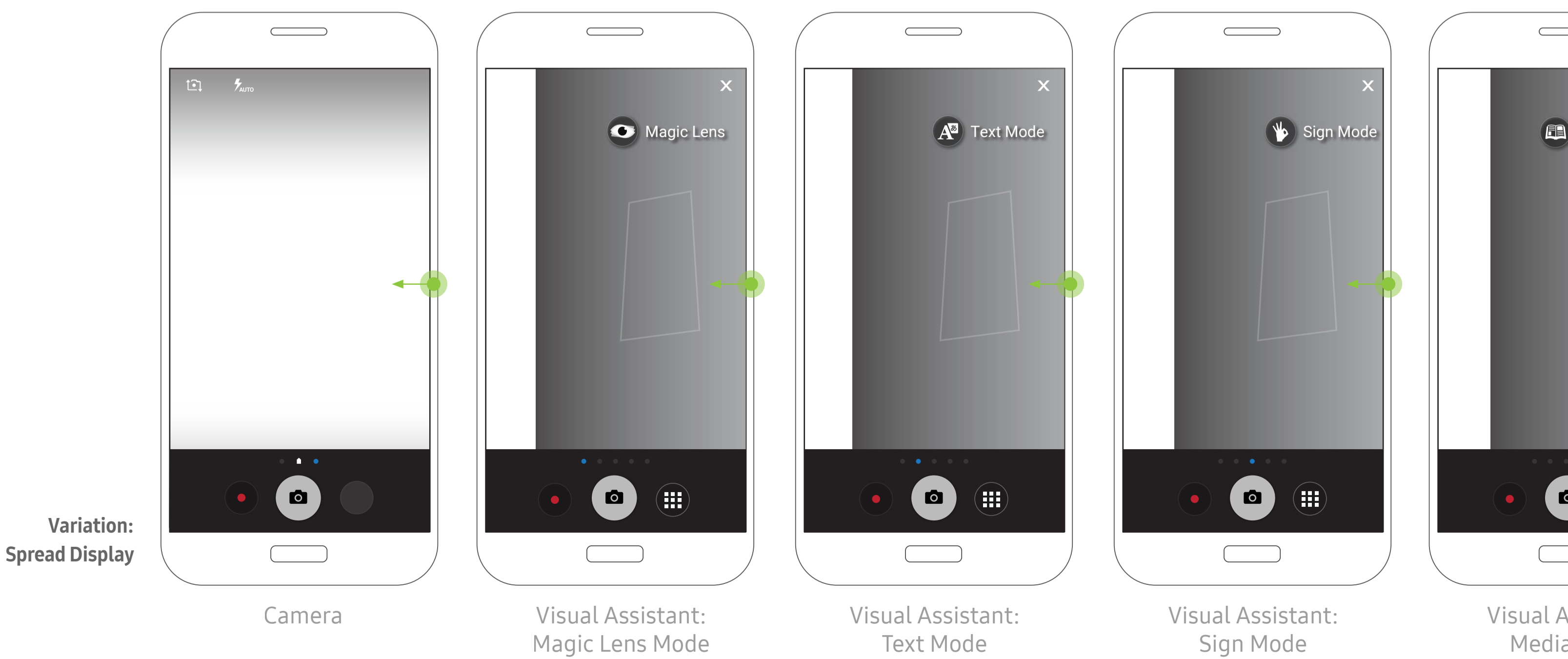
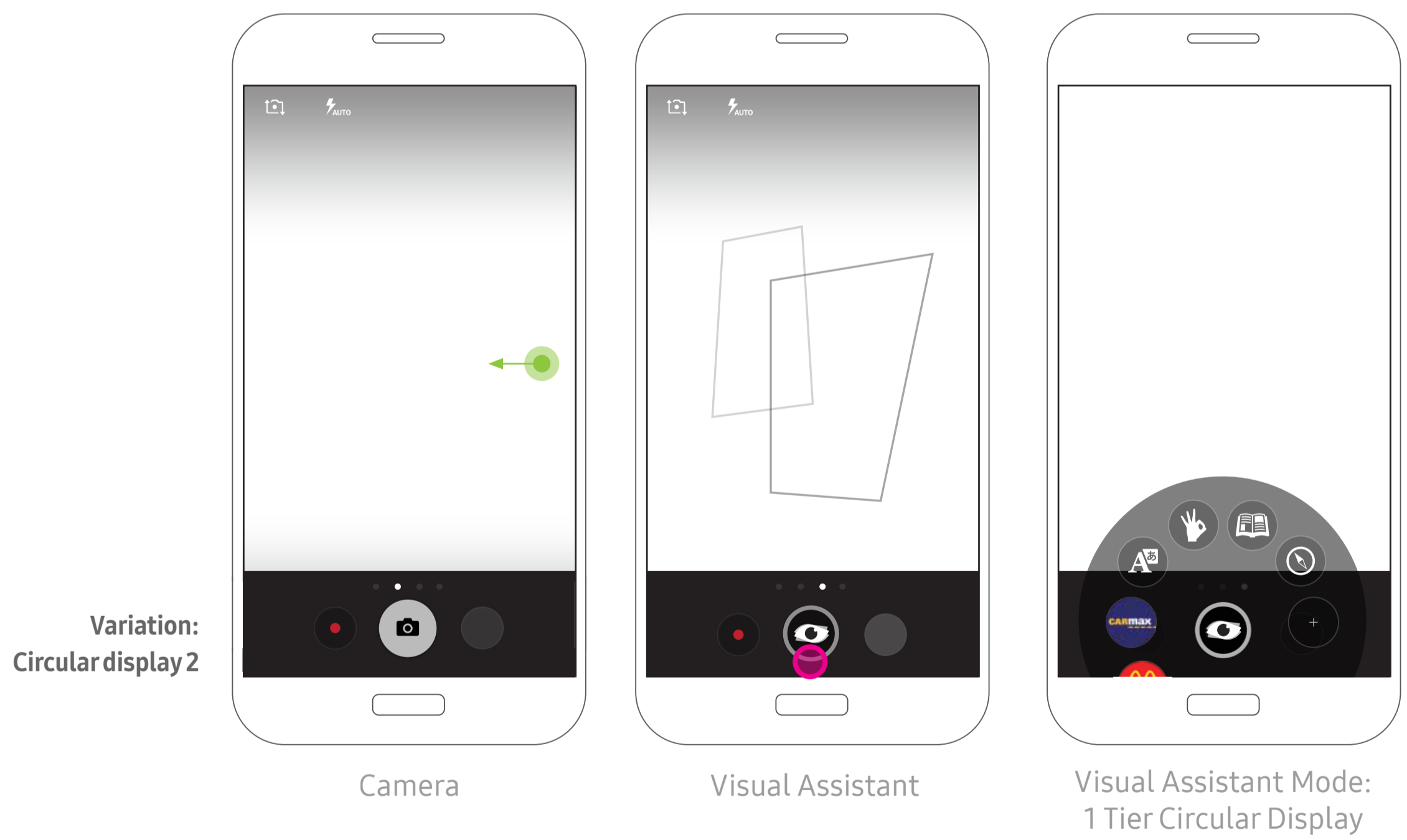
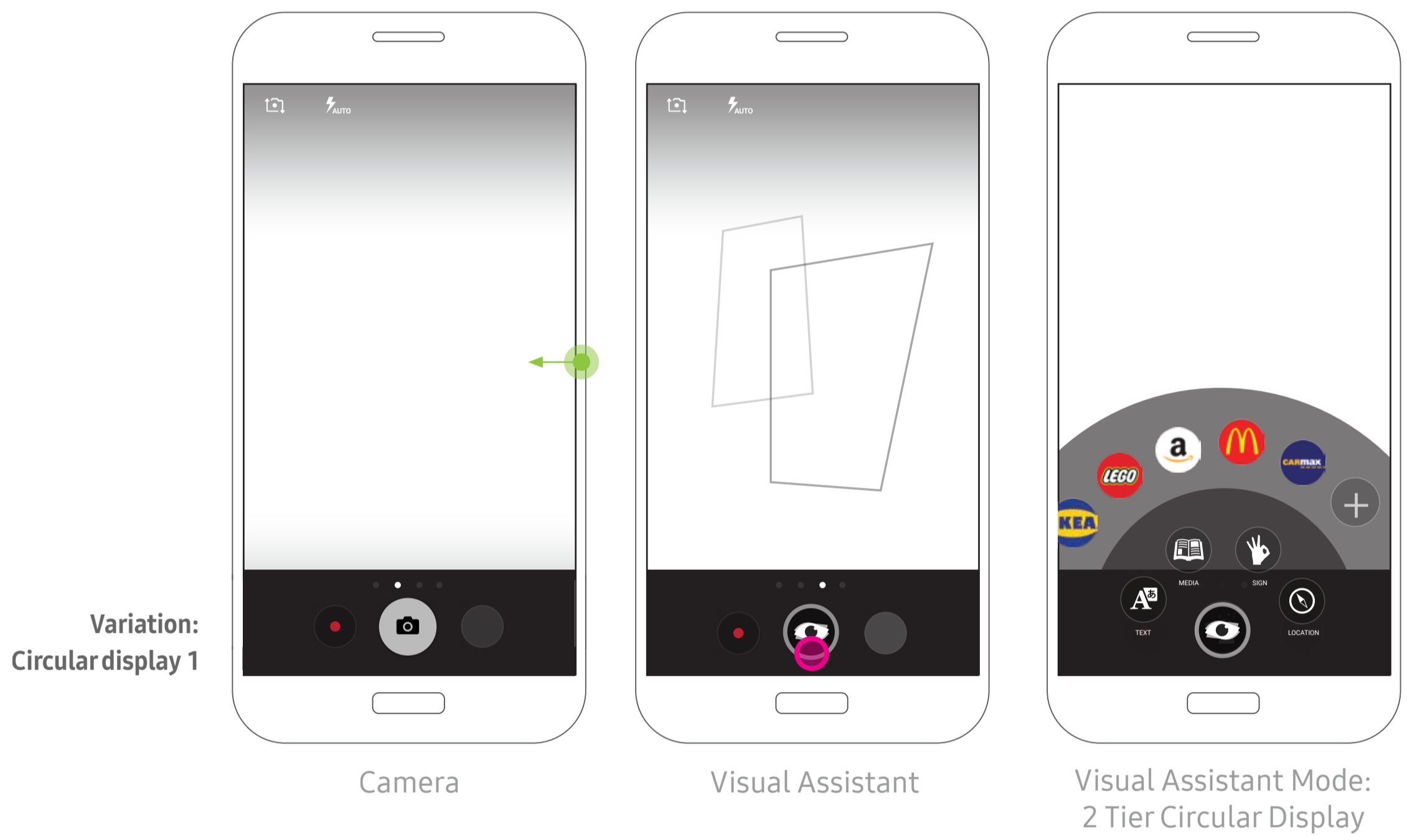
## CASE 1

### Screen Swap

- Swiping left brings augmented view on camera app
- Another swipe in from the right of the screen shows Visual Assistant Mode
- Subtle swipe animation action can help to show requested action is being carried out

