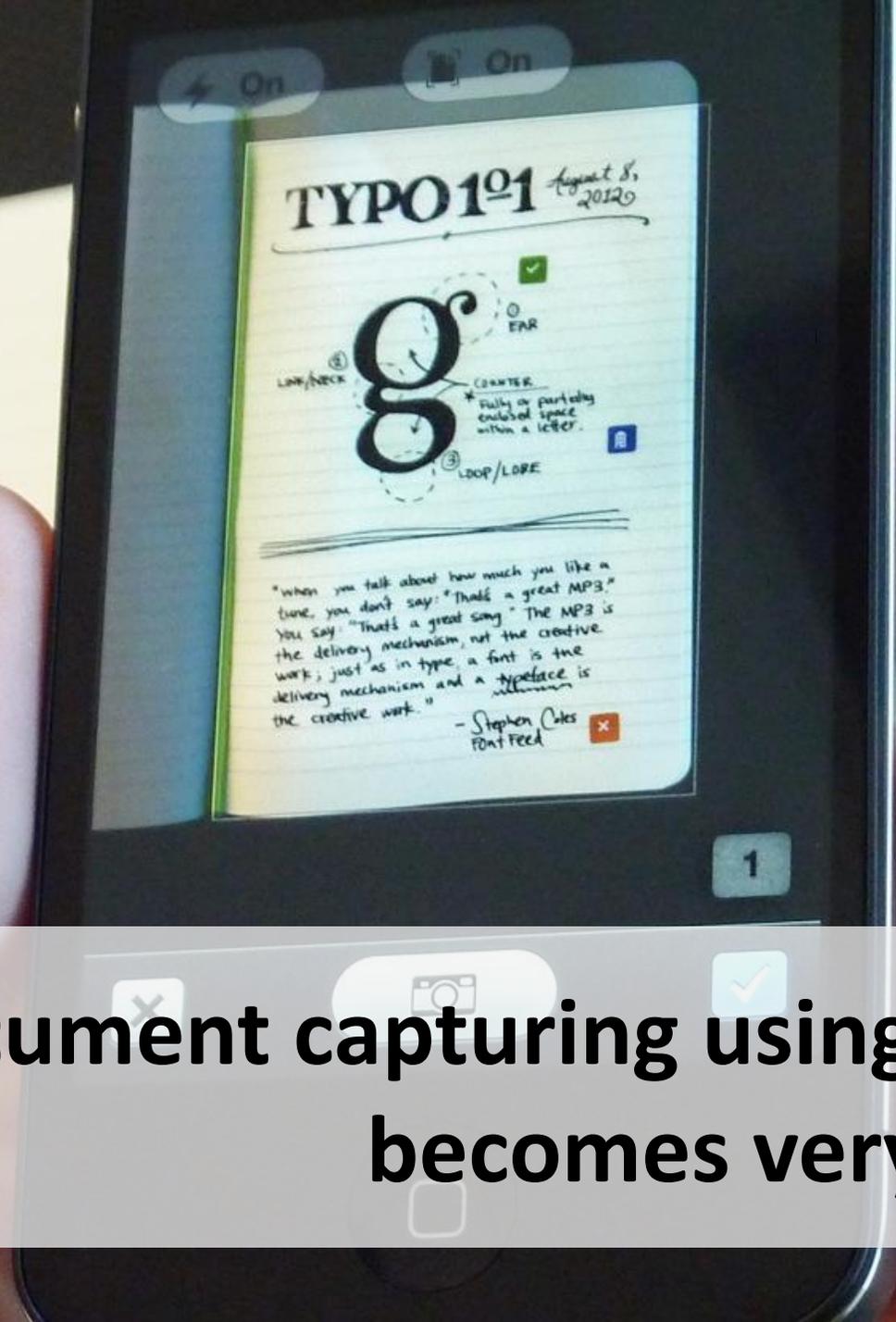


ScanShot: Detecting Document Capture Moments and Correcting Device Orientation

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Document capturing using a smartphone camera becomes very common



CamScanner.



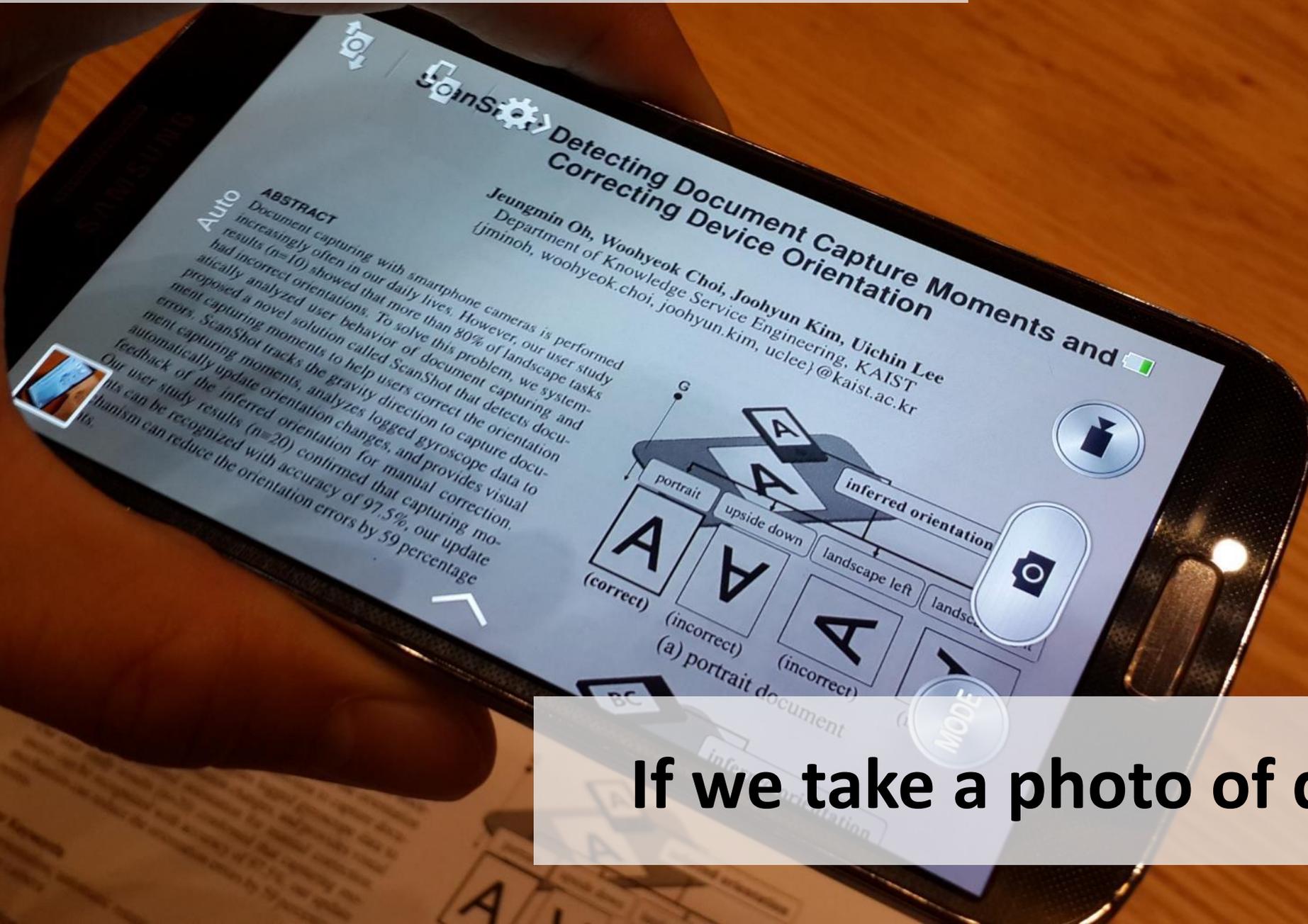
SCANNABLE



Office Lens

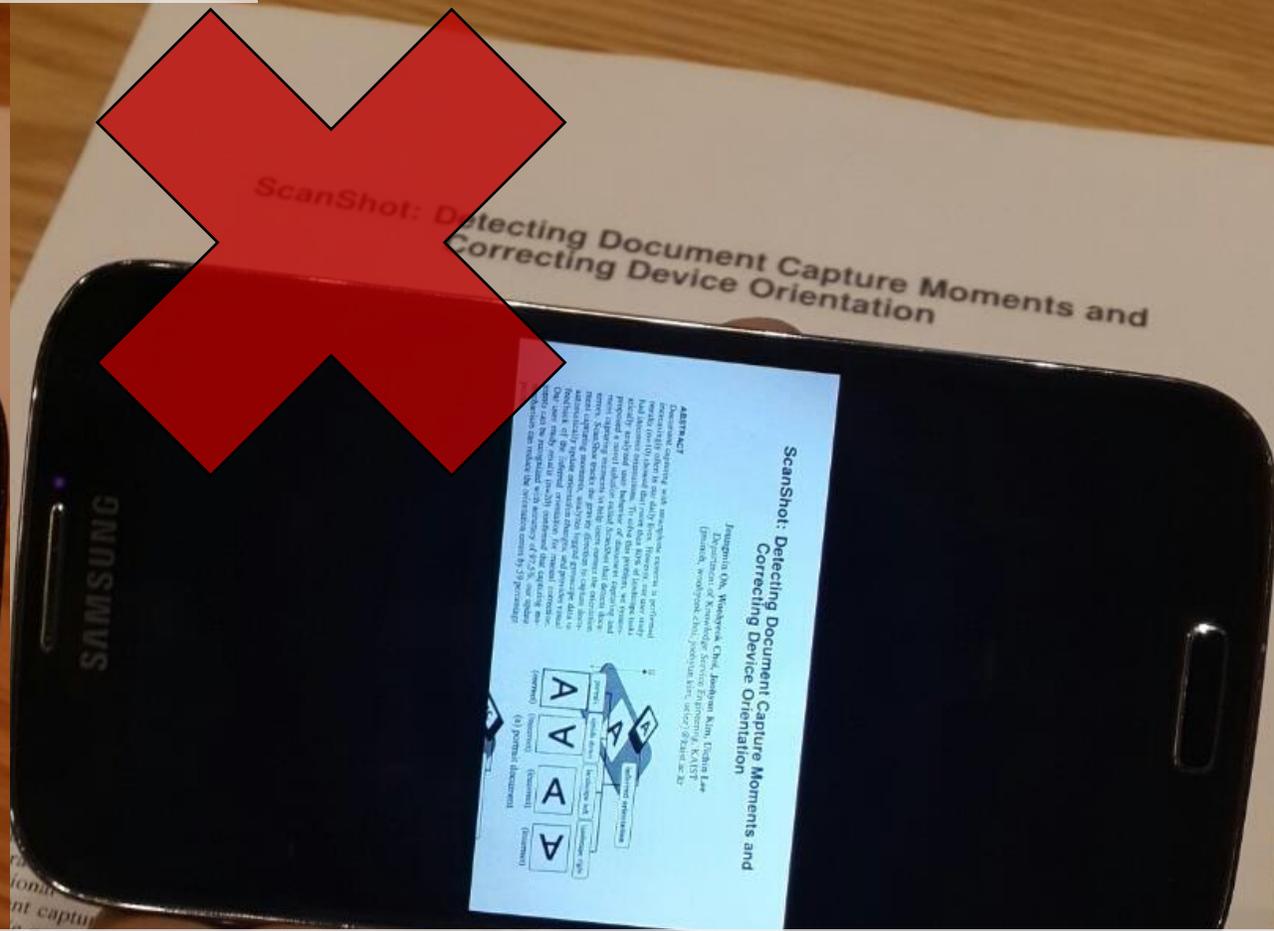
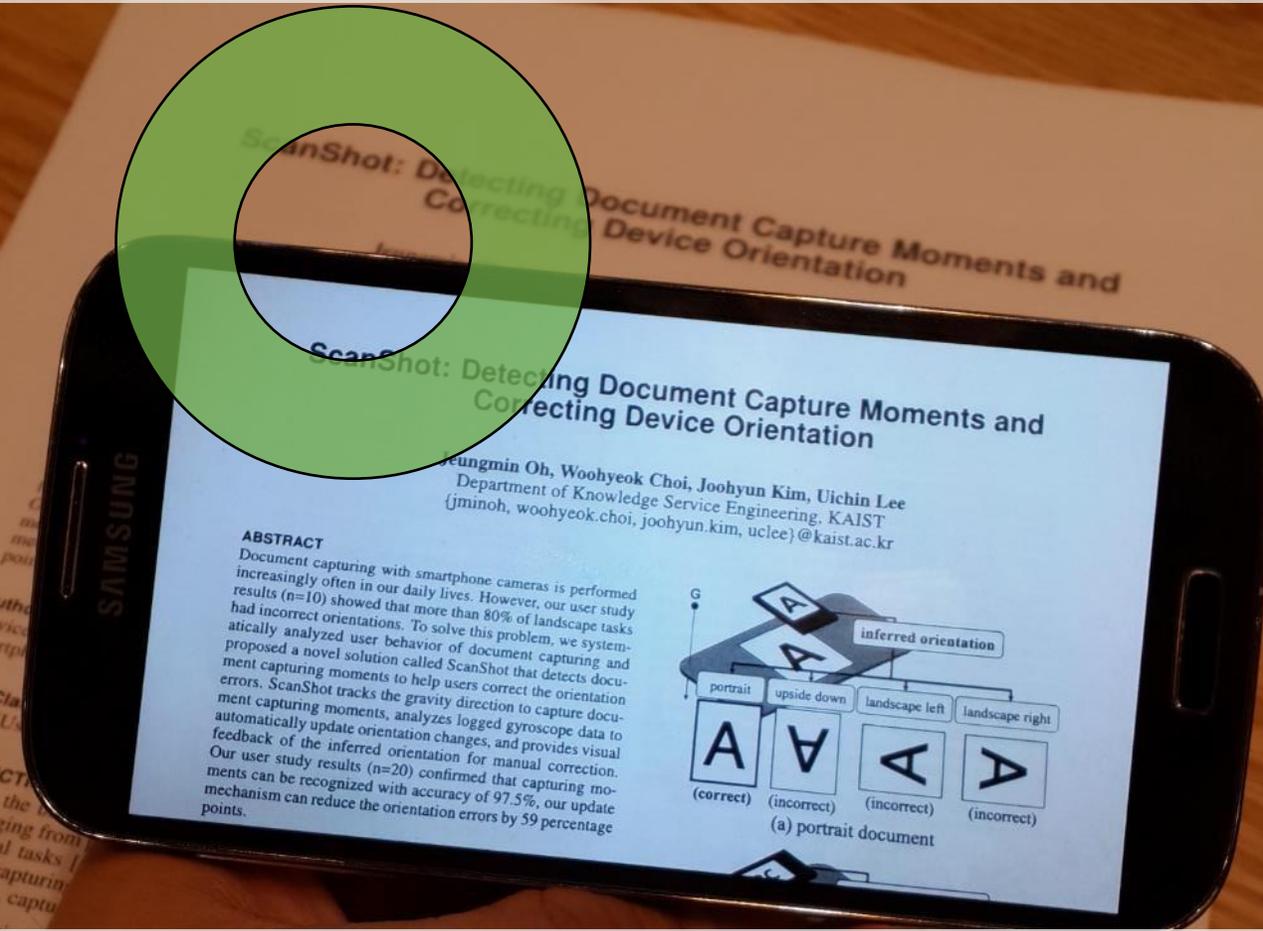
Many apps support document capturing, however...

Capturing a document



If we take a photo of document...

Viewing a captured document



Occasionally, captured photos had with erroneous orientation

Why do such orientation errors happen?