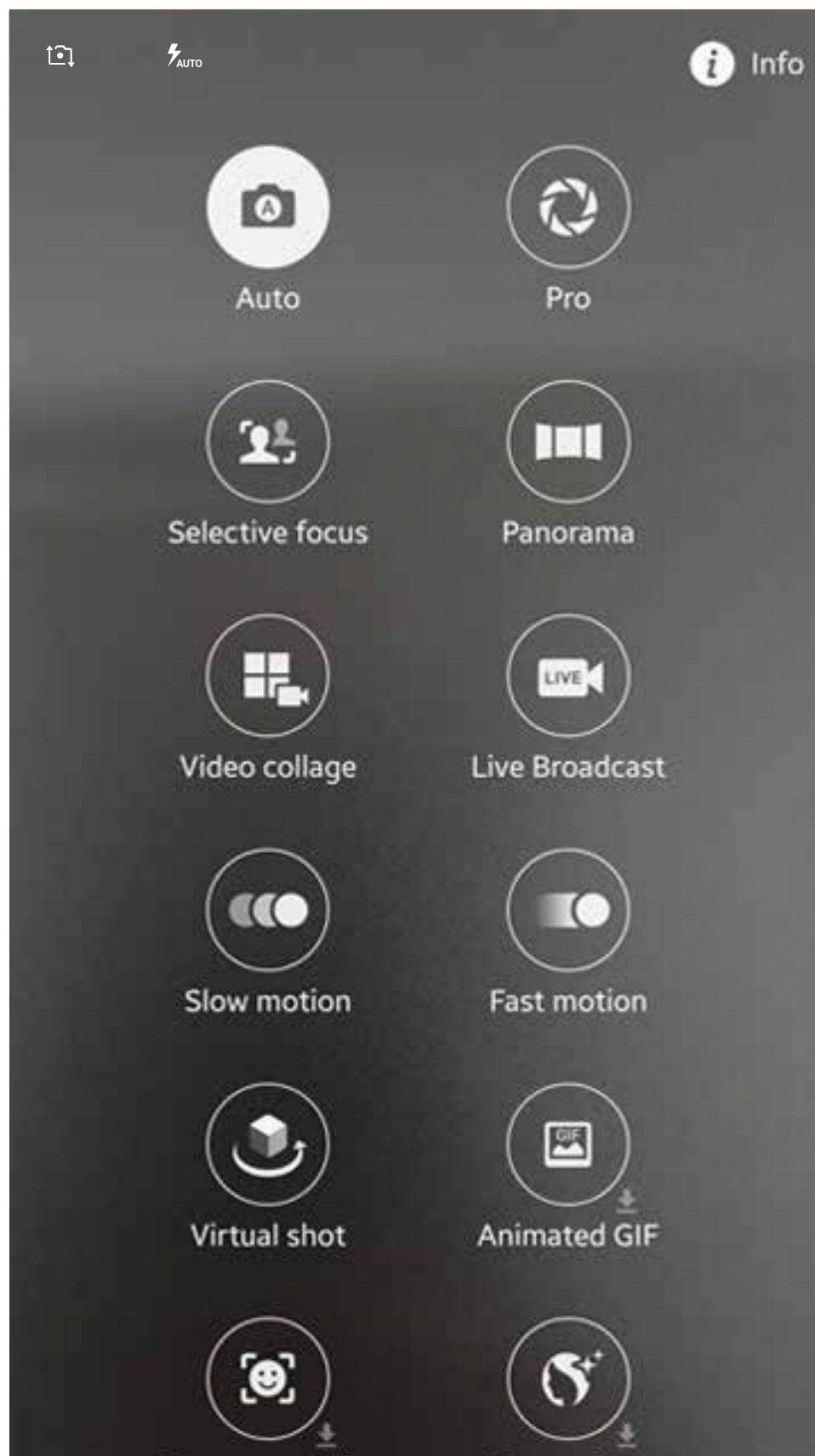


## Interface Variations



Screen Swap

Case 1



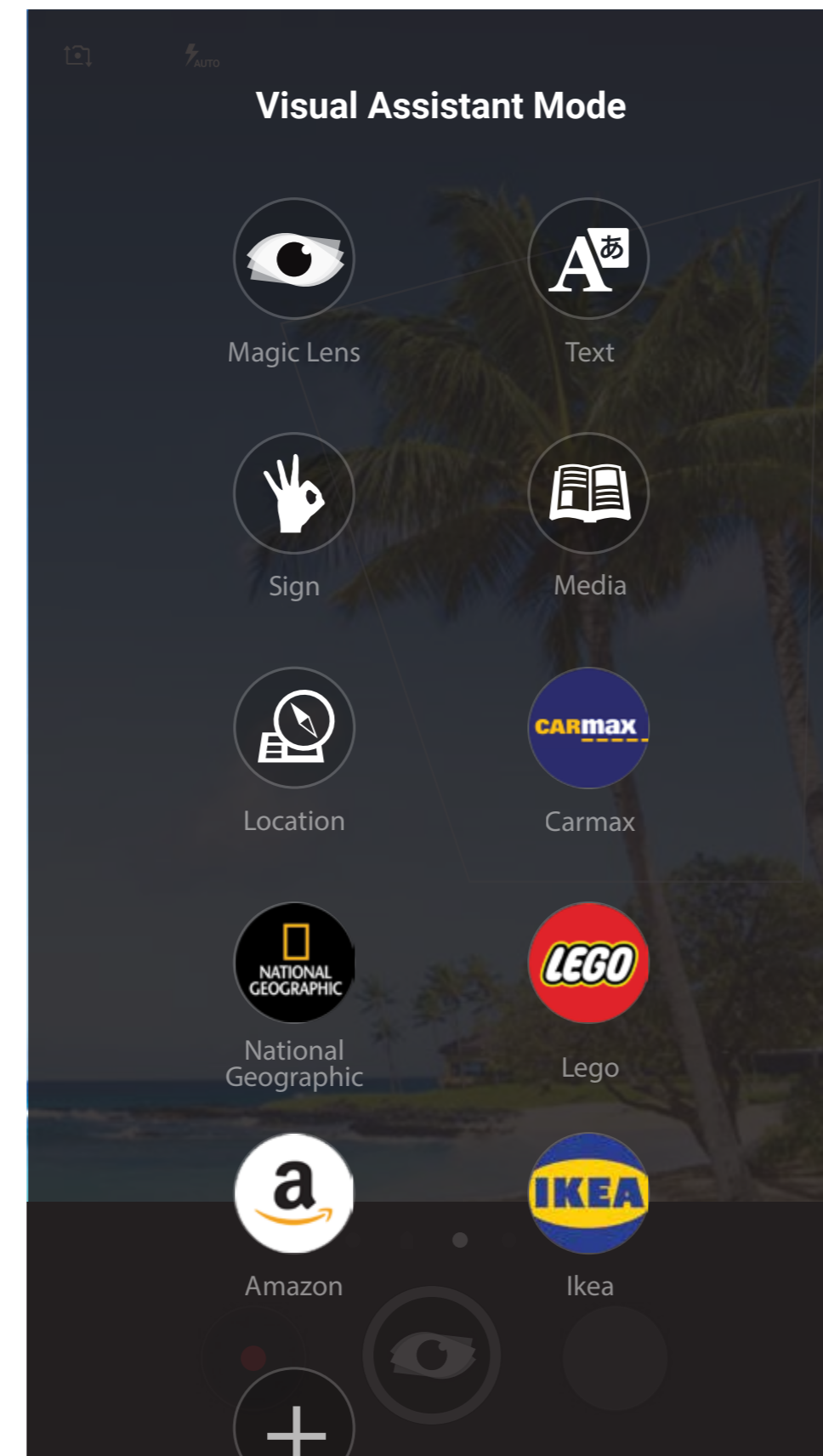
Camera Mode



Camera



Visual Assistant



Linear display for Visual Assistant Mode

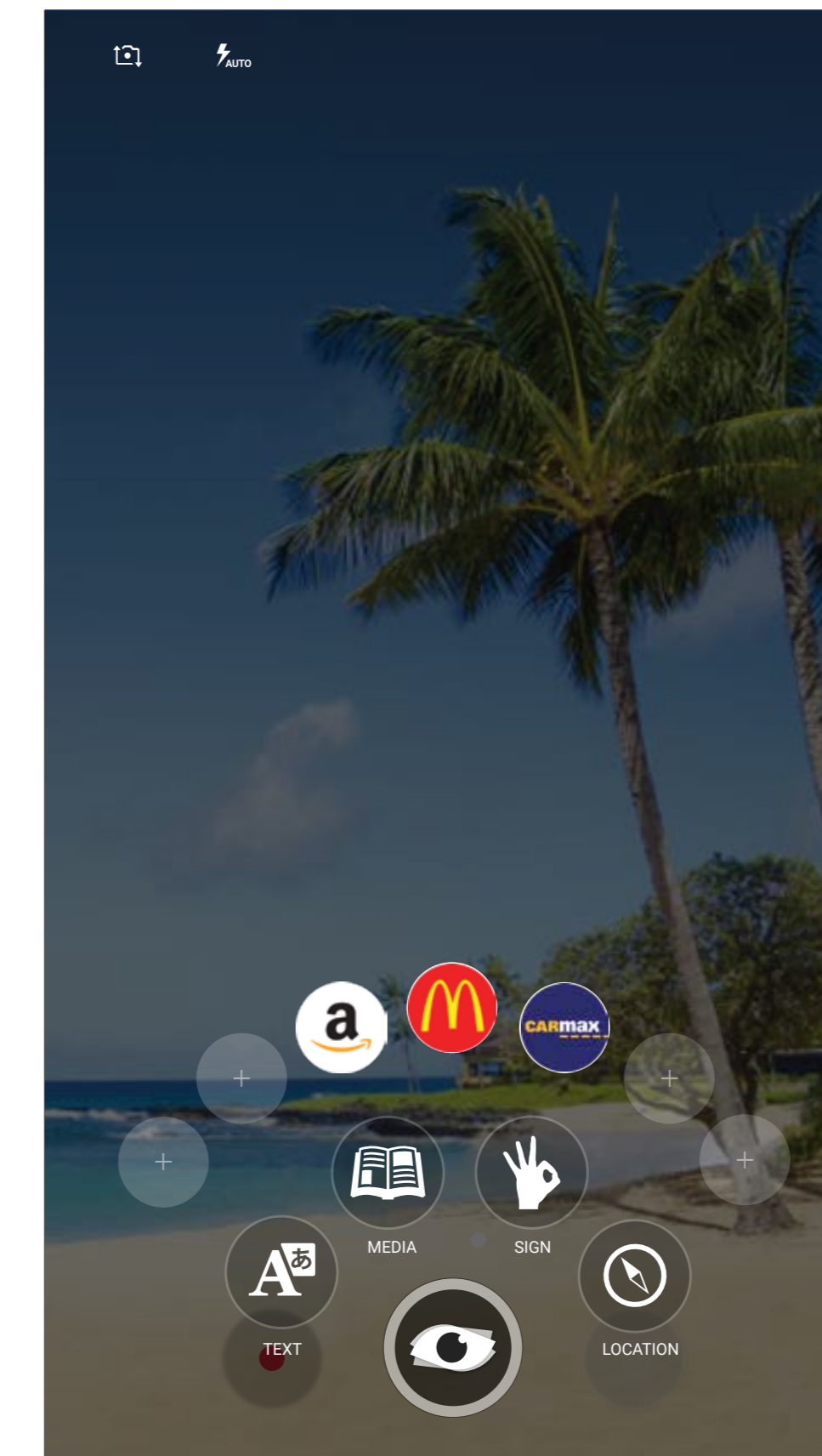
Interface Variations



Camera



Visual Assistant



Circular display for Visual Assistant Mode



Circular display variation 1



Circular display variation 2

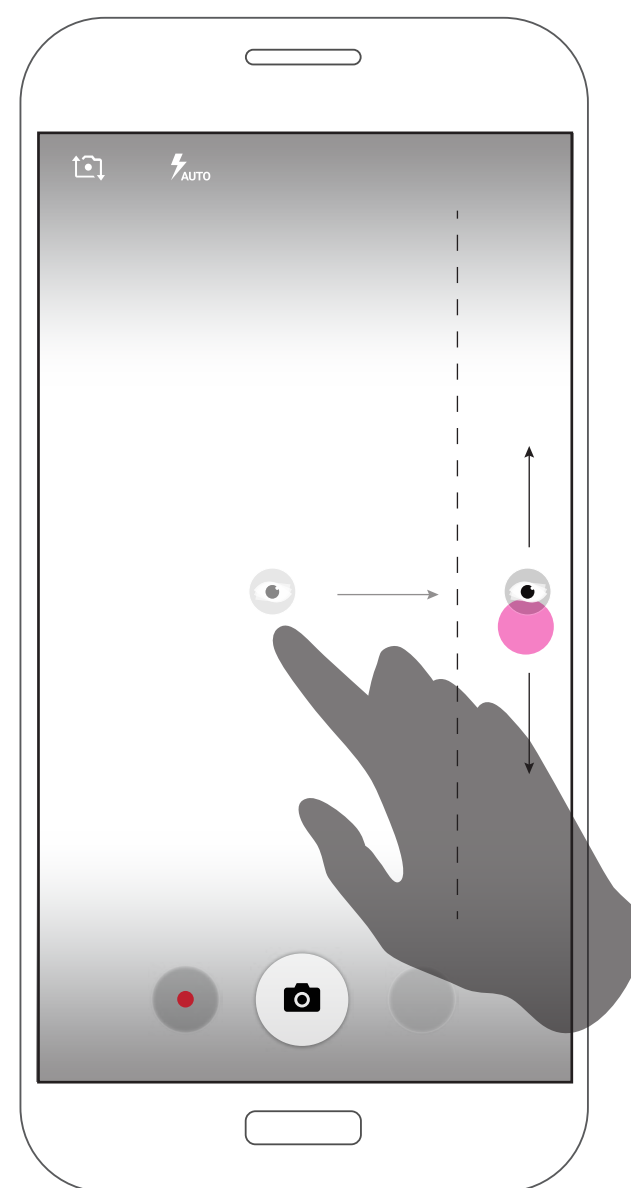
# MOVABLE ICON

On Camera App

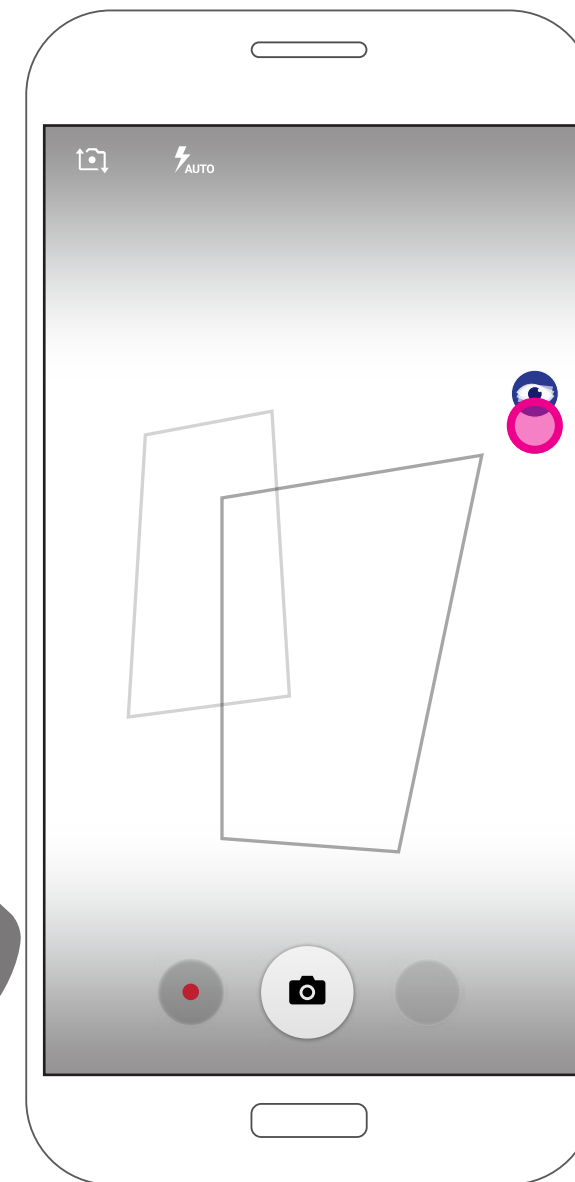
MAIN NAVIGATION  
INTERFACE OPTIONS

## Movable Visual Assistant icon

- Icon can be movable in specific area by user control
- Simple tapping opens augmented superimposing contents experience
- Visual Assistant Mode can be displayed by hold pressing the icon



Camera



Visual Assistant

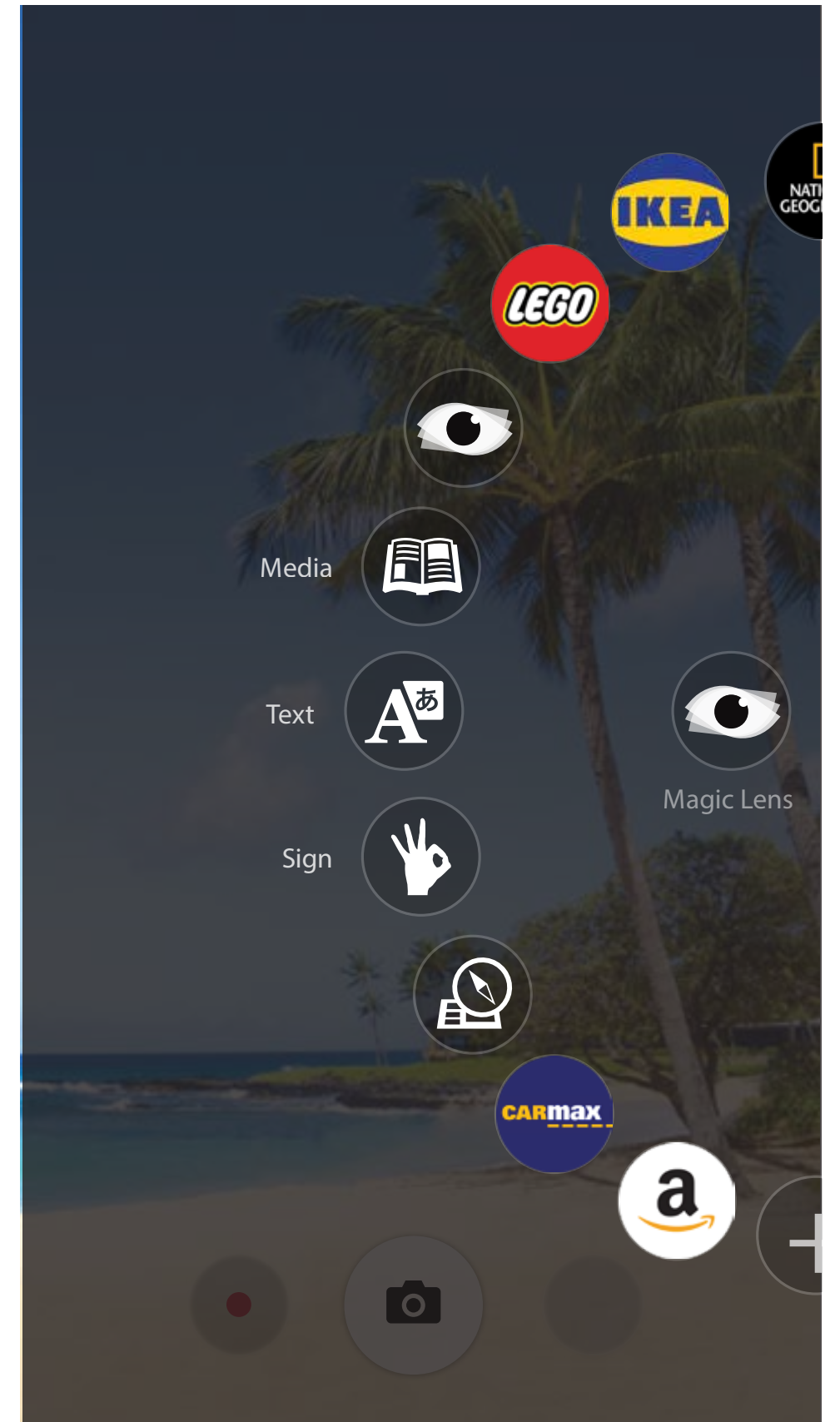


Visual Assistant Mode

Movable Icon



Camera



Visual Assistant

# COLLAPSE AND EXPAND

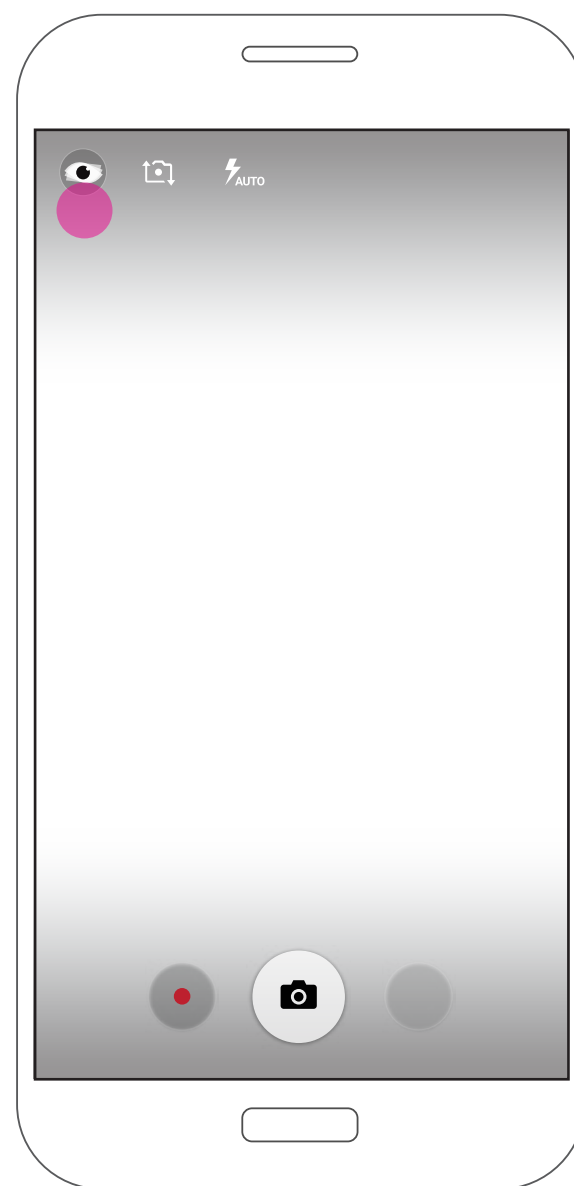
## MAIN NAVIGATION INTERFACE OPTIONS

On Camera App

### CASE 1

#### Visual Assistant Icon

- Simple icon can trigger augmented information on the camera view
- Visual Assistant Mode can be shown by dragging icon and enable to expand displaying window which can be reorderable by user intention



Camera



Visual Assistant

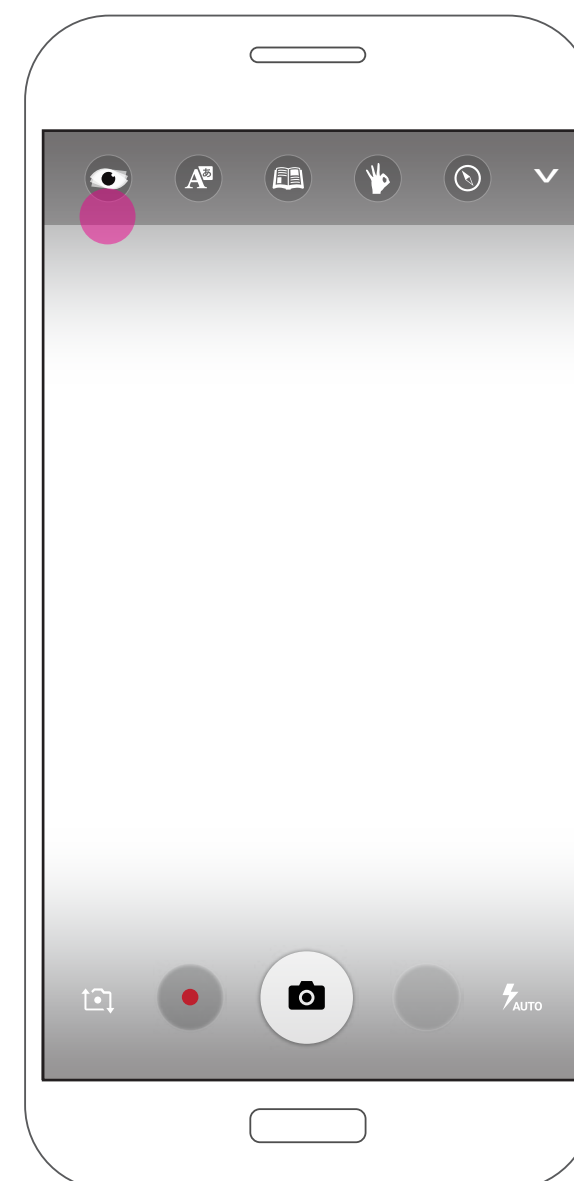


Visual Assistant Mode

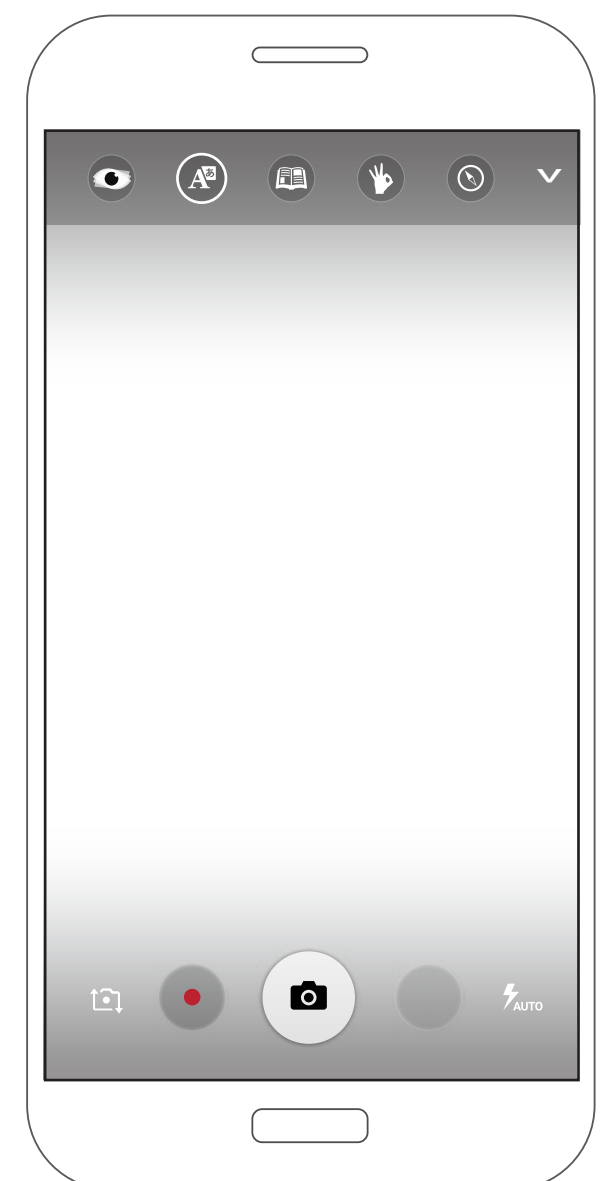
### CASE 2

#### Visual Assistant like a Feature on camera app

- Place "Mode" icons on top of the camera screen to integrate augmented information on current view
- By simple tapping can trigger each mode of visual assistant