Portrait



**Upside
Down**

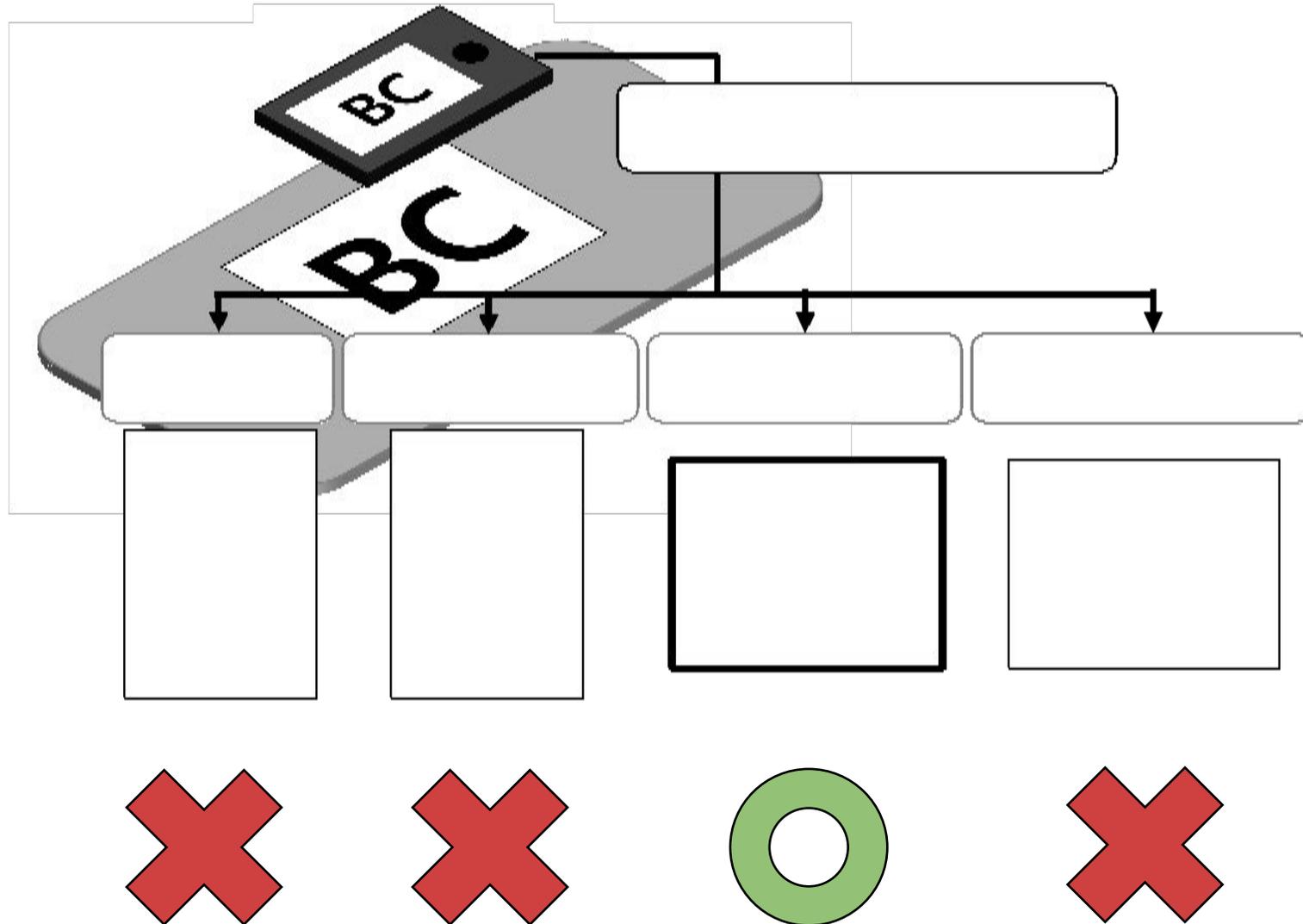


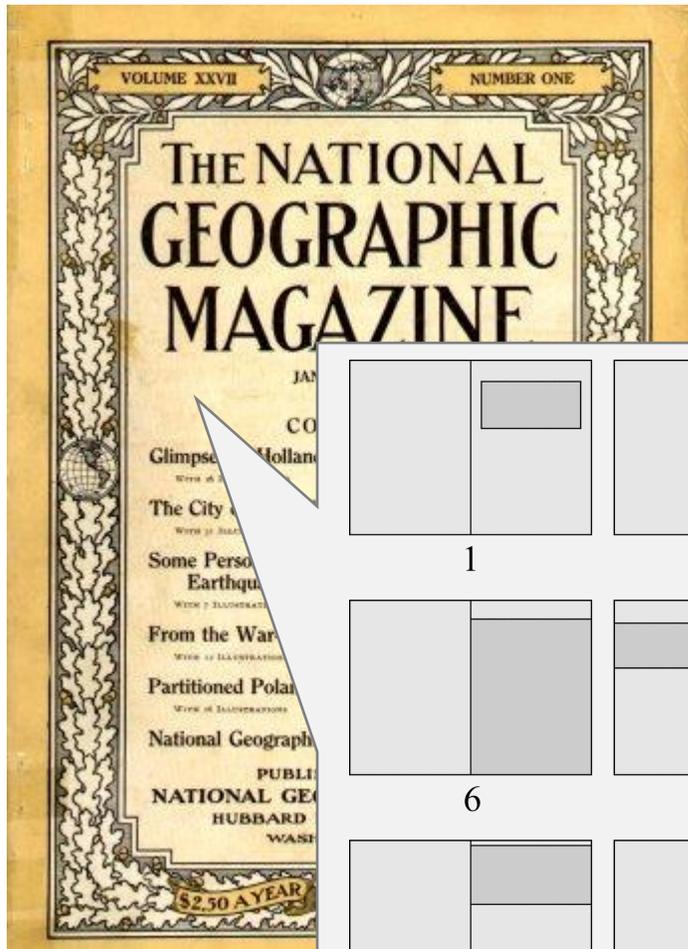
Landscape Right



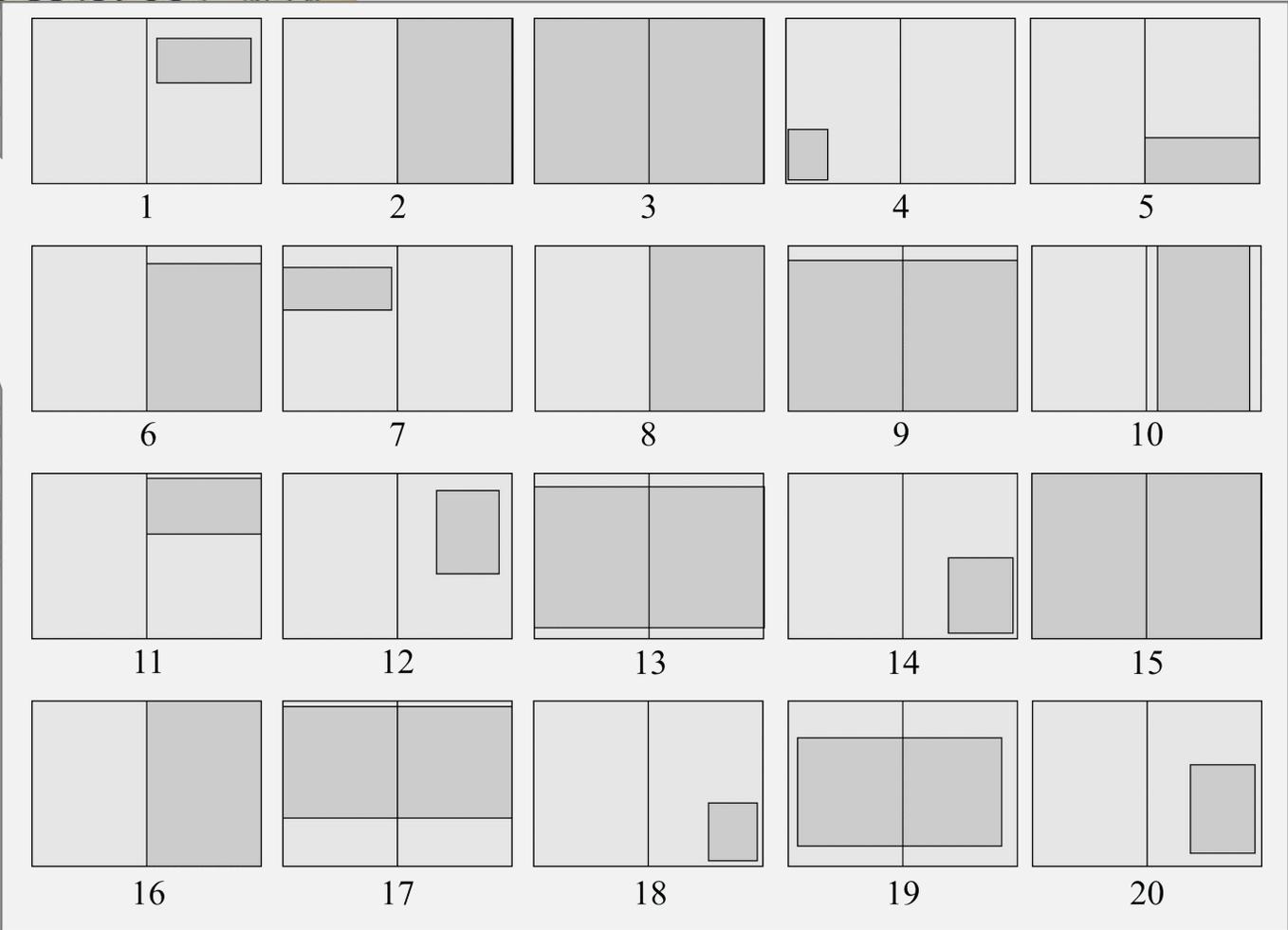
Landscape Left

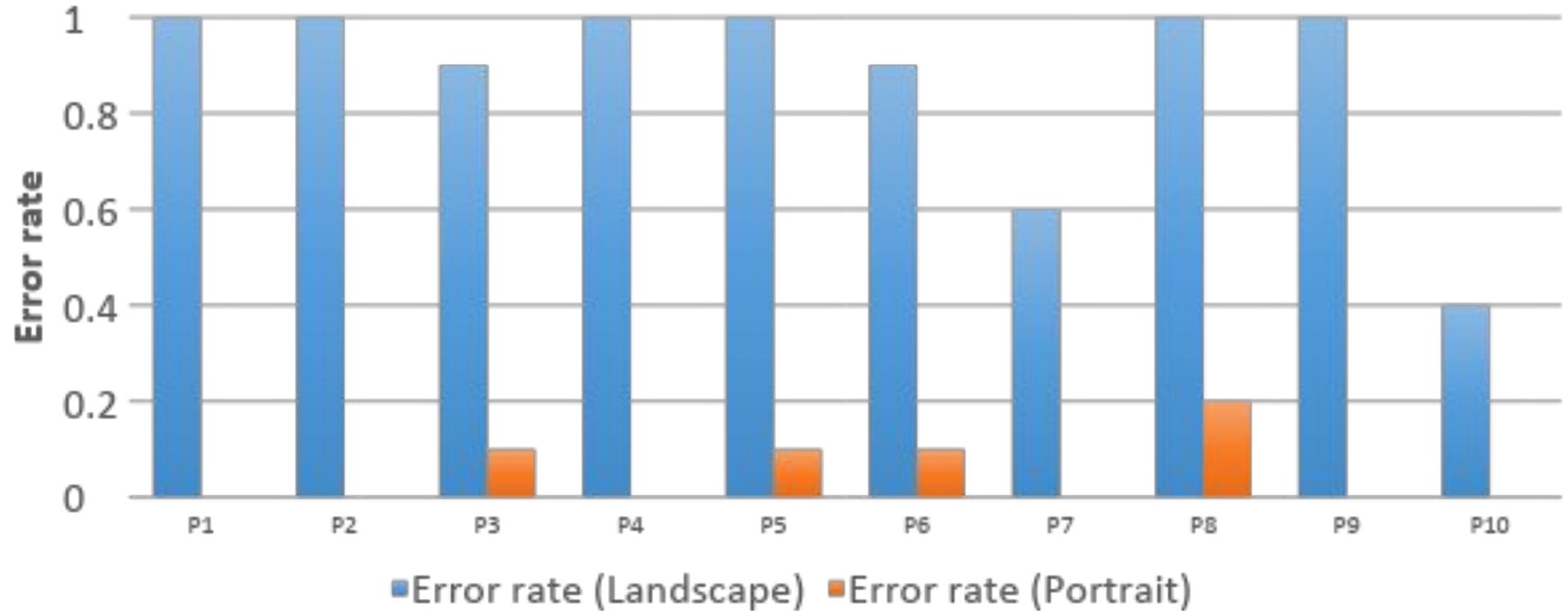
Why do such orientation errors happen?