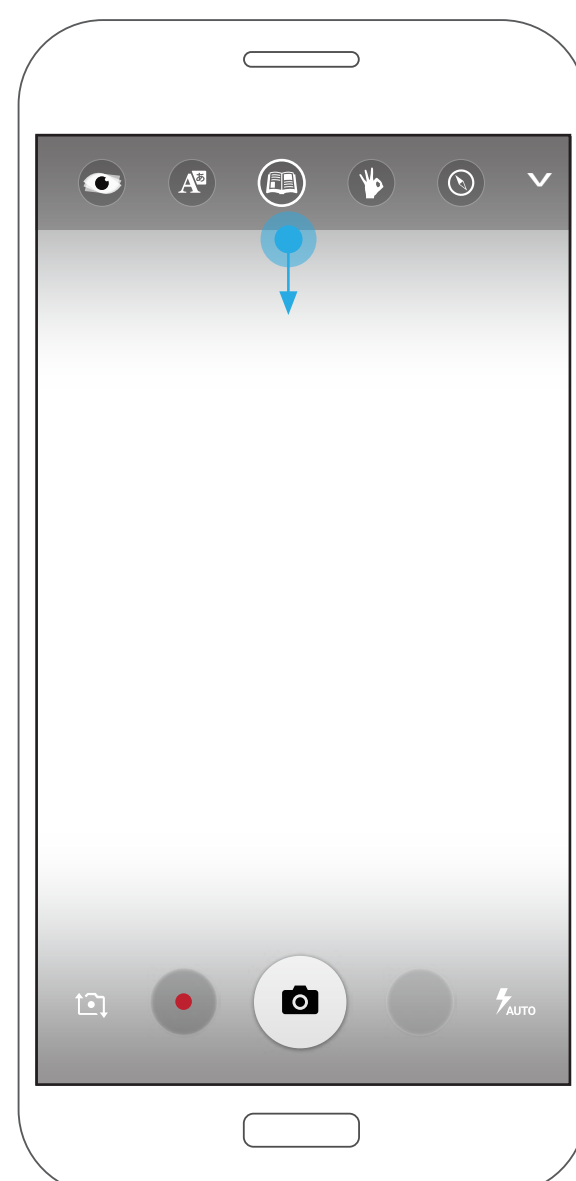
Camera



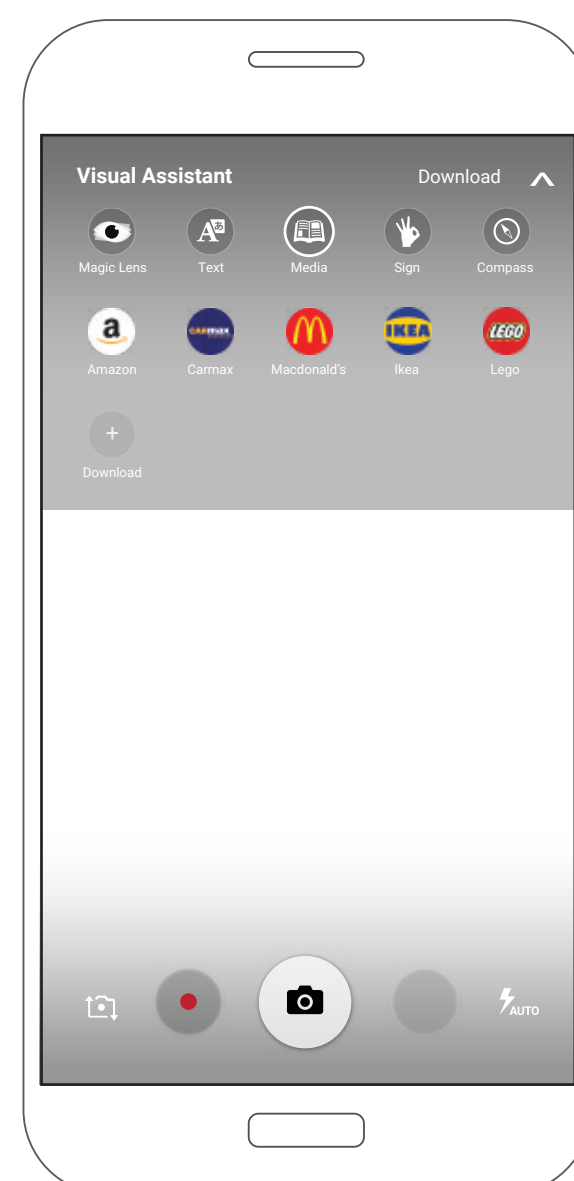
Visual Assistant

### Window Expansion

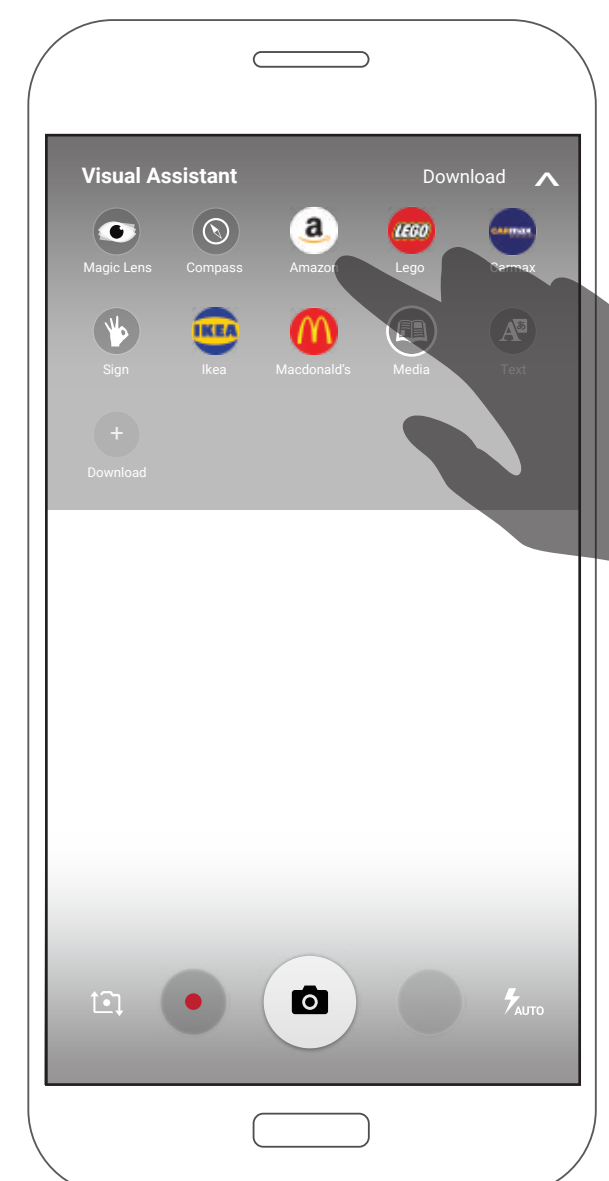
- Visual Assistant Mode panel can be expandable
- The orders can be changeable by user control