We ran photo taking experiment...





The error rate for landscape task exceeds 80%

Solution

1. Detect a document capture moment



2. Fix an orientation error by tracking rotation

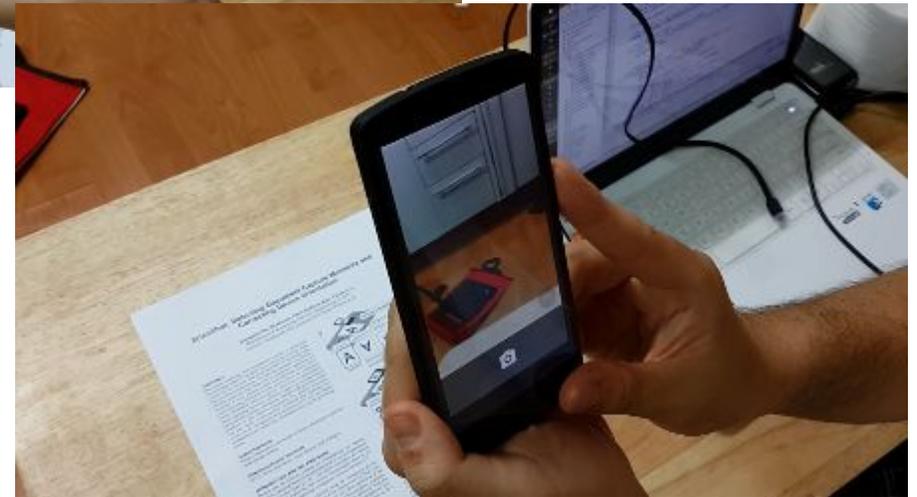
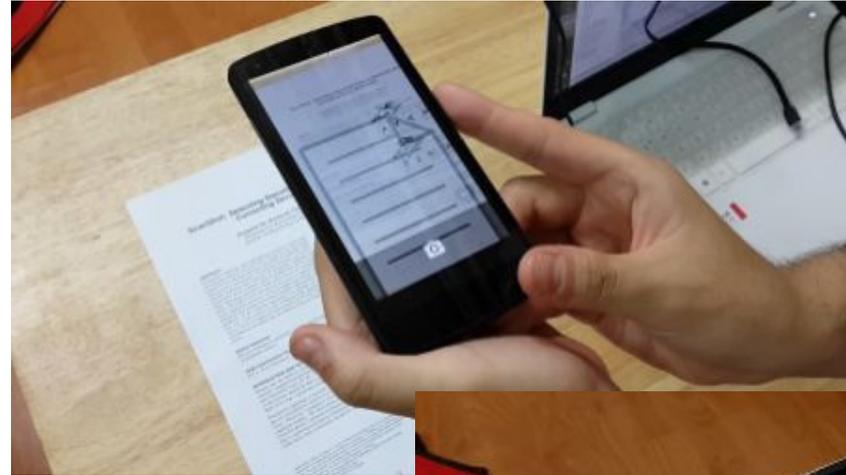
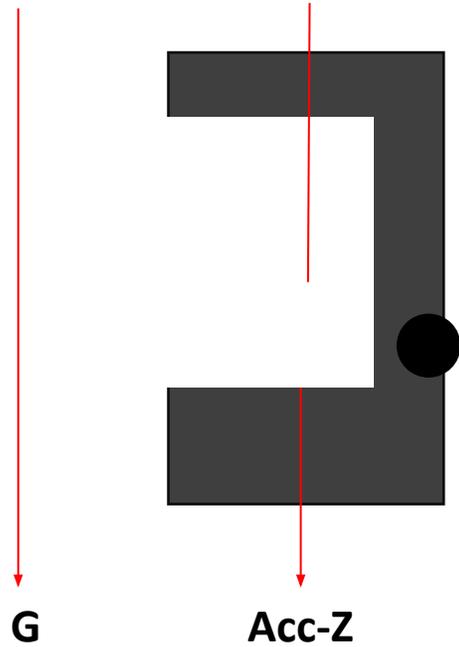