Camera



Visual Assistant Mode Window Expansion

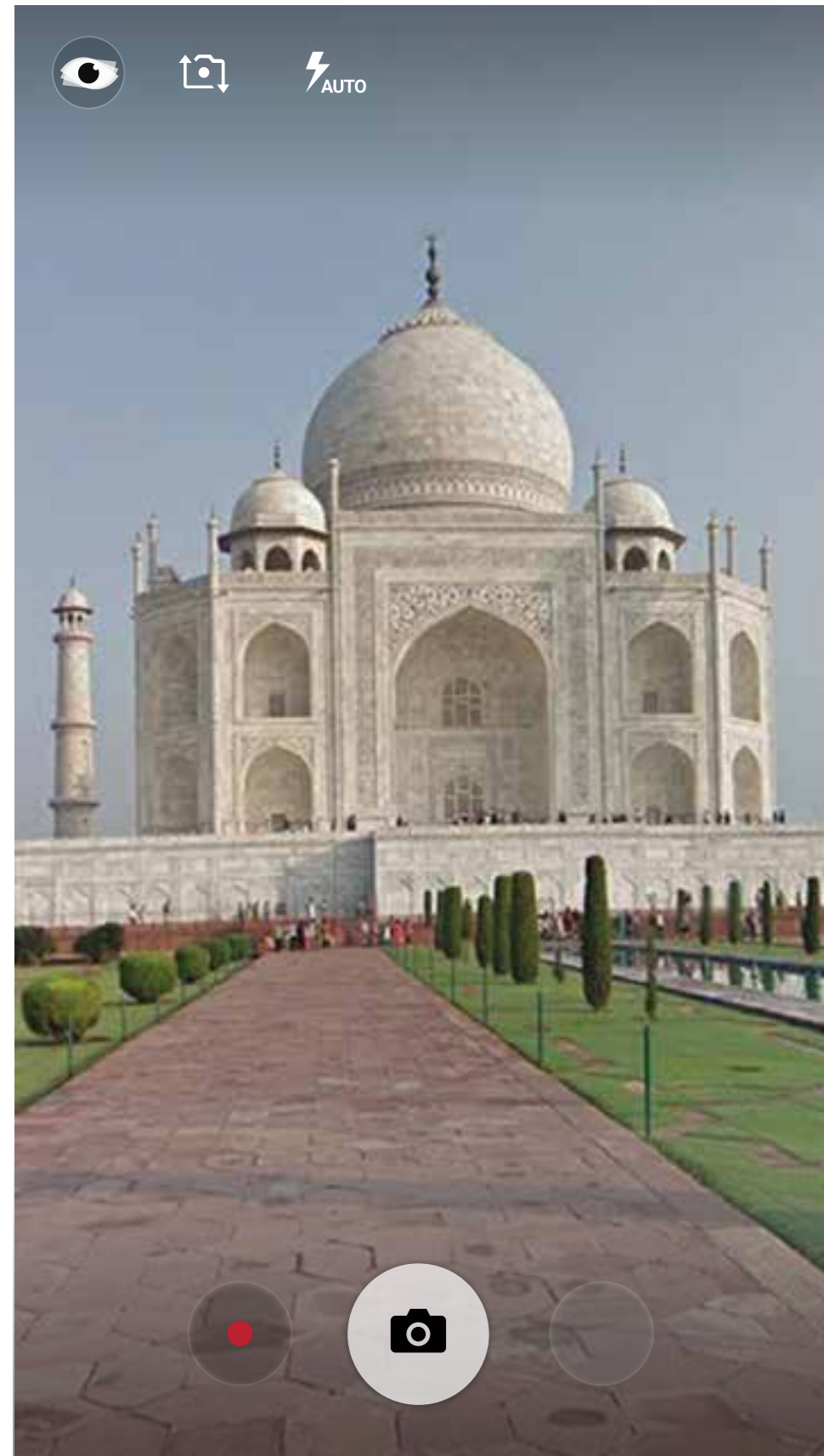


Visual Assistant Mode customize UI

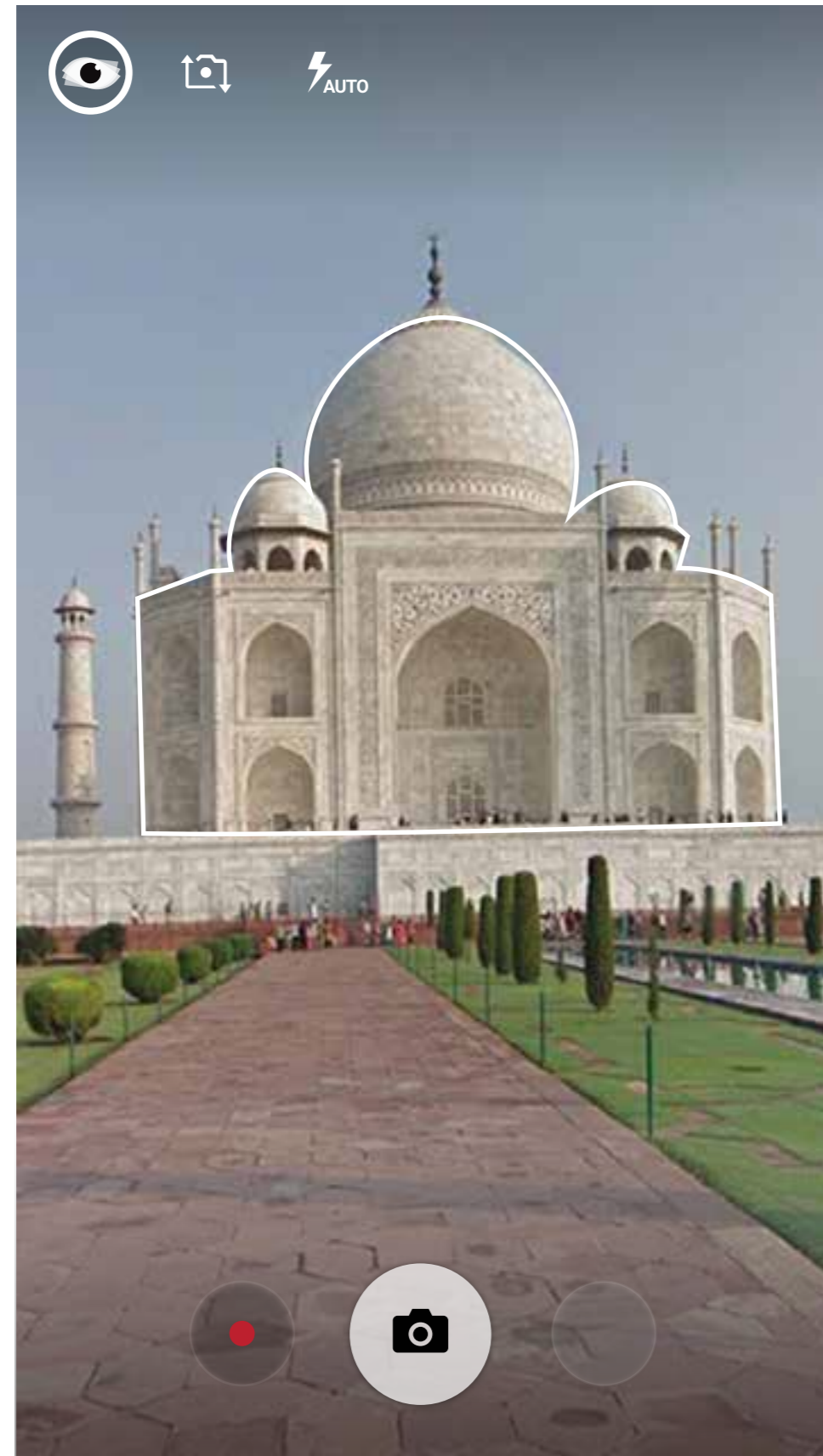


Collapse and Expand

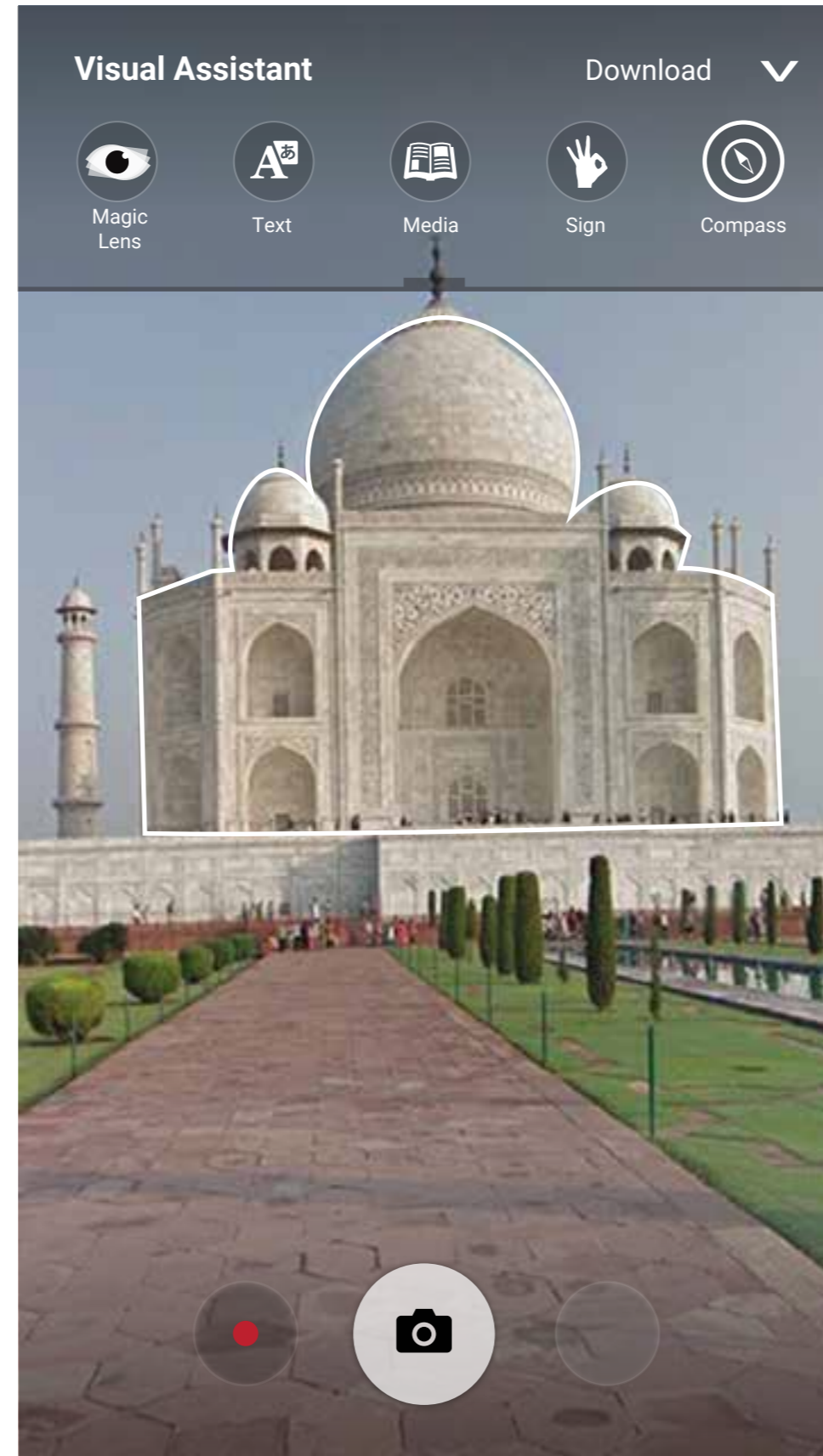
Case 1



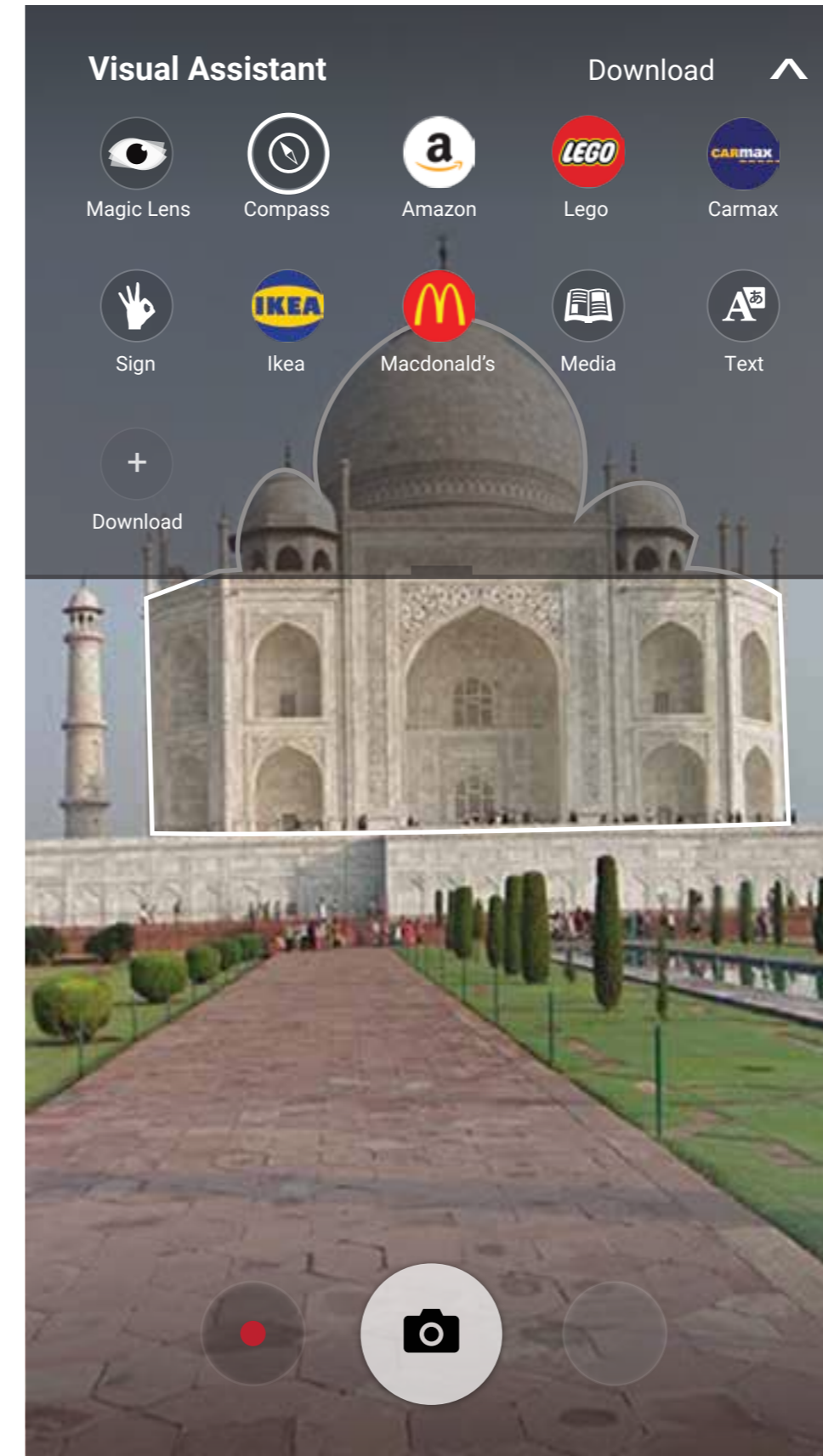
Camera



Visual Assistant

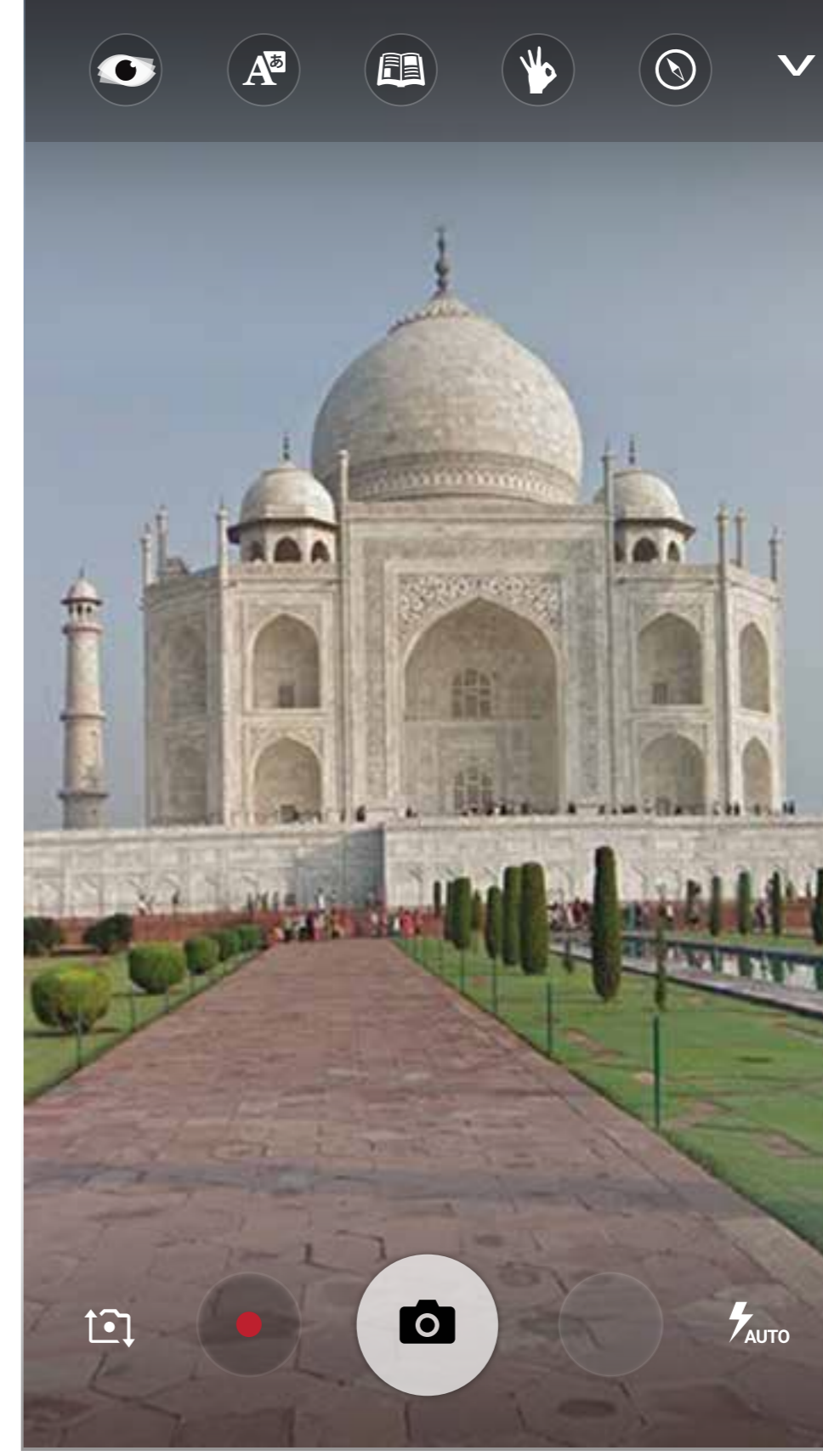


Visual Assistant Mode

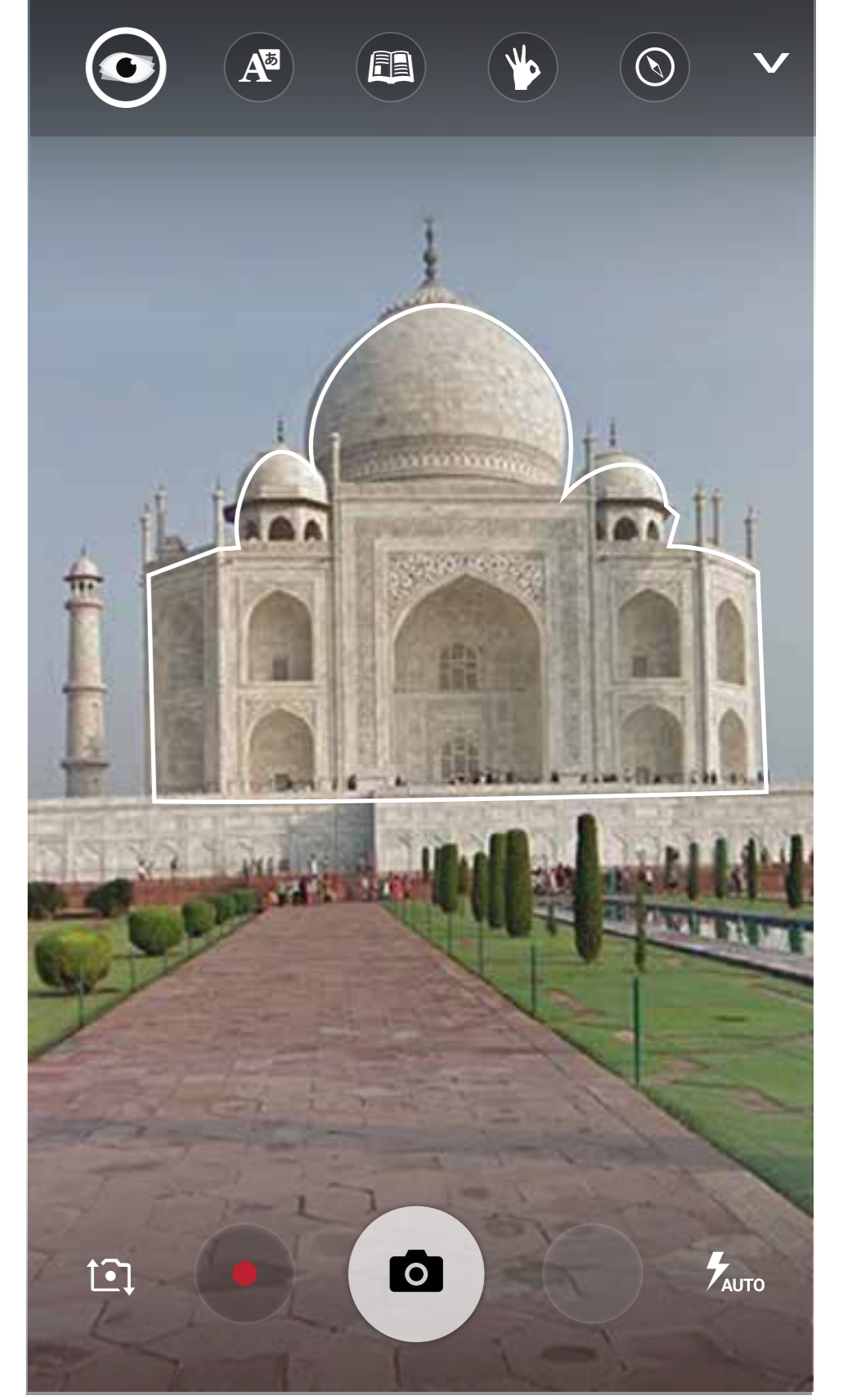


Visual Assistant Mode Expand

Case 2



Camera



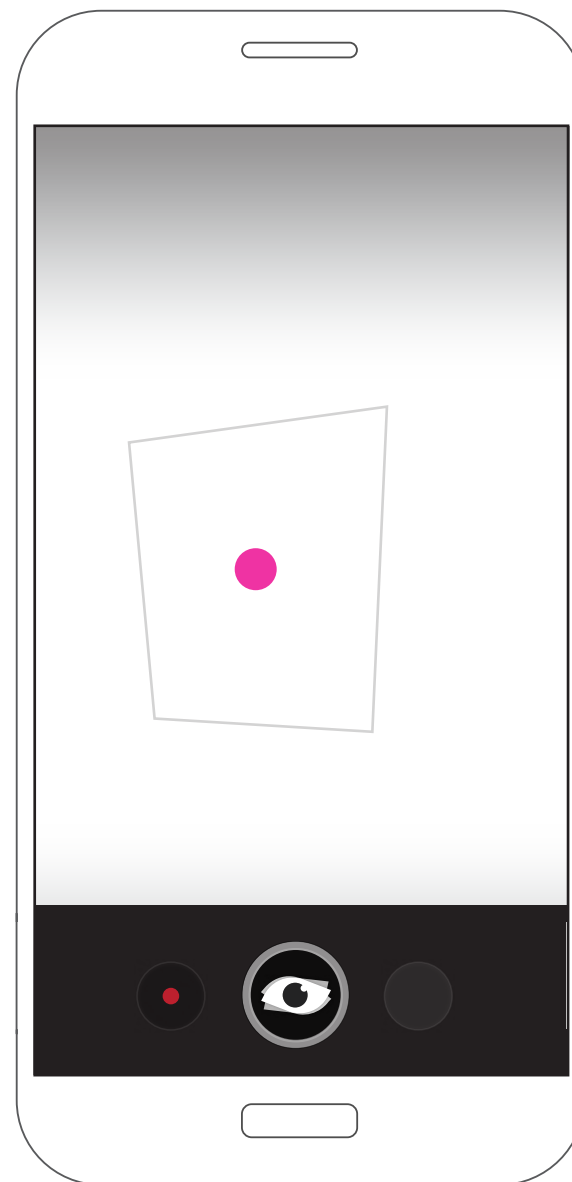
Visual Assistant On

# **SUB NAVIGATION**

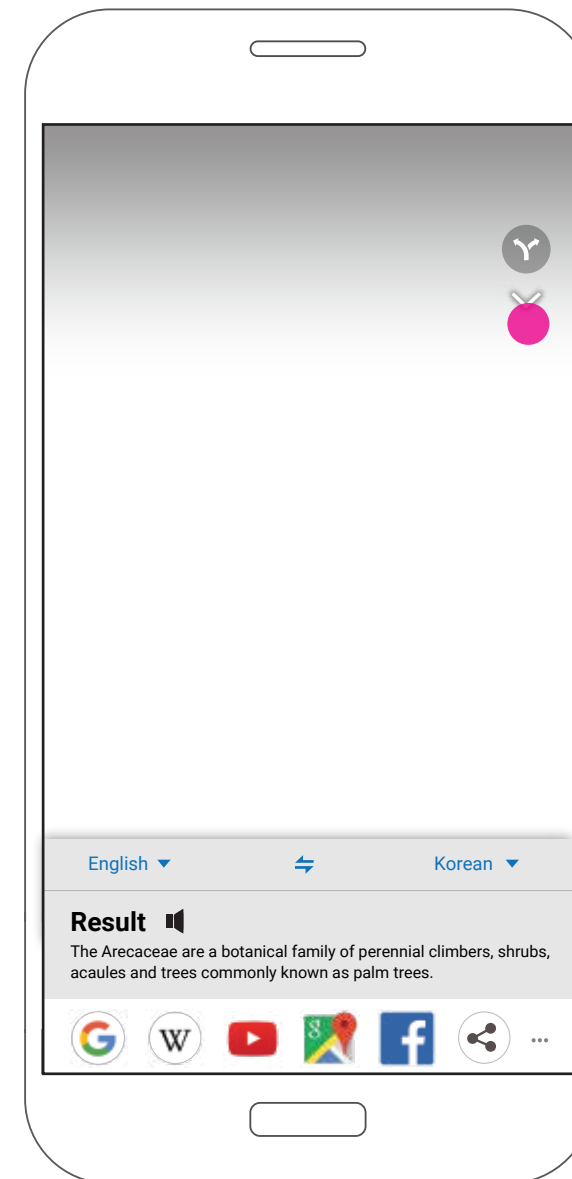
# SUB FEATURE NAVIGATION

## Sub Features

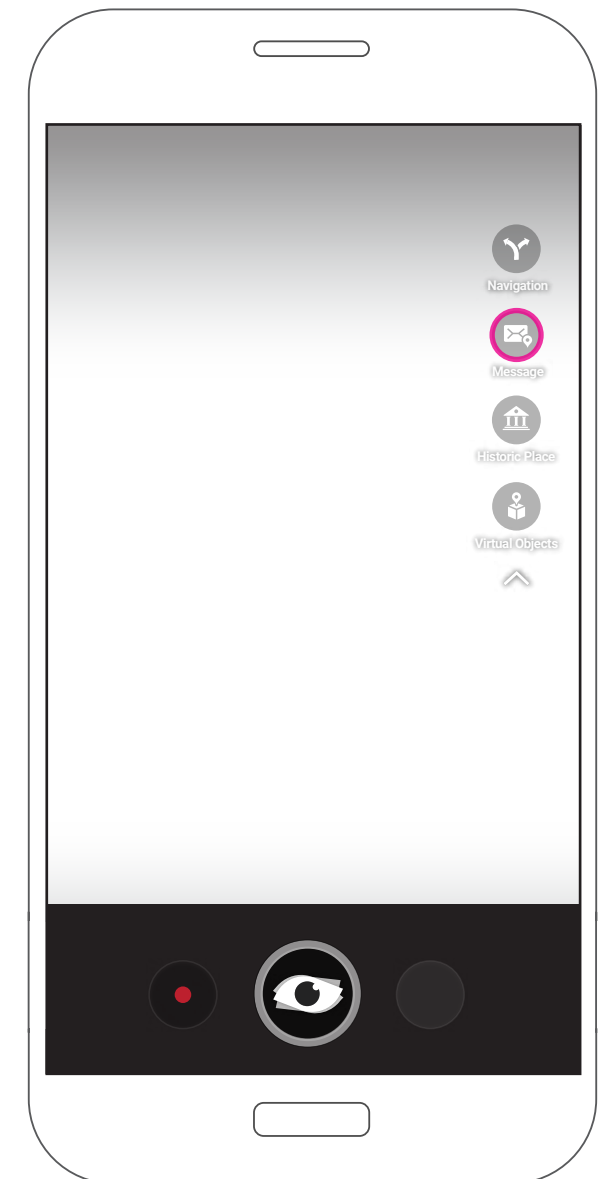
Sub features are various functions for user to experience and control. This enable to perform action by direct manipulation of the object or by invoking a command for more playful



**Object Selection**  
Select by user tapping



**Sub Features**  
Provide most relative features to play and manipulate objects based on results



**Sub Feature Interface**  
Collapse& expansion

SUB NAVIGATION

**SUB FEATURE FUNCTIONS**



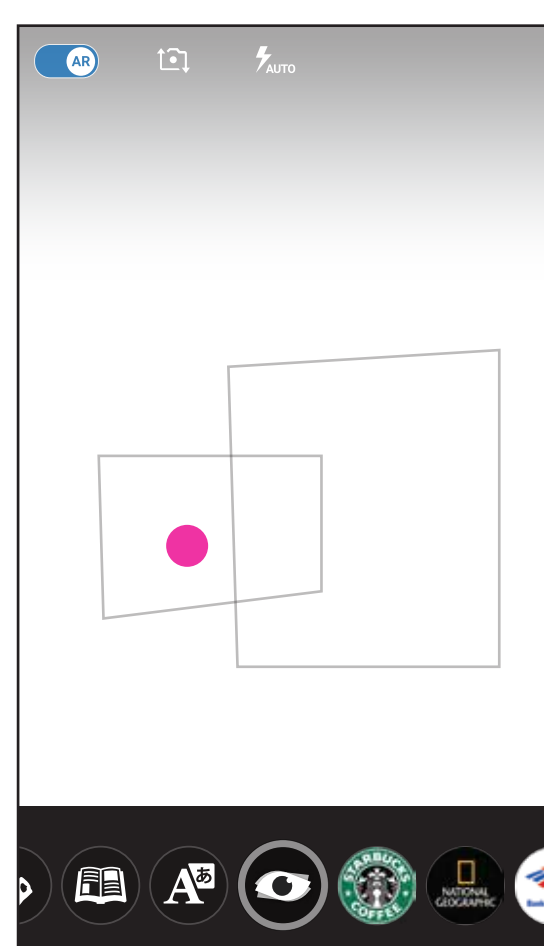
# MAGIC LENS MODE

Object, Scene, Text, Bar Code Recognition

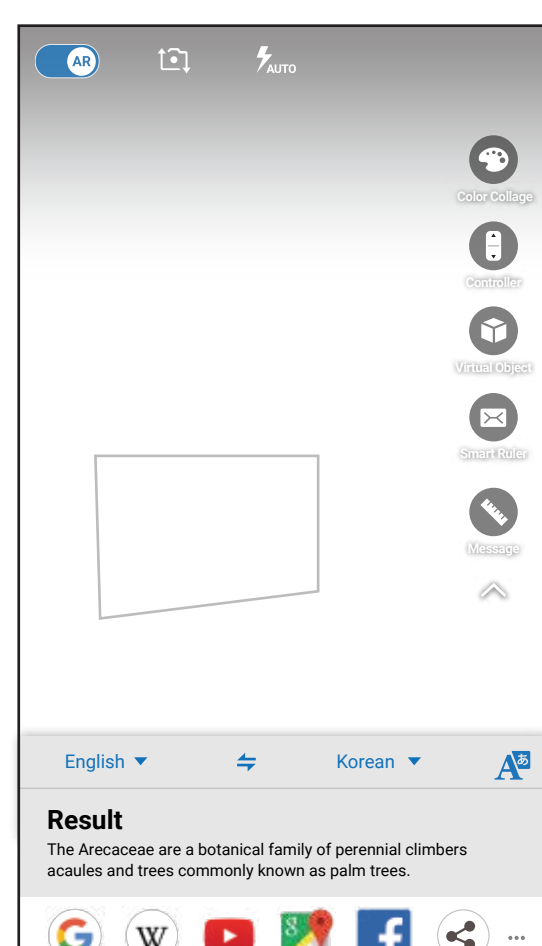
- MagicLens
- Text
- Media
- Sign
- Location

## Main Feature

- Visual Search
- Translation
- Cloud Service Links
- Sub features



Item Selection



Sub features based on result

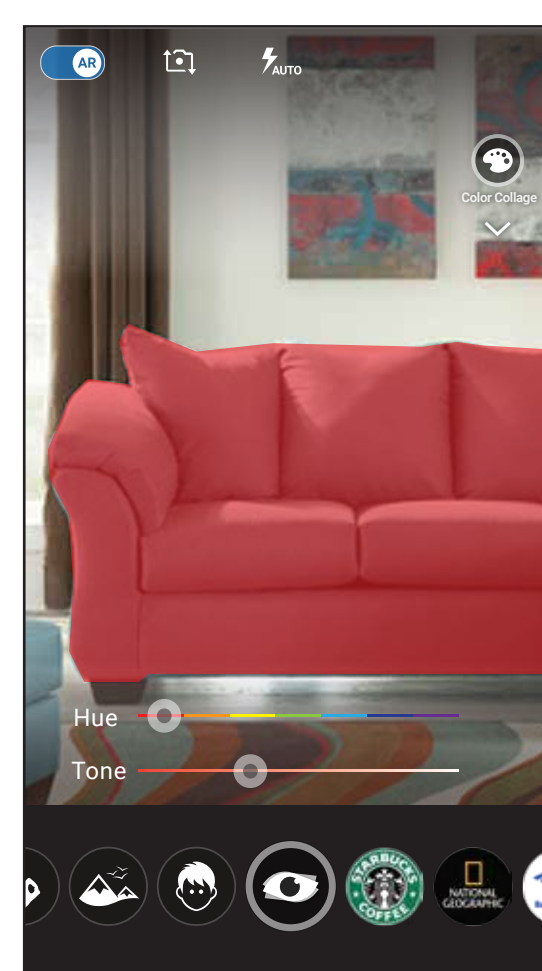
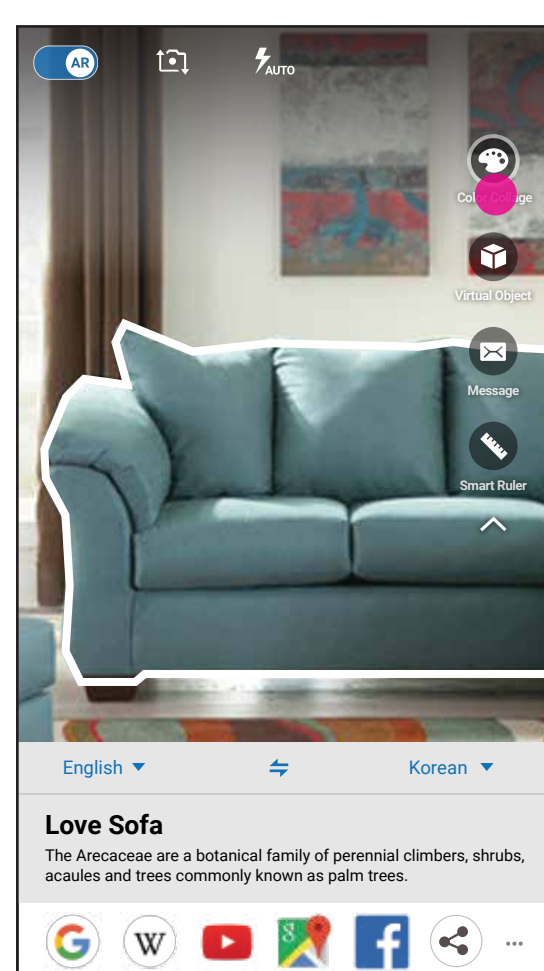
## Sub Feature Scenarios

Based on recognition, related additional features and functions are provided and edited by user control. And 3rd party features are downloadable in Camera App store for extensible function.

- Possible Feature Scenarios
- 3D Color Collage
  - Remote Control
  - Virtual Object
  - Object Message
  - Smart Ruler

### 3D Color Collage

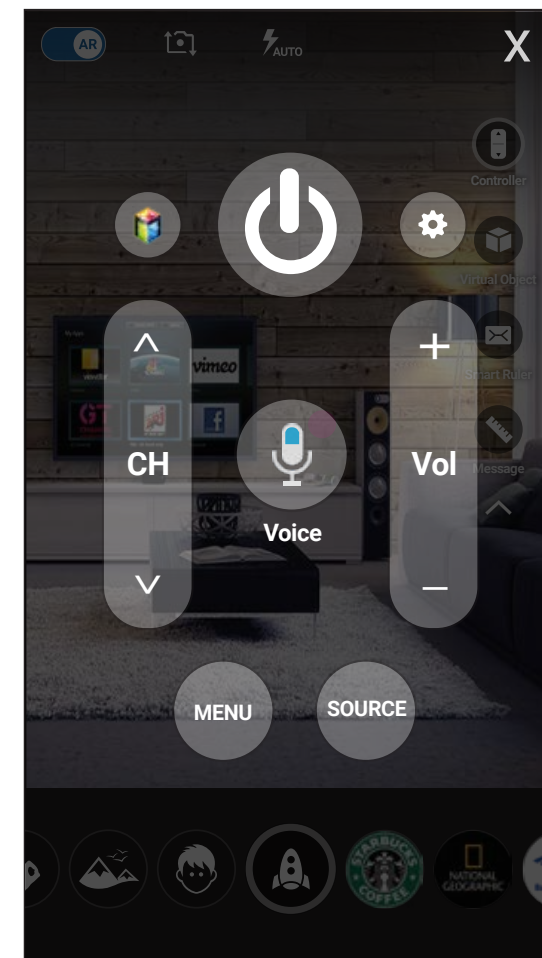
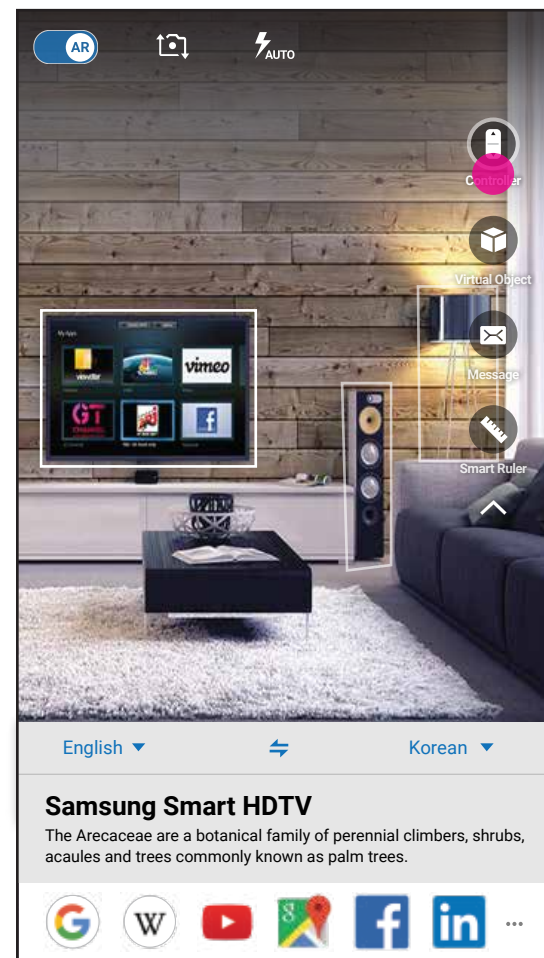
Provide Segmentated object hue/tone augmentation, photo taking of segmented object (save to Gallery App) and image importing from gallery to augment in real view



### Remote Control

Provide remote control for electric device—power on/off, volum, light brightness, and etc.

Furthermore, ideally, IoT orchestrazation setting function e.g. set light on and turn TV on

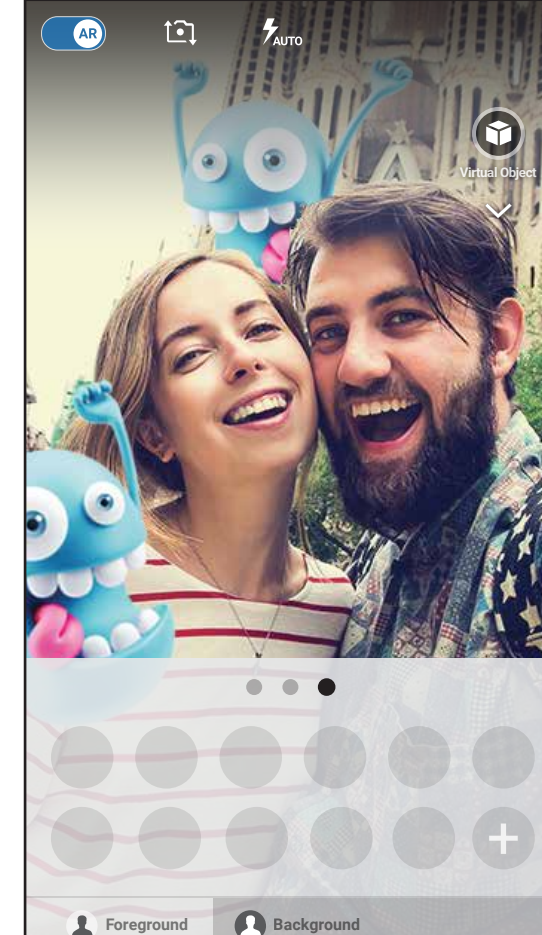
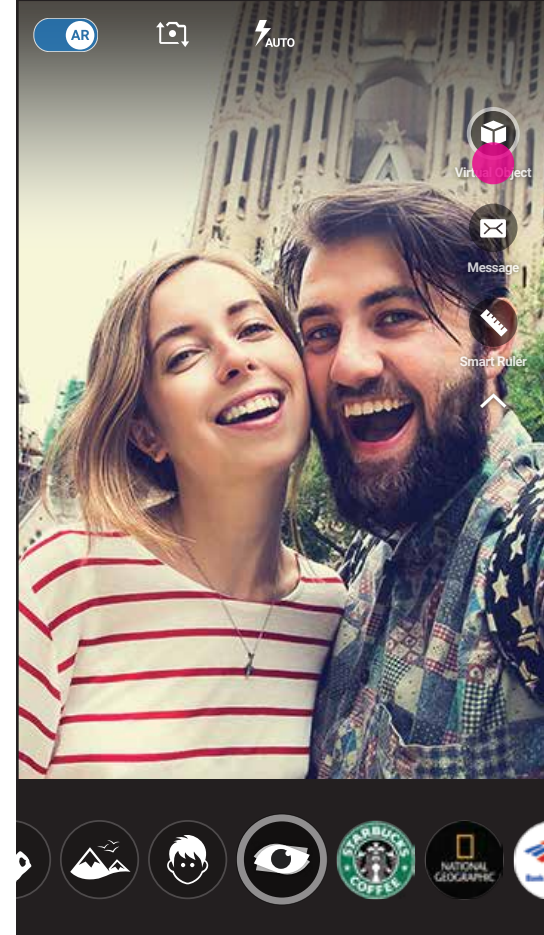


### Virtual Object

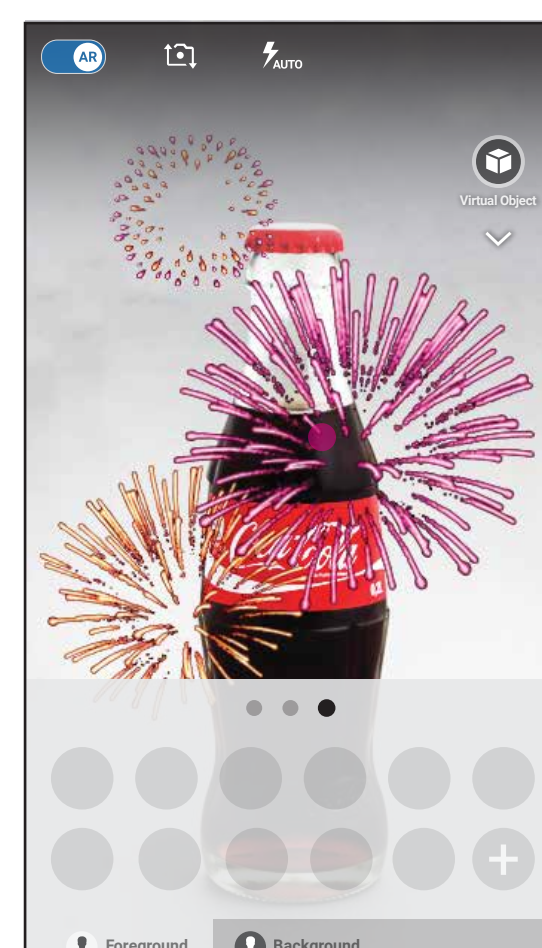
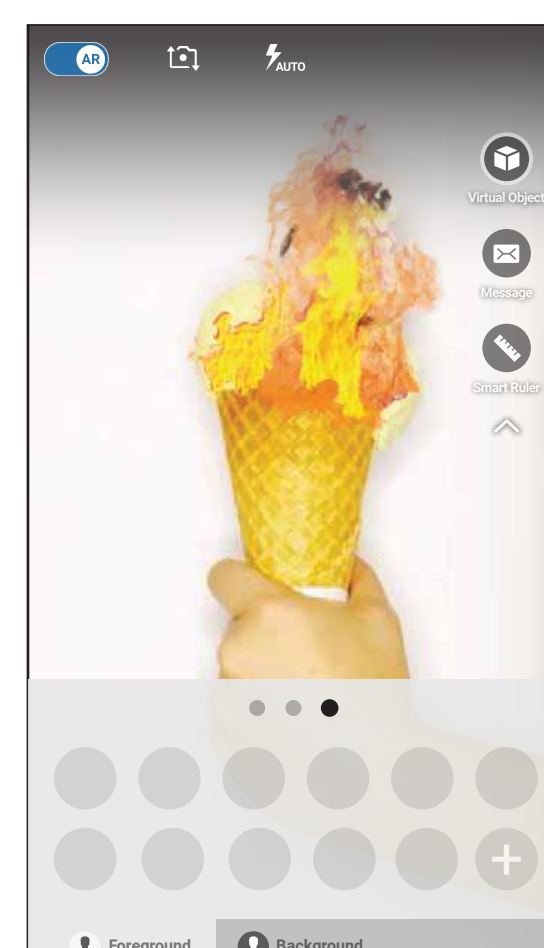
Agment animated character or background in real view by importing user creation or downloading objects from 3rd party.

- Animated characters or background image
- Object Advertisement
- Model of Packaged box

Front Camera



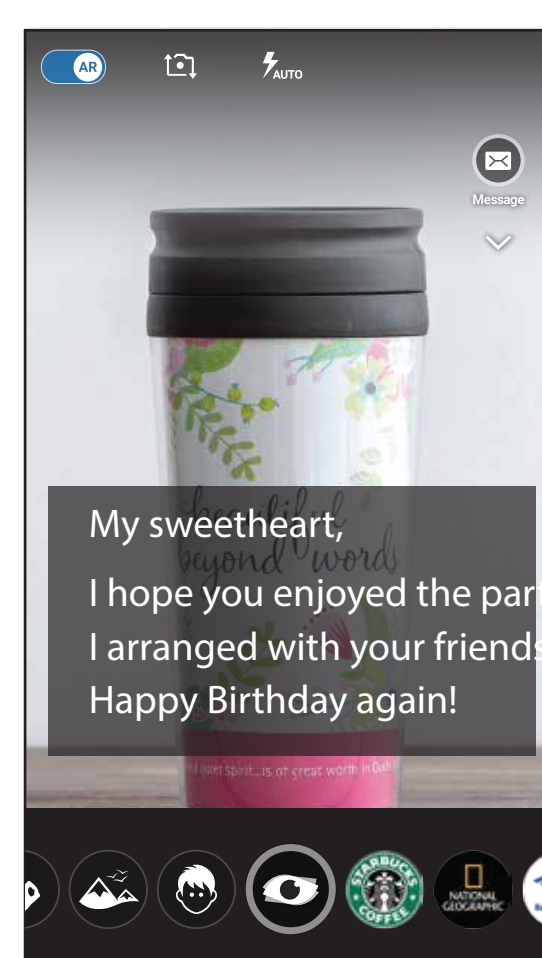
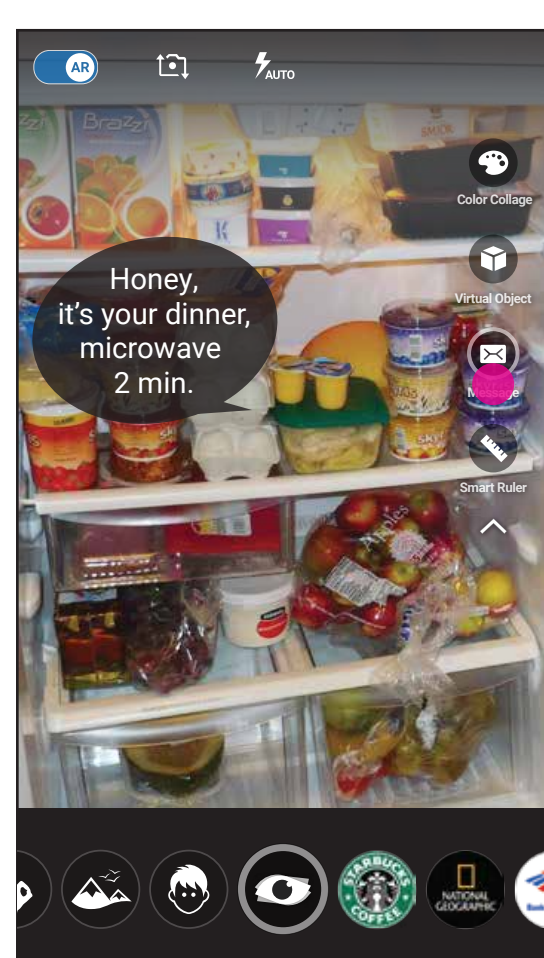
Rear Camera



### Object Message

Create and leave hidden message onto object to be seen by tagged person

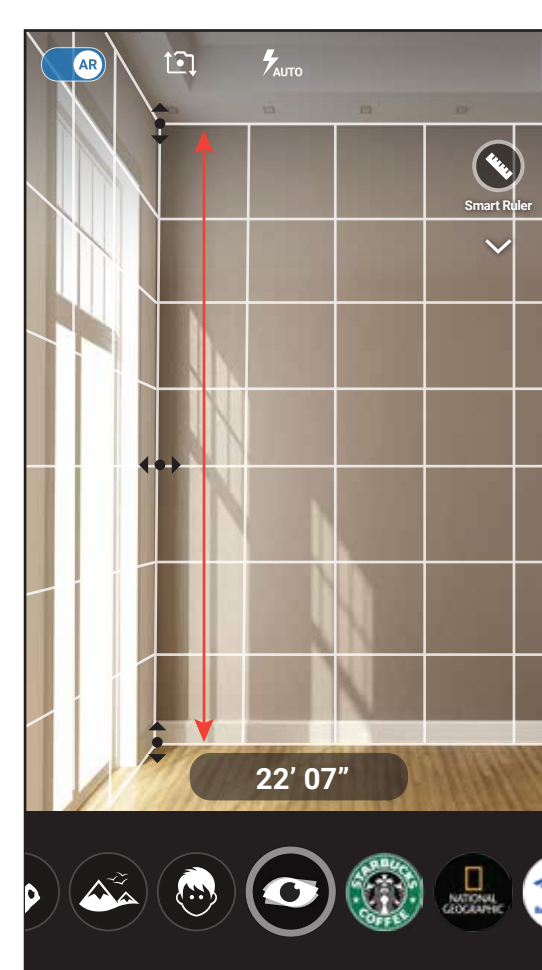
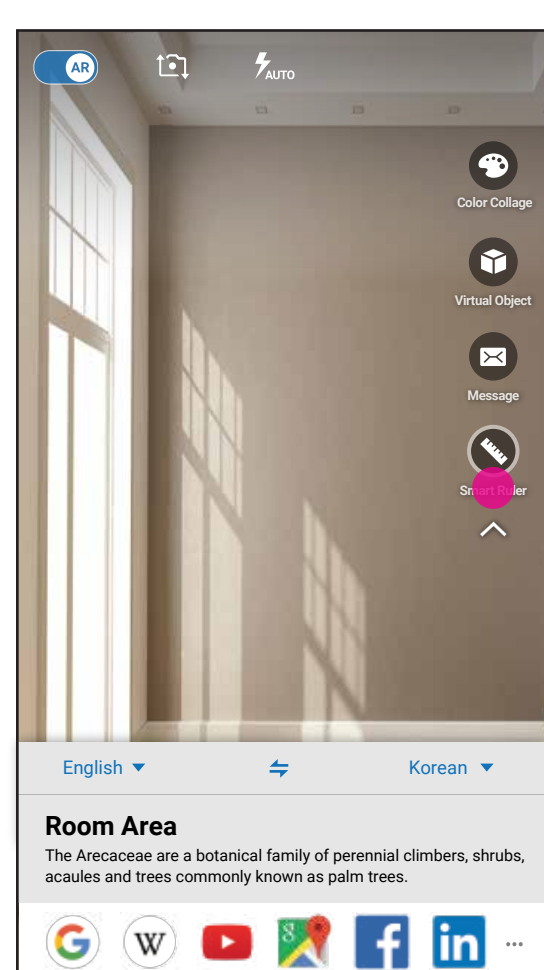
Make your own creative story telling or simple special message for you and your loved one!



### Smart Ruler

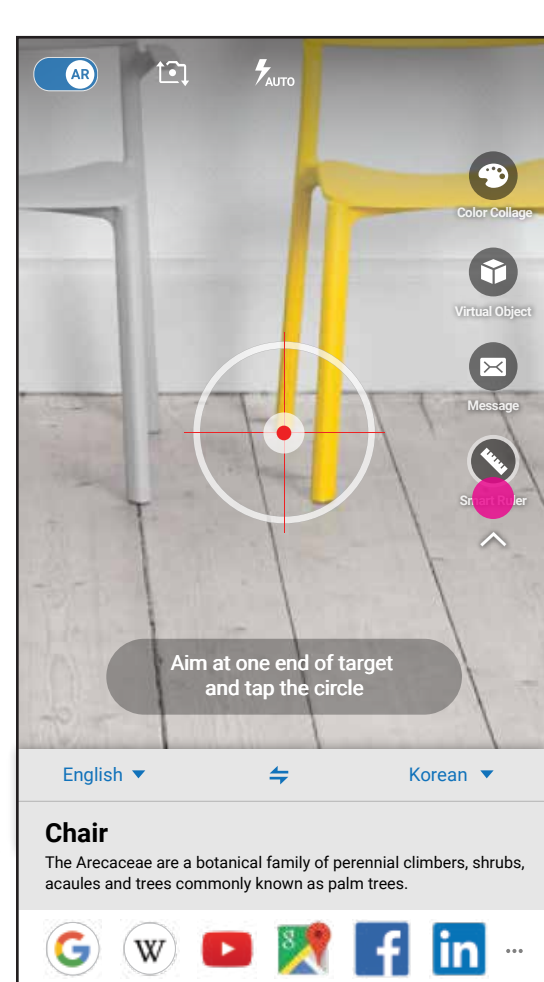
Provide standard ruler for measurement Grid system and point by point measurement can be used for spatial and object size measurement

Grid System Measurement



Grid System

Point to Point Measurement





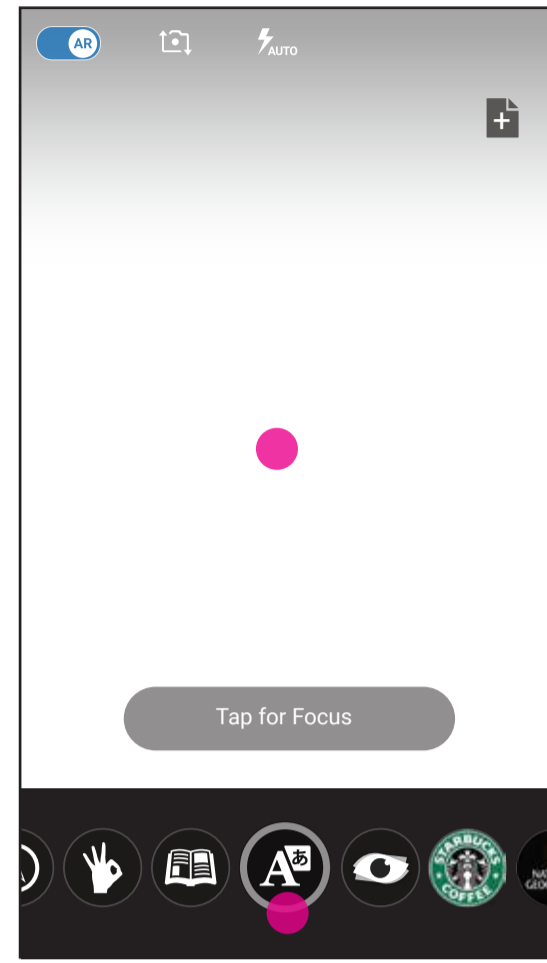
# TEXT MODE

Text and Bar Code Recognition

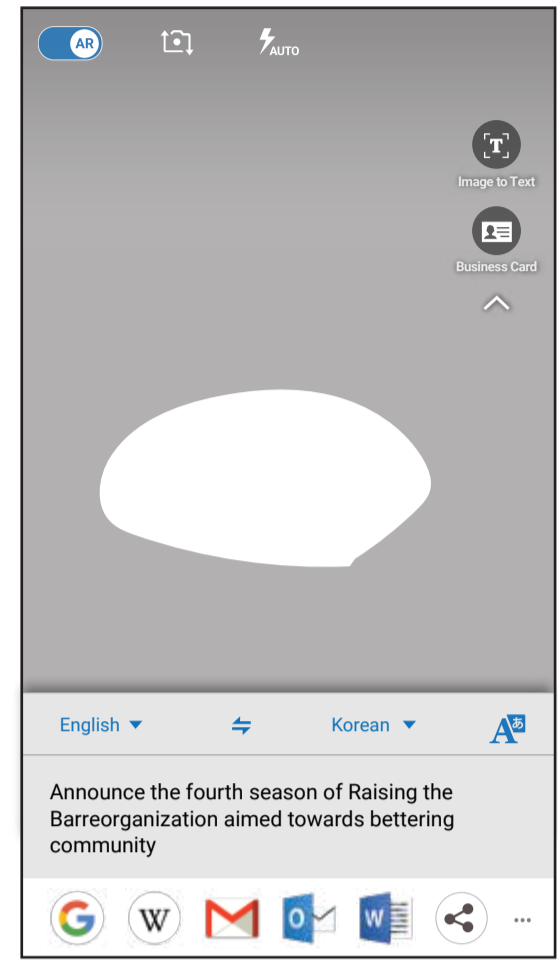
- MagicLens
- Text
- Media
- Sign
- Location

## Main Feature

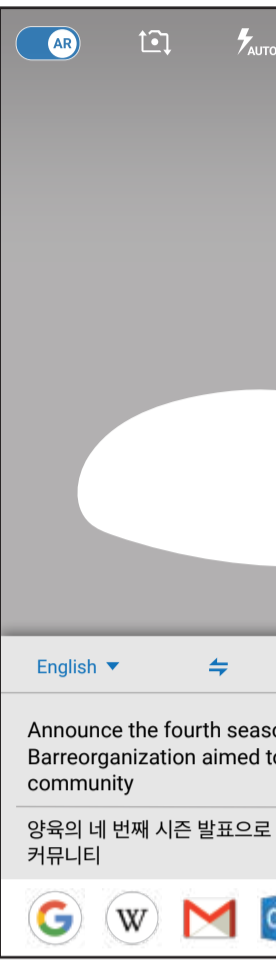
- Optical Character read
- Translation
- Save as text
- Bar code read



Tap screen for Focusing, Tap icon for snapshot



Select by user drawing



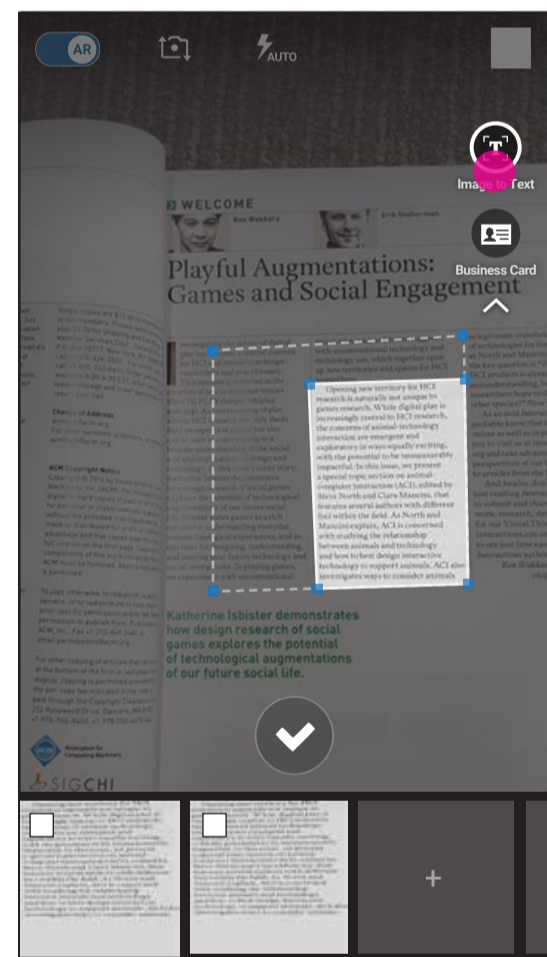
## Sub Features Scenarios

Based on optical character recognition, related additional features and functions are provided and edited by user control.