3. Display an overlay indicator for manual correction

1. Detecting document capture moments

2. Fixing an orientation error by tracking rotation

3. Displaying an overlay indicator for manual correction

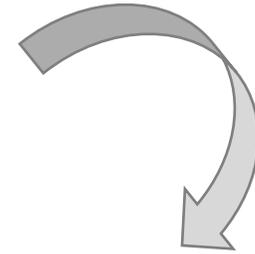
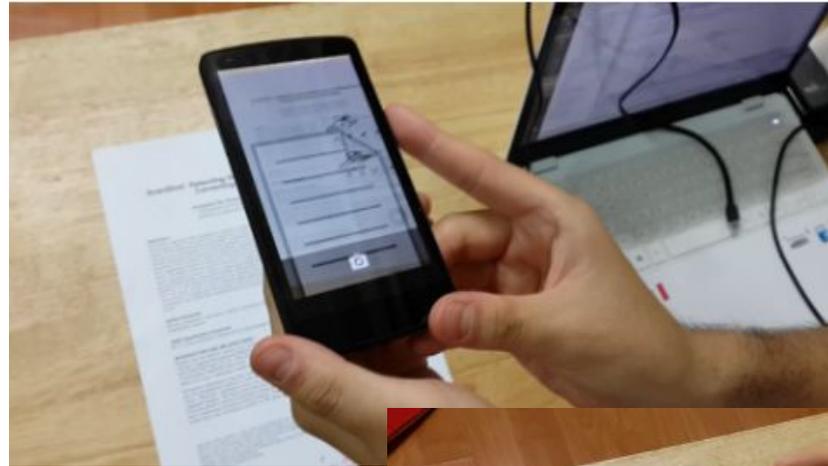
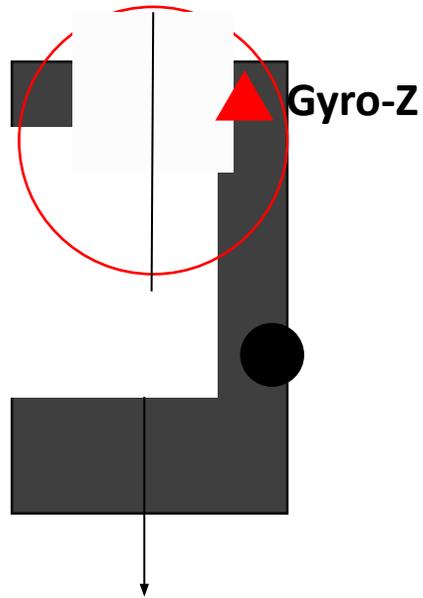


Accelerometer is used for detecting document capturing behavior

1. Detecting document capture moments

2. Fixing an orientation error by tracking rotation

3. Displaying an overlay indicator for manual correction

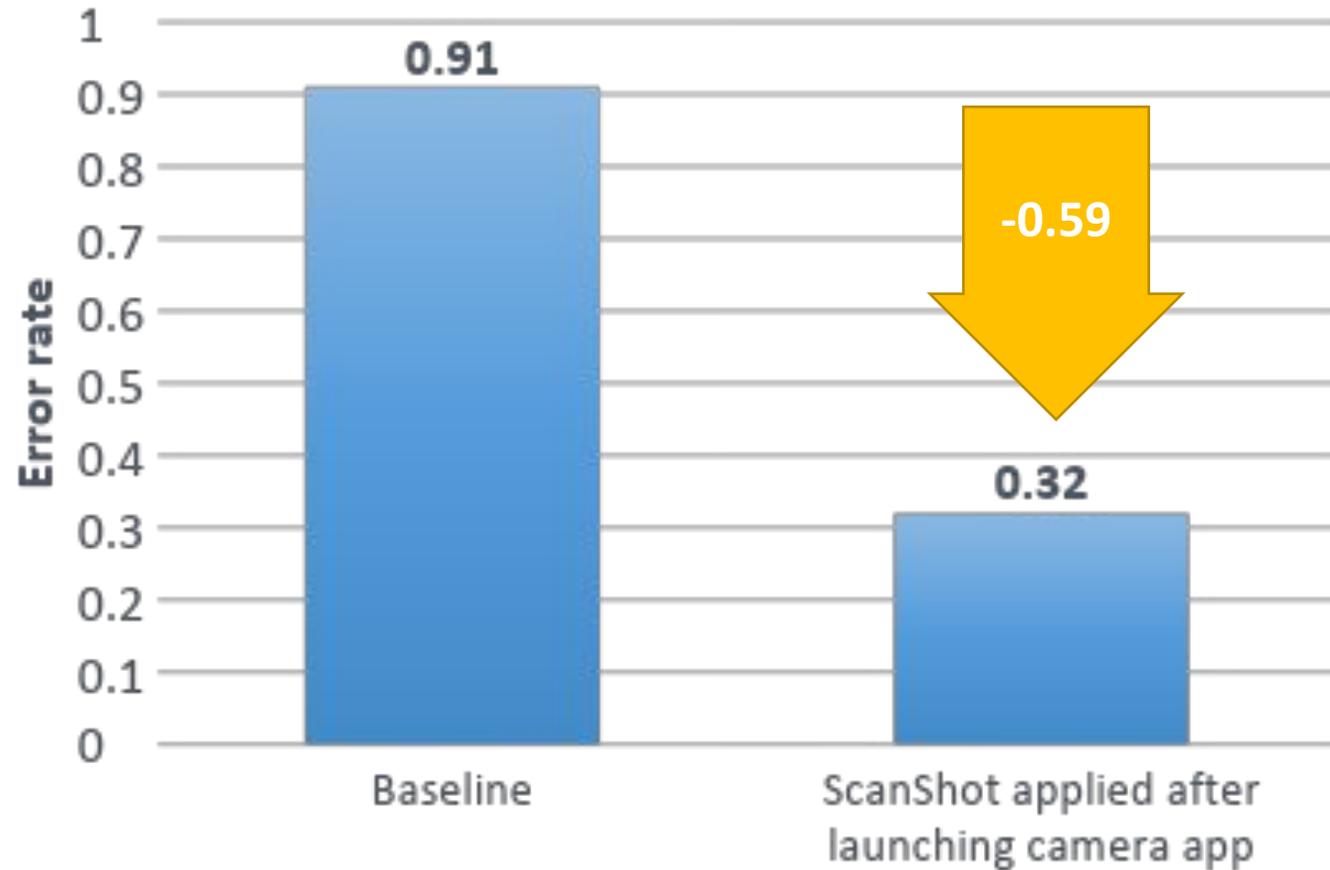


Gyroscope is used for tracking rotation to fix an orientation error

1. Detecting document capture moments

2. Fixing an orientation error by tracking rotation

3. Displaying an overlay indicator for manual correction



ScanShot successfully reduced erroneous orientations in the landscape document capturing task