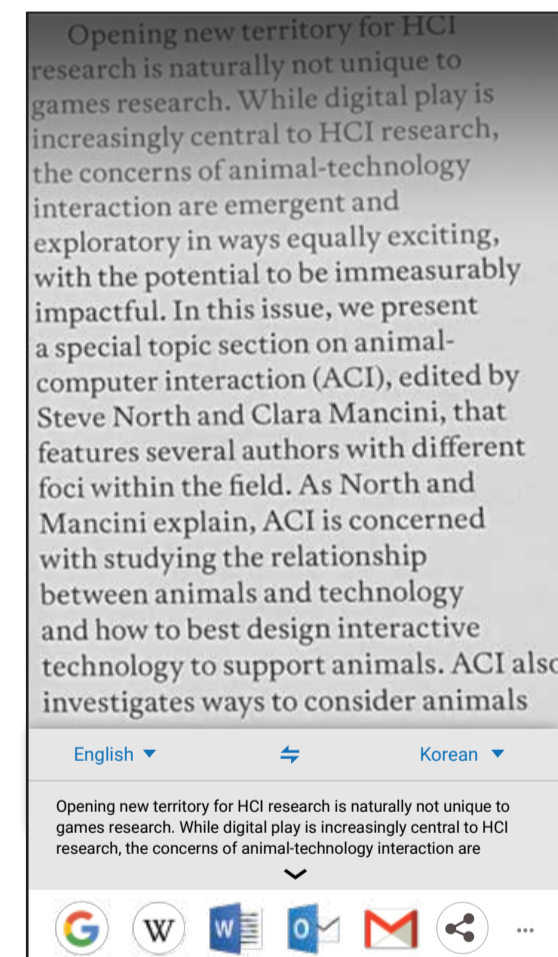
- Possible Feature Scenarios
- Image to Text
- Business card

## Image to Text

Image save as text and export text to other application  
Multi pages capturing/selection/combining for exporting



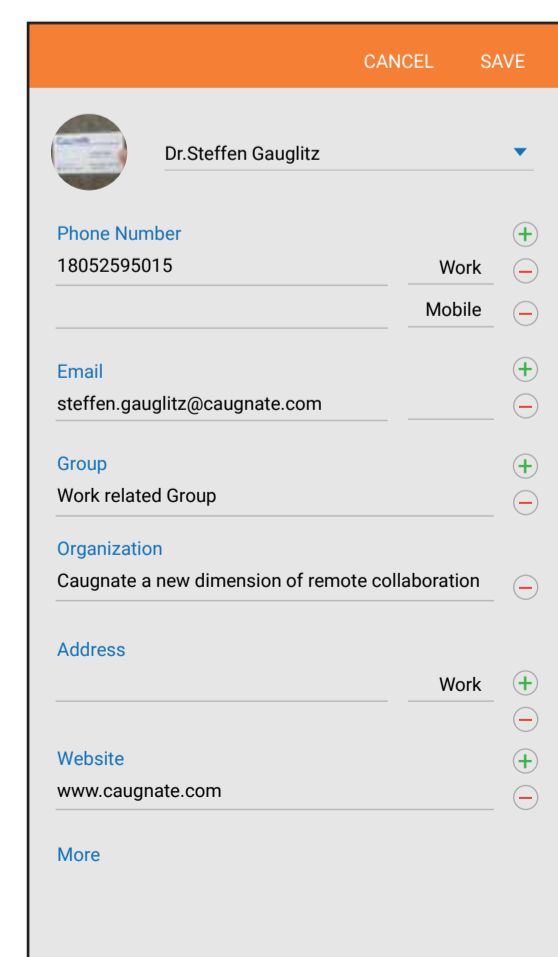
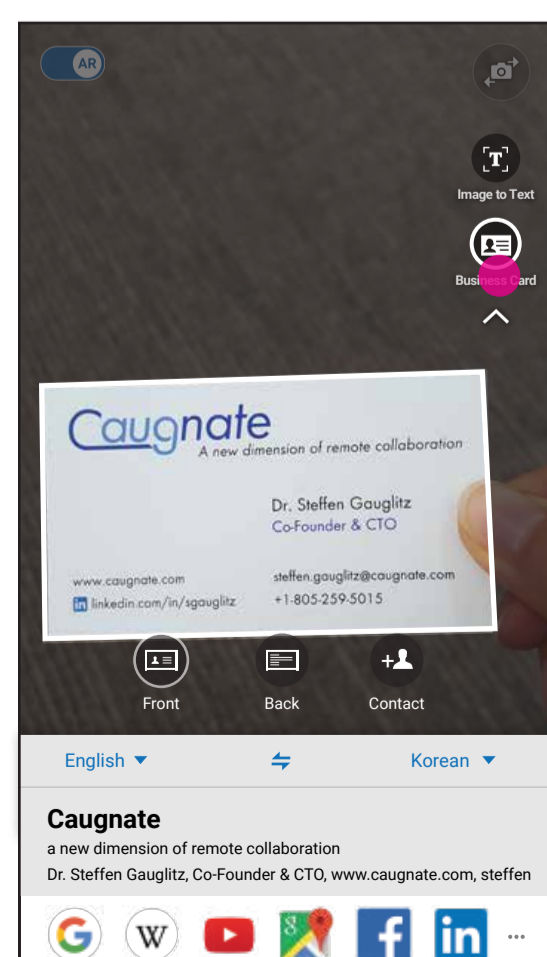
Adjust scan area & multiple pages scan/combine



Edit text & export

## Business Card

Categorize information of personal business card and store to Contacts App





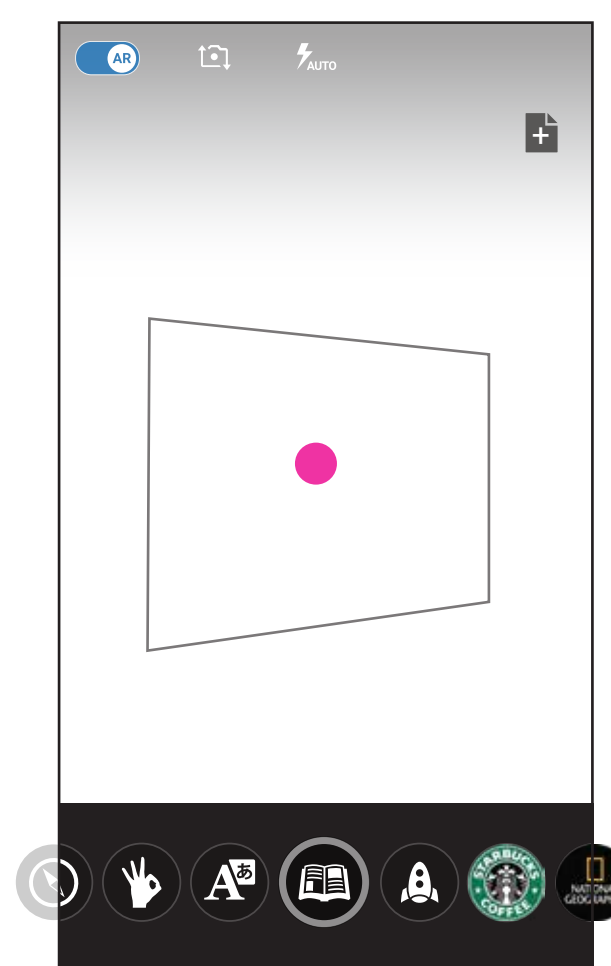
# MEDIA MODE

Image + Text+ QR Code

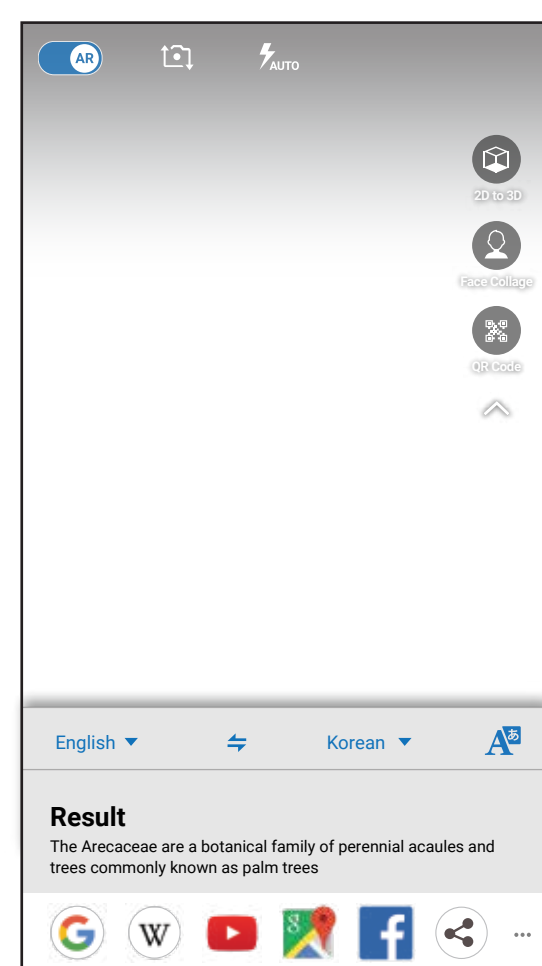
- MagicLens
- Text
- Media
- Sign
- Location

## Main Feature

- Image Recognition
- Optical Character Read
- QR Code
- Translation



Item Selection



Sub features based on result

## Sub Features Scenarios

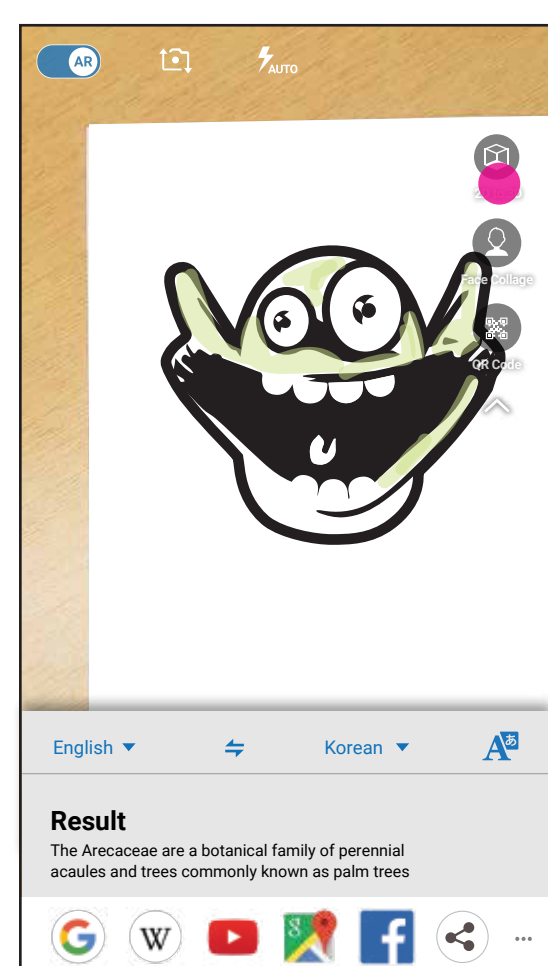
Based on 2D image recognition, related additional features and functions are provided and edited by user control for interactive experience and real world creativity.

- Possible Feature Scenarios
- 2D to 3D Reconstruction
  - Face Collage
  - QR Code

### 2D to 3D Reconstruction

Image recognition, color alive, 3D modeling

- Drawing
- Interior Drafting
- Assemble Instruction



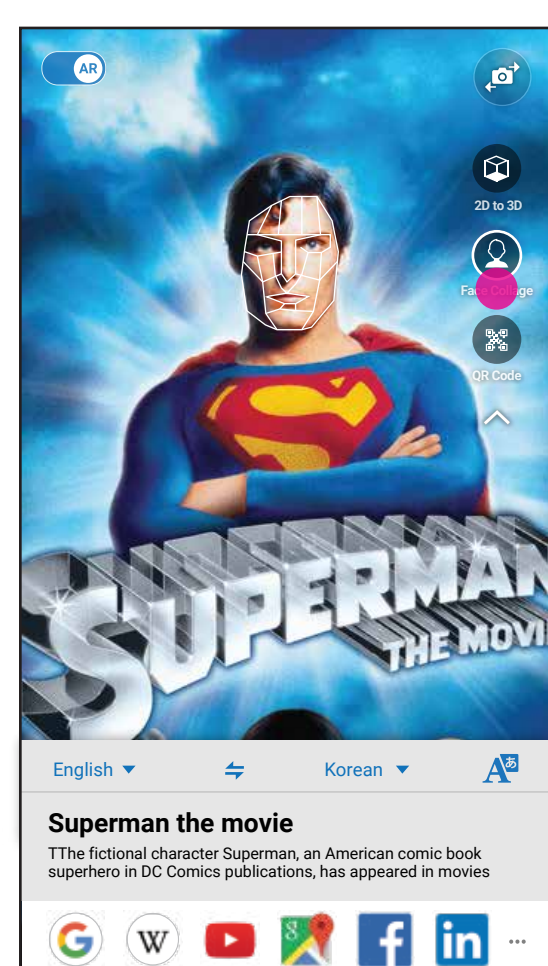
2D Outline Creation



3D Modeling

### Face Collage

Use 'Dual Camera' mode, detect face image on 2D and replace selfie face



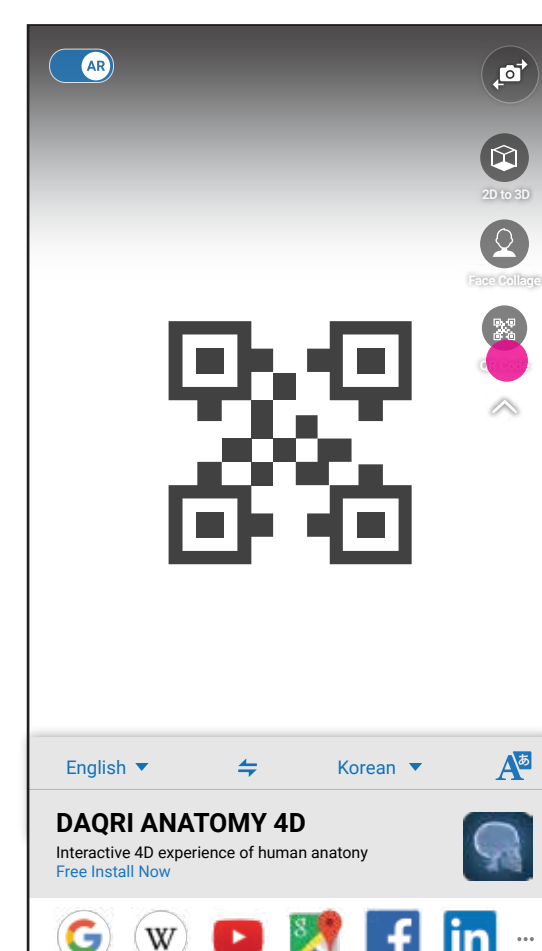
Use Dual Camera Mode



Size adjustment

### QR Code

QR Code read without downloading separate QR Reader App  
Provide related links





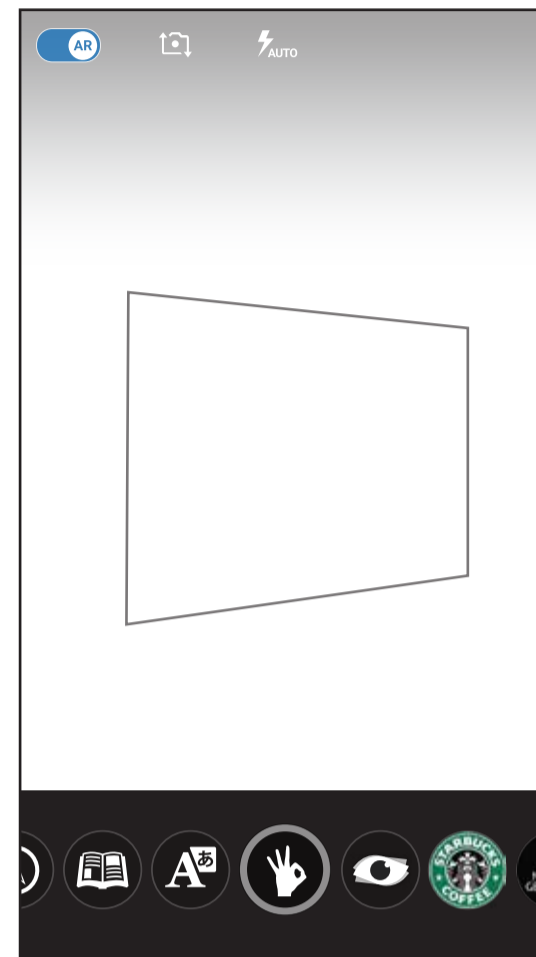
# SIGN MODE

Face Expression + Hand/Body Gesture

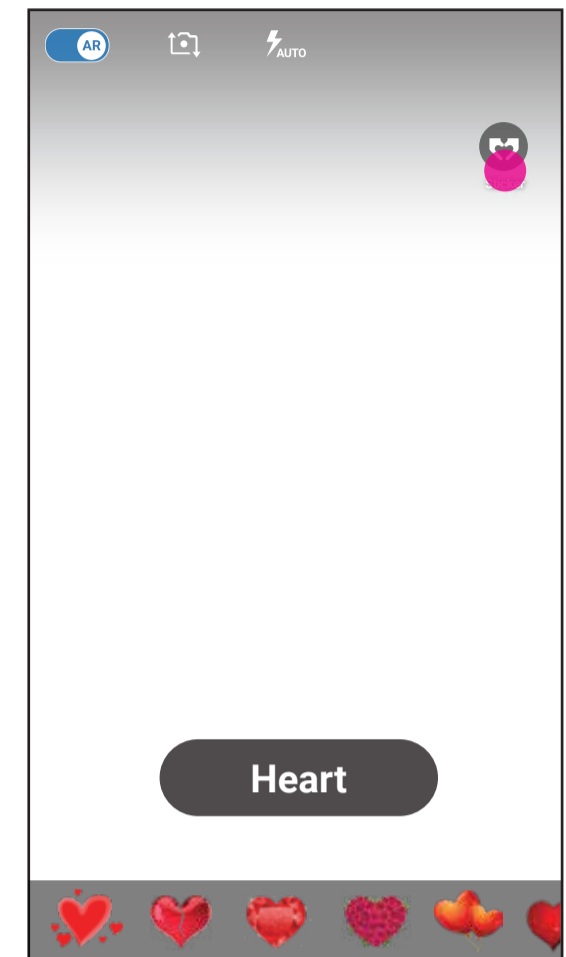
- MagicLens
- Text
- Media
- Sign**
- Location

## Main Feature

Face Expression Recognition  
Gesture Recognition



Identifying



Body Sign Recognition

## Sub Features Scenarios

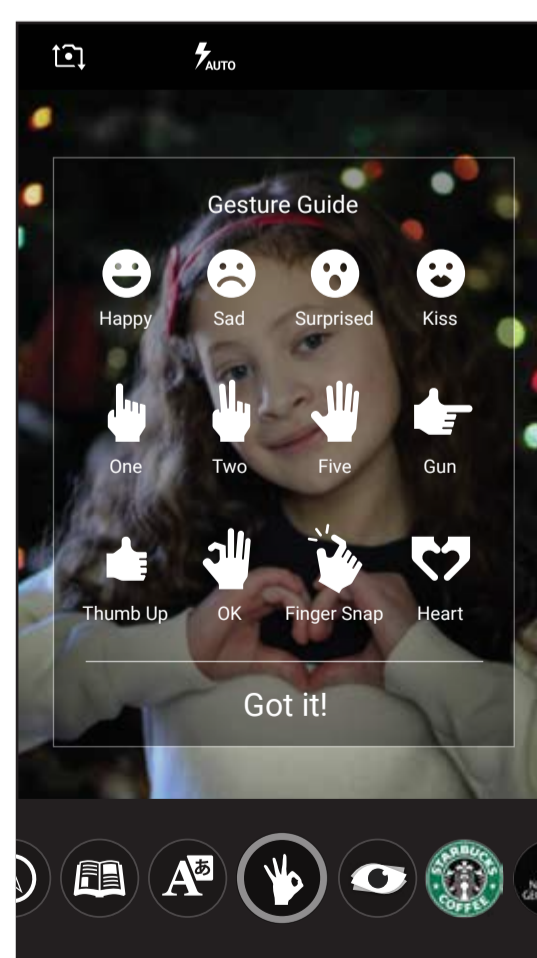
Based on gesture recognition, related additional features are provided for interactive experience and real world creativity.

Possible Feature **Sticker Creation**  
Scenarios

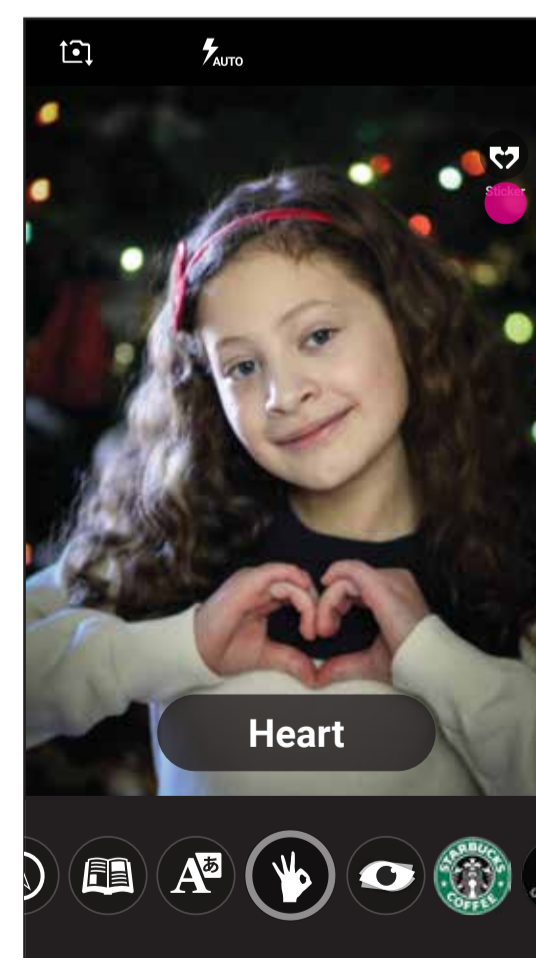
## Sticker Creation



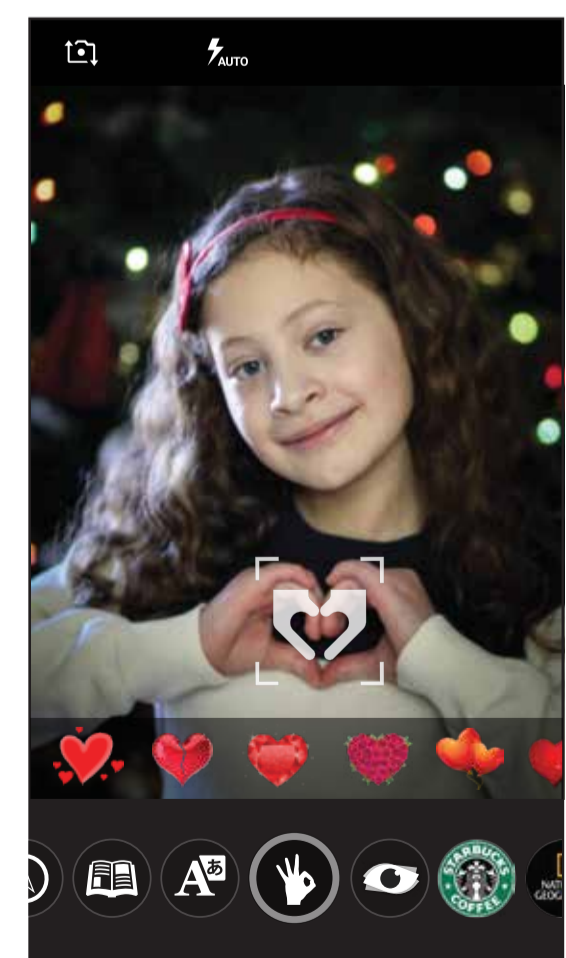
Create sticker based on face and body gesture recognition  
Apply created image as emoji for self expression



User guide



Recognize face and body gesture



Sign icon & Animated stickers for user play with





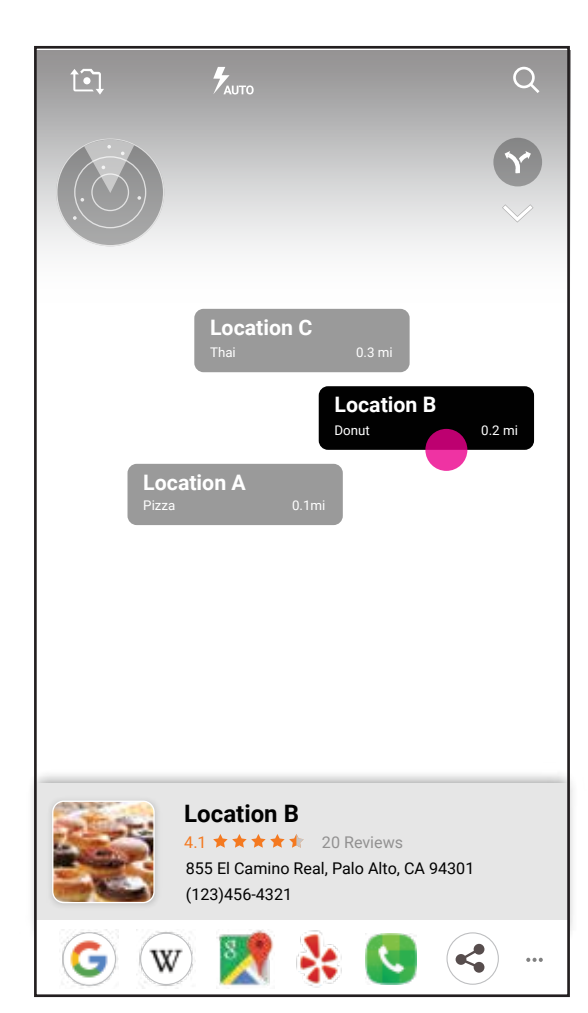
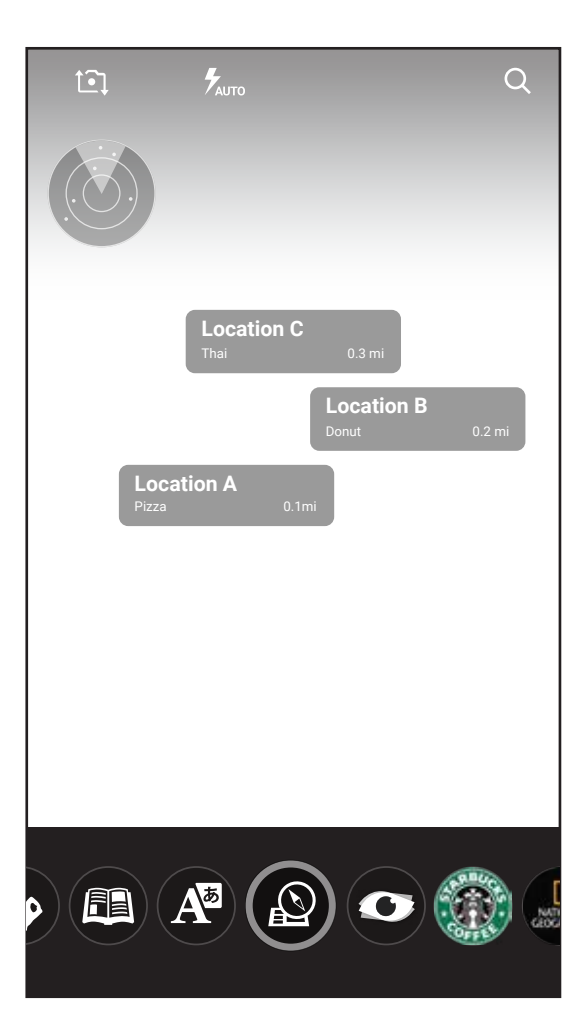
# LOCATION MODE

Compass + Landmark

- MagicLens
- Text
- Media
- Sign
- Location

## Main Feature

- GPS Positioning
- Location Search
- Related Links



Select location marks for viewing details

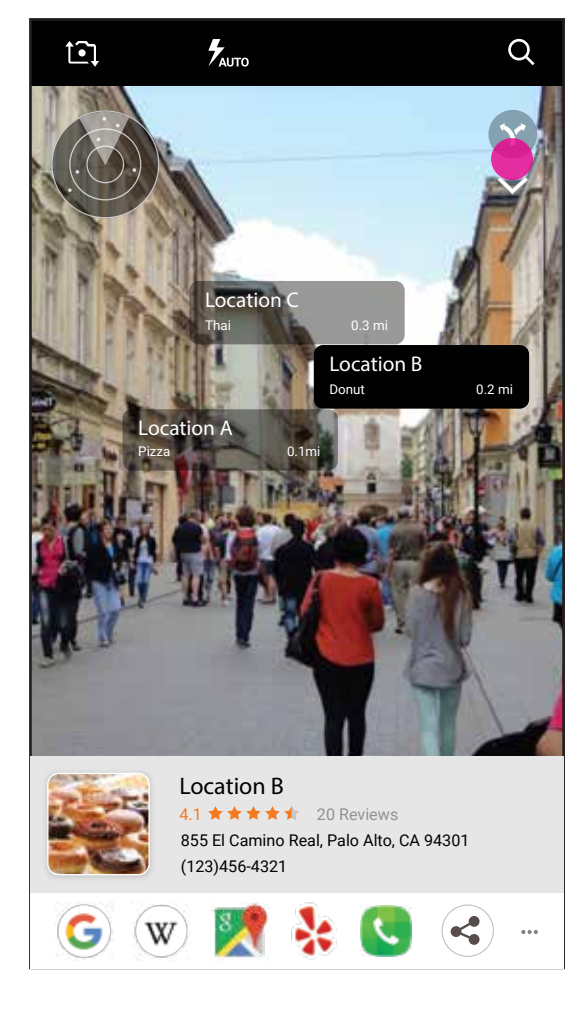
## Sub Features Scenarios

Based on the selected location, related additional features are provided for explore the place.

- |                            |  |
|----------------------------|--|
| Possible Feature Scenarios | <ul style="list-style-type: none"> <li>Navigation</li> <li>Location-based Message</li> <li>Historic Landmark</li> <li>Location based virtual Object</li> </ul> |
|----------------------------|--|

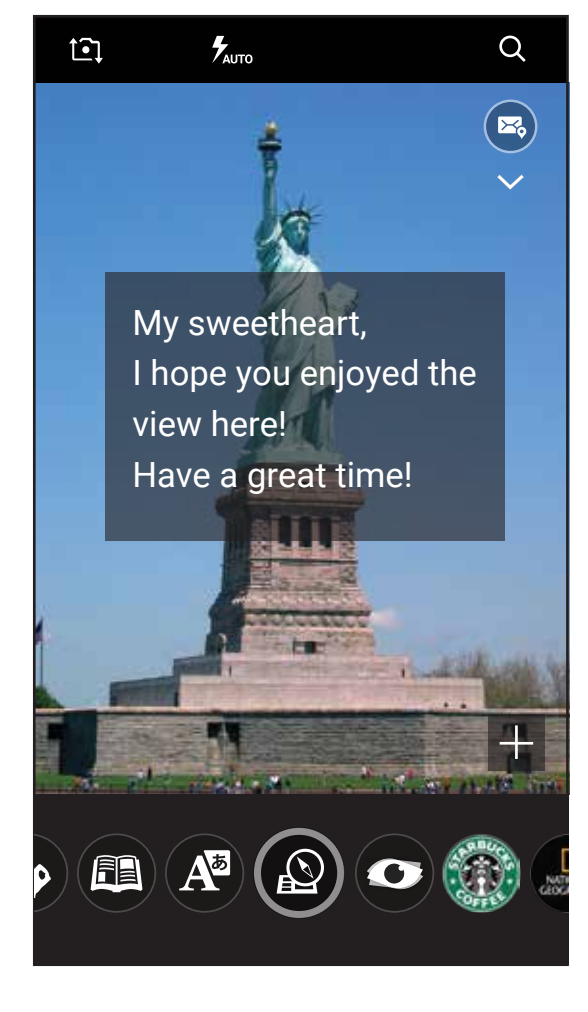
### Navigation

Visual search for the place and provide virtual route indicator into mobile screen



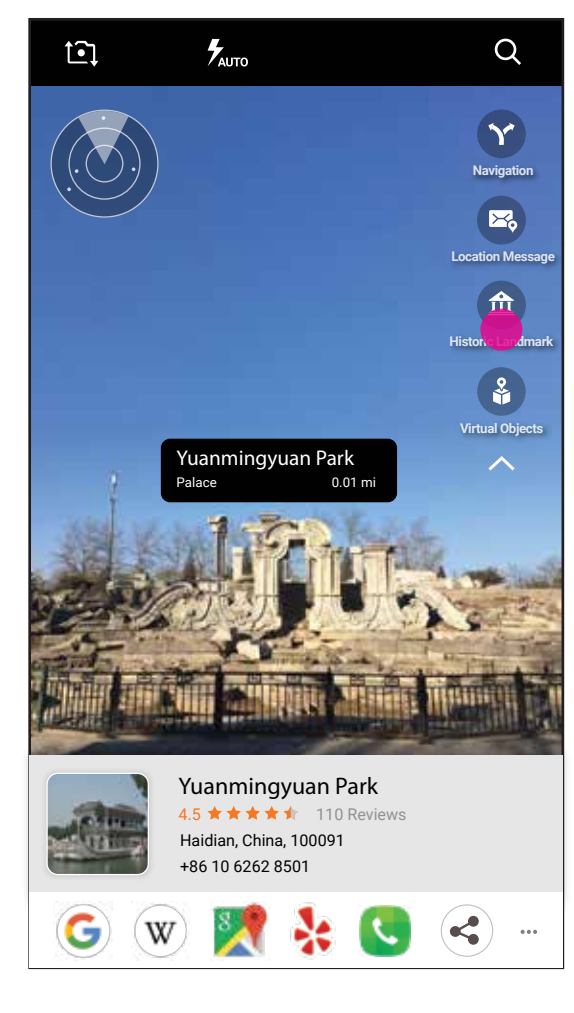
### Location Message

Create hidden message based on current location to be seen by tagged person or share with friends



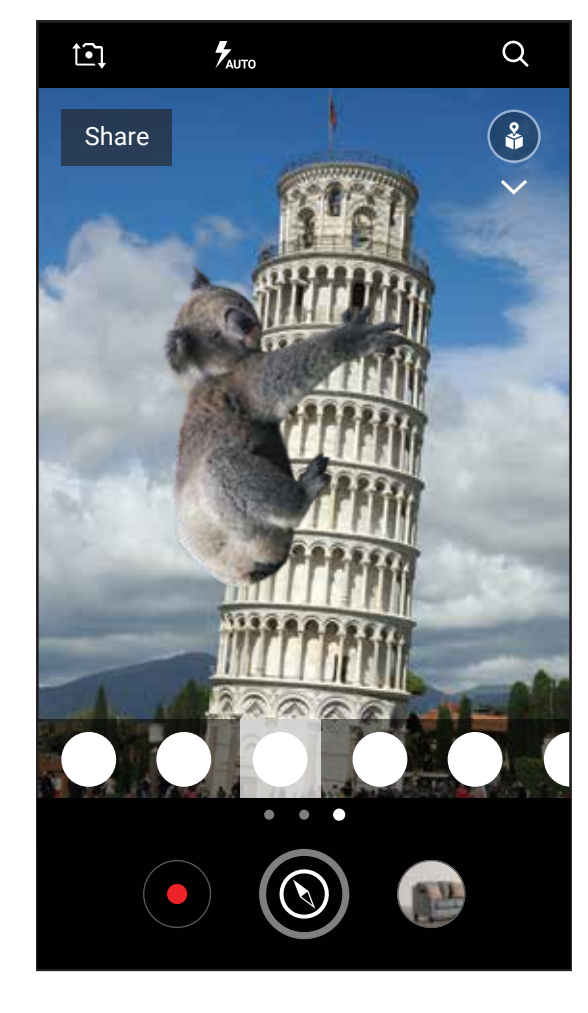
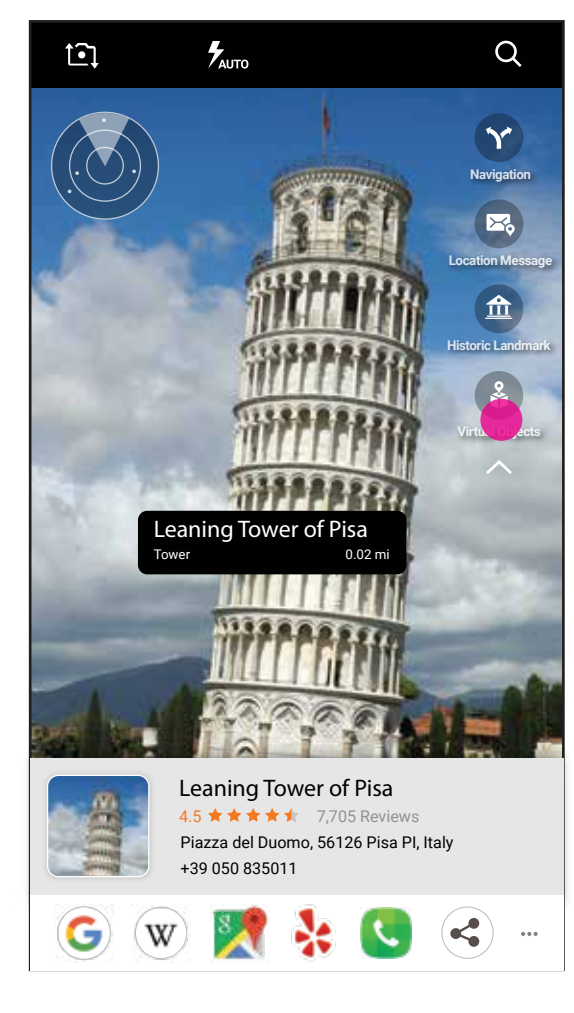
### Live Museum

Augmented historic view onto real view like live museum.



### Location-based Virtual Objects

Create and share interesting scenes.



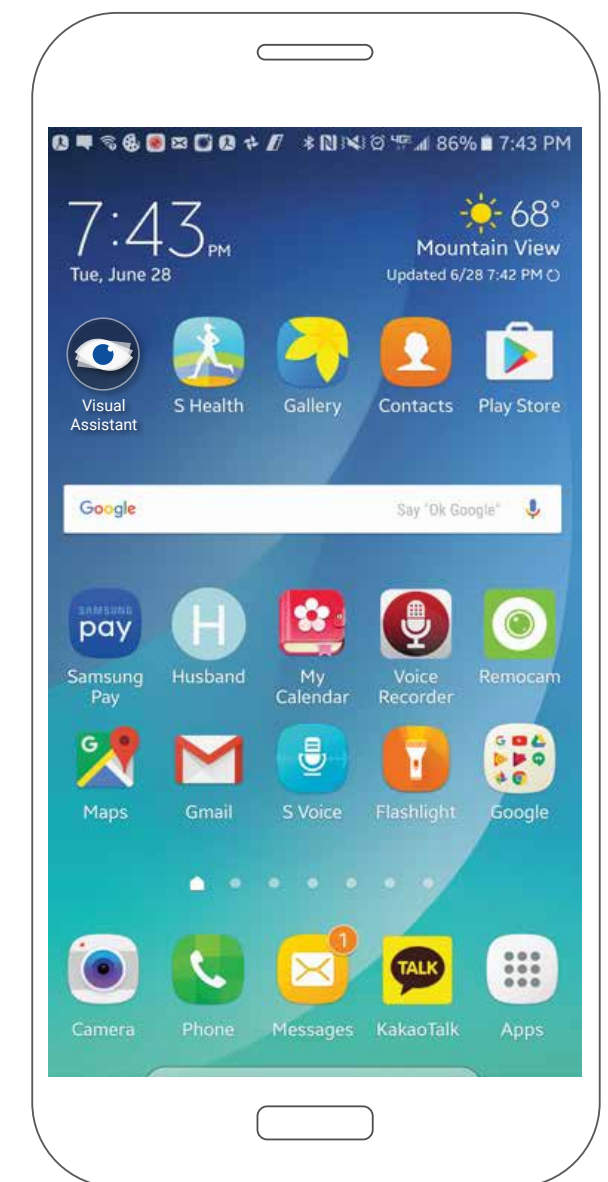
# **EASY ACCESS POINT**

Alternative Entry Point

# FROM HOME SCREEN

## Easy Access from Home Screen

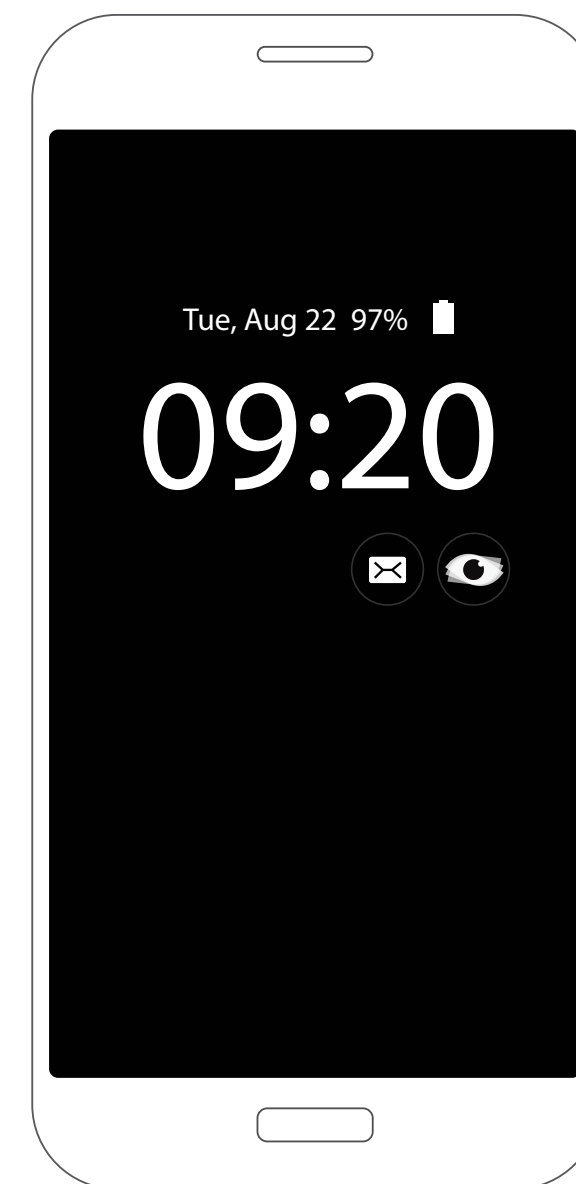
- Create Visual Assistant icon on home screen through widget or pin it



# FROM SCREEN OFF

## Access from Screen-off

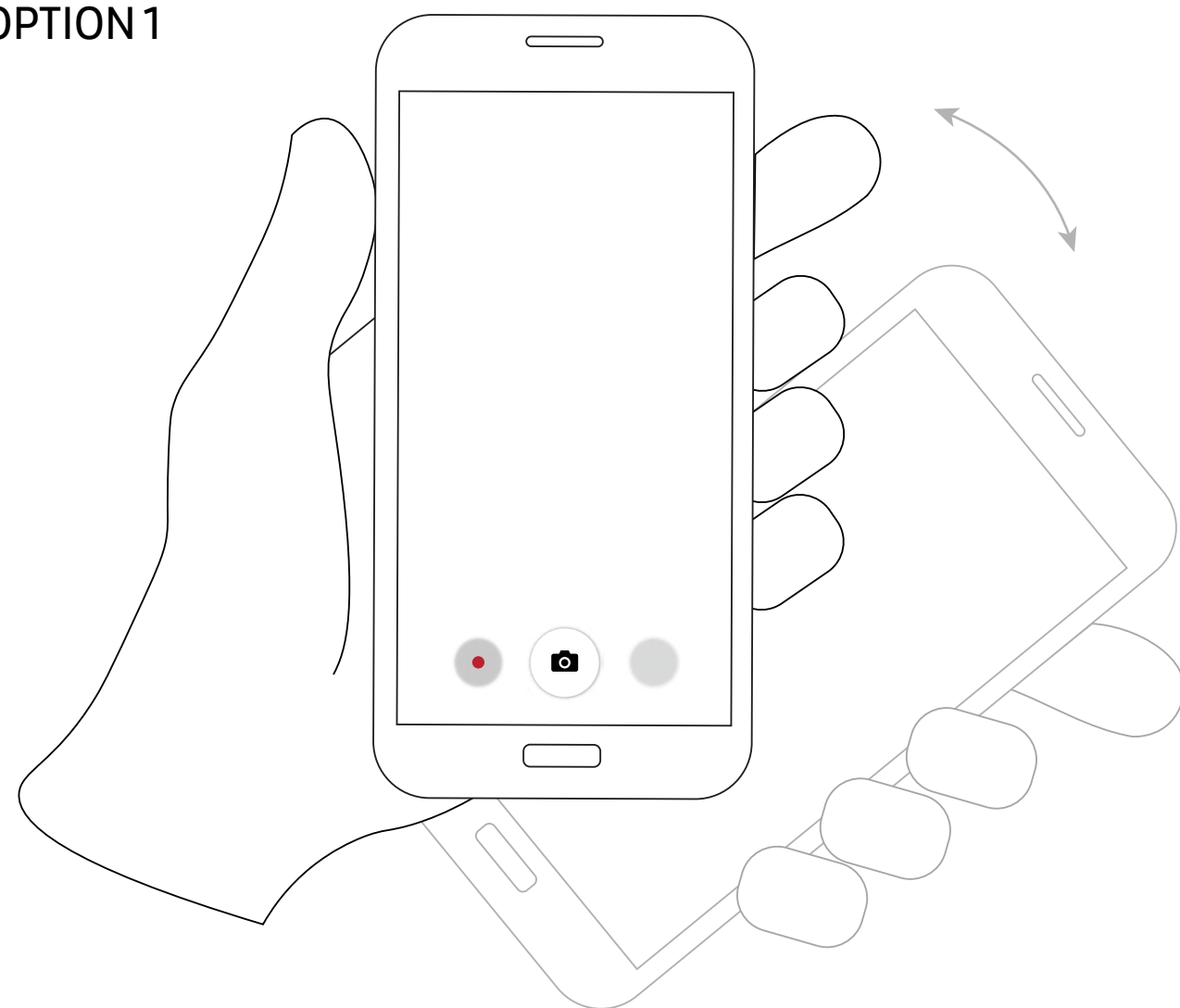
- Add Visual Assistant icon on off-screen to instant access



# PHYSICAL ENTRY POINT

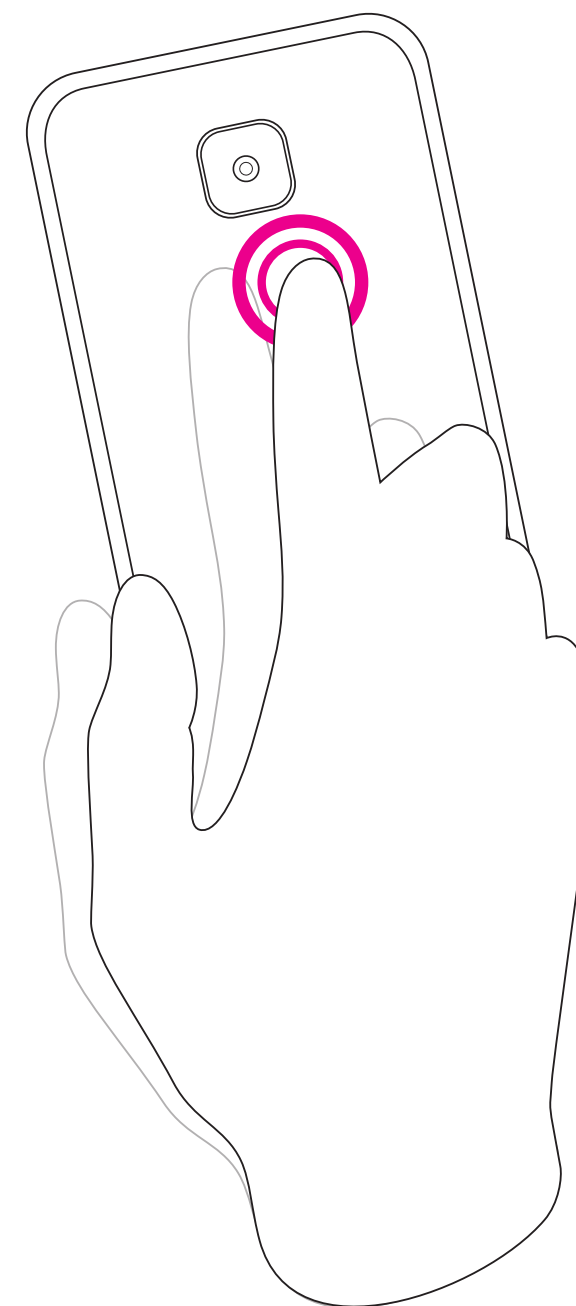
Secondary alternative options

OPTION 1



One Time Phone Shaking  
from Camera App

OPTION 2

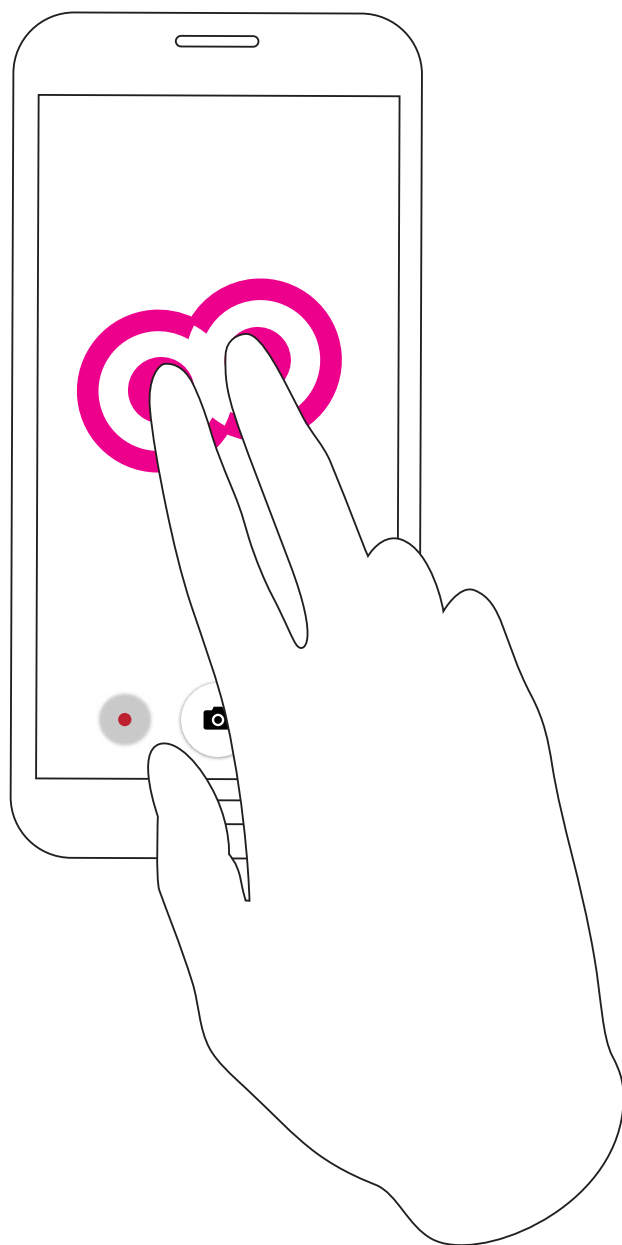


Double Tapping Back of the Phone  
from anywhere

# PHYSICAL ENTRY POINT

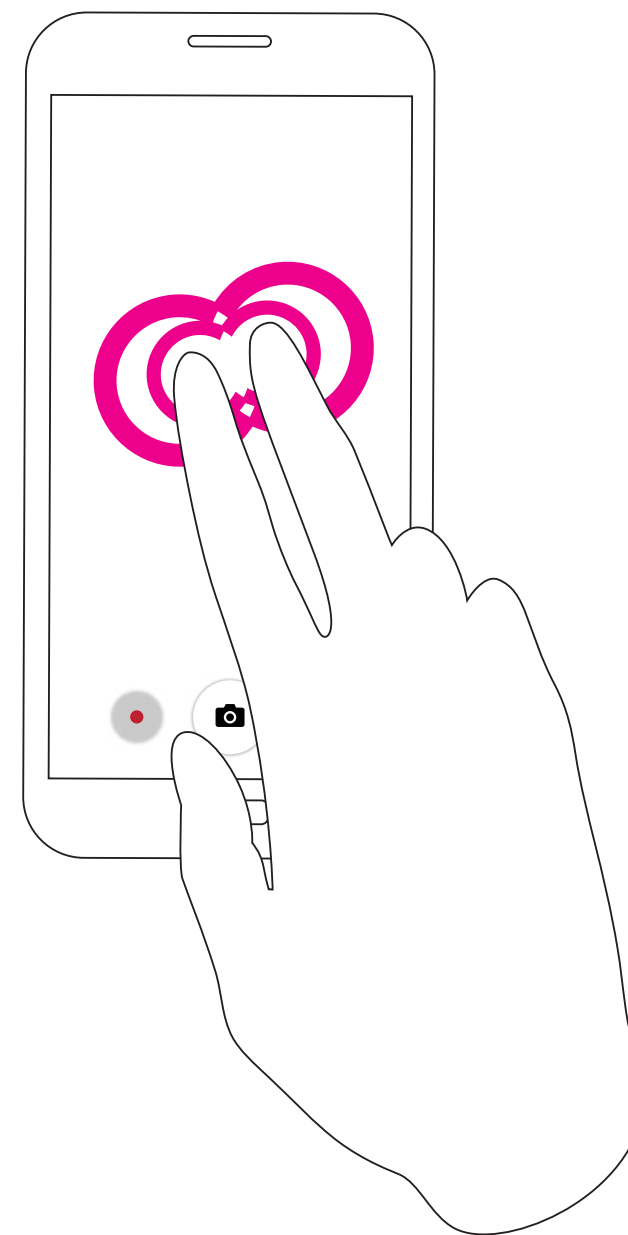
Secondary alternative options

OPTION 3



Hold/Press from Camera App

OPTION 4

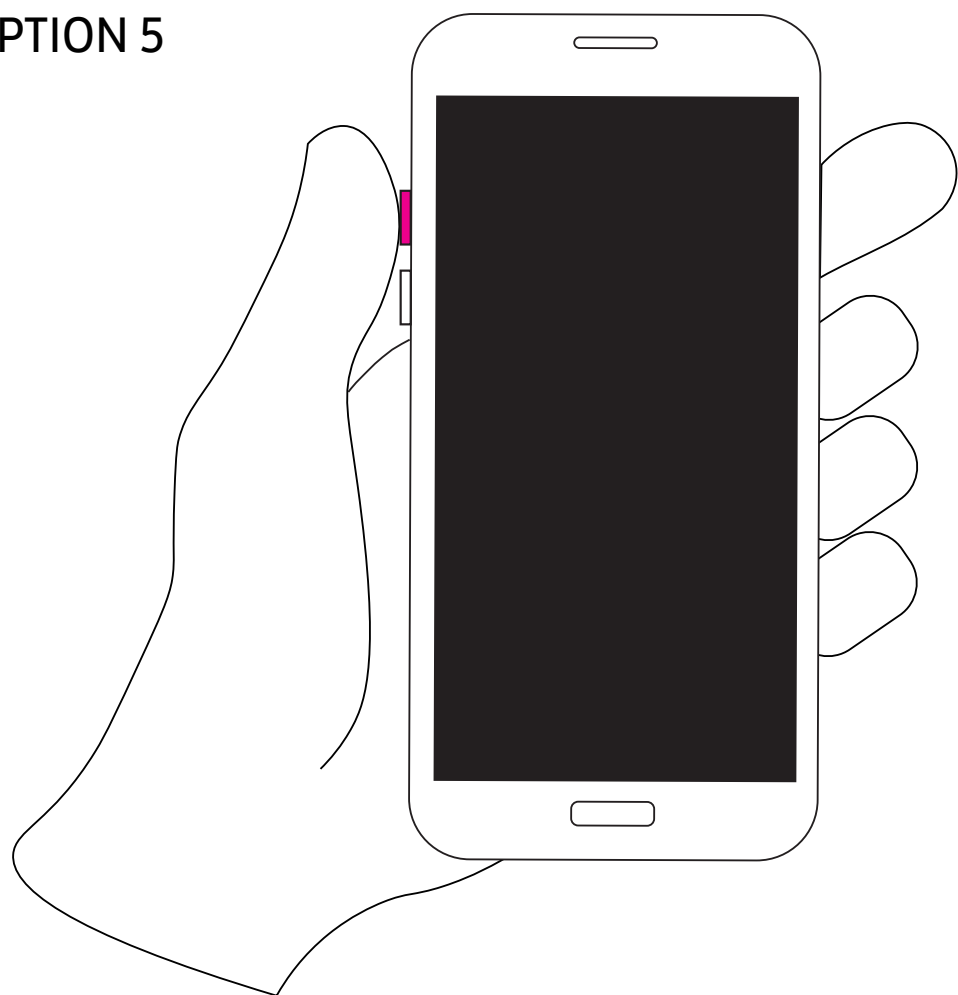


Double Tapping from Camera App

# PHYSICAL ENTRY POINT

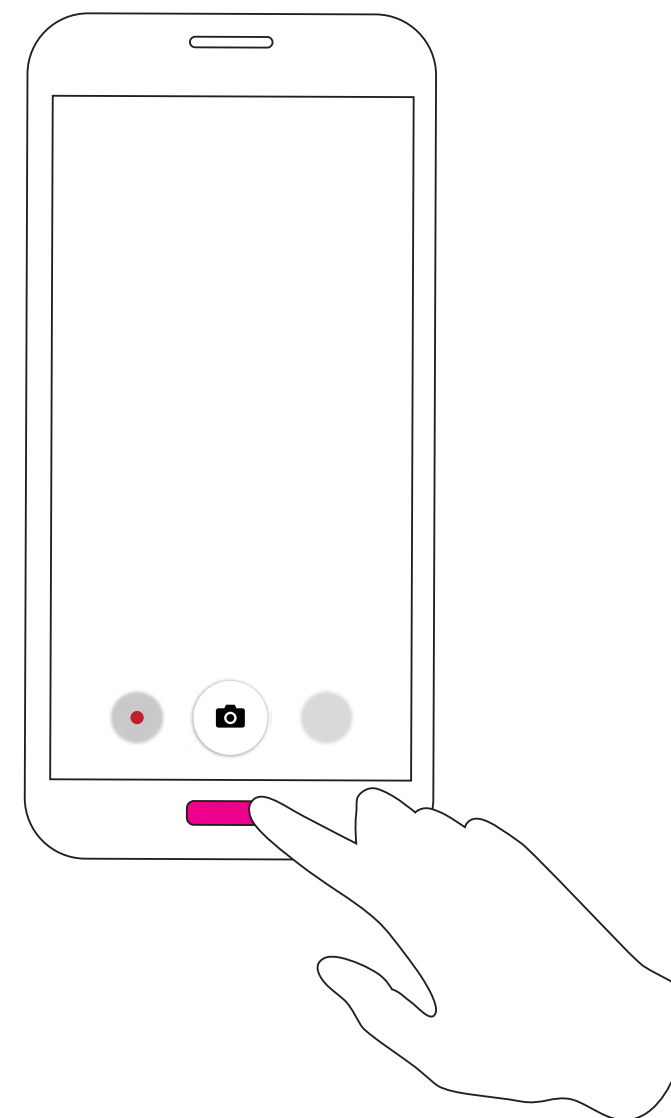
Secondary alternative options

OPTION 5



Click the Button  
(from the screen-off & Camera App)

OPTION 6



Double Click the Button  
(From Camera App)