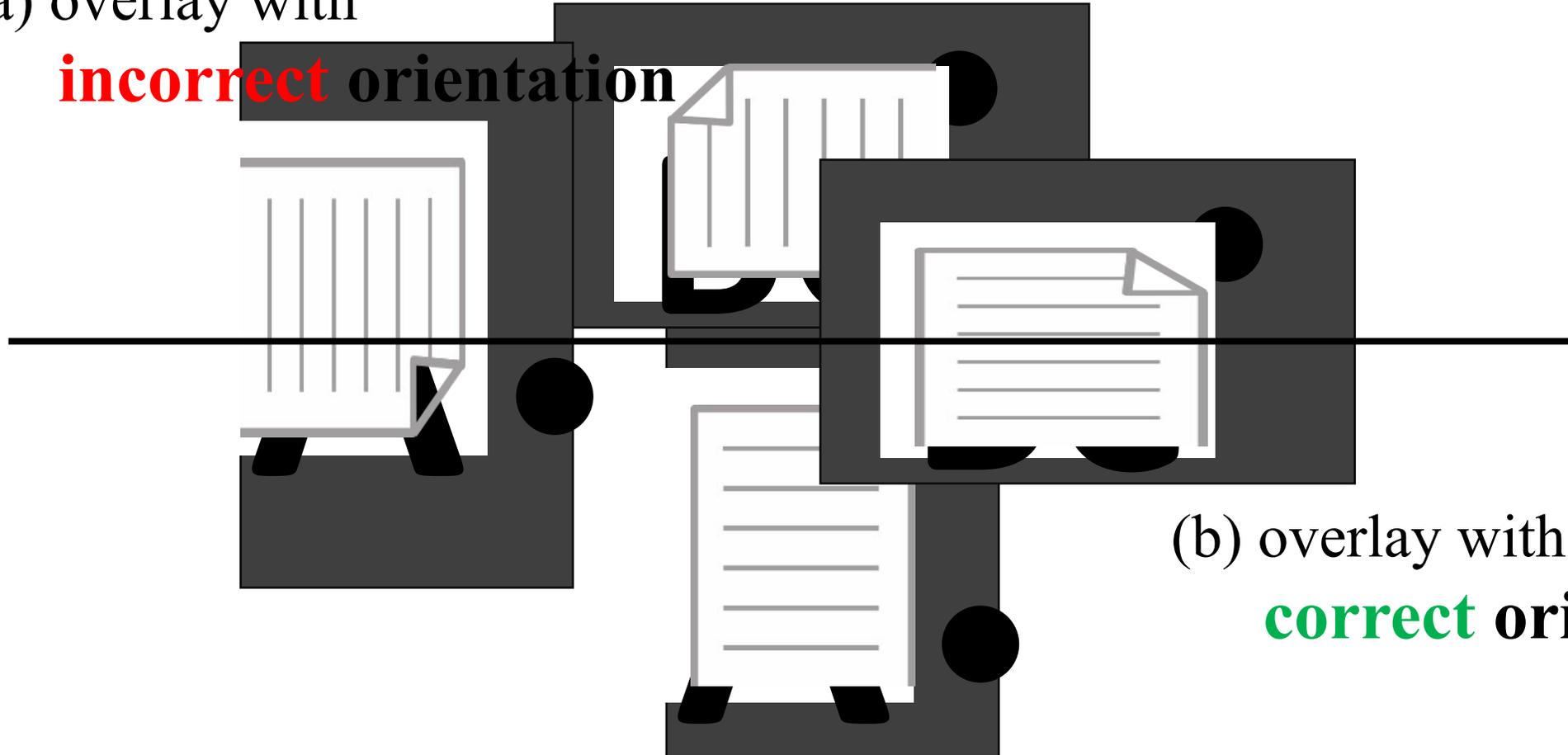
1. Detecting document capture moments

2. Fixing an orientation error by tracking rotation

3. Displaying an overlay indicator for manual correction

(a) overlay with

incorrect orientation



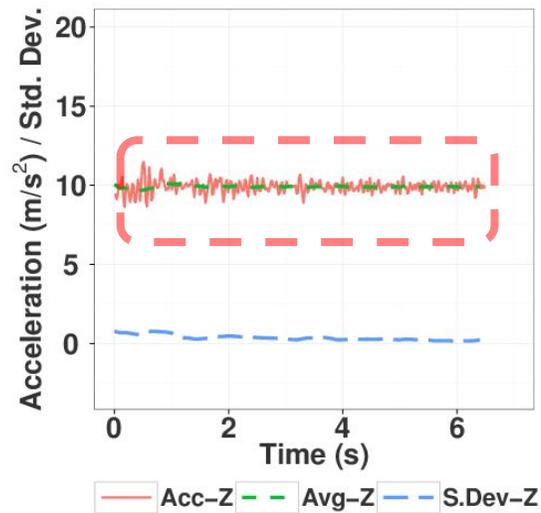
(b) overlay with

correct orientation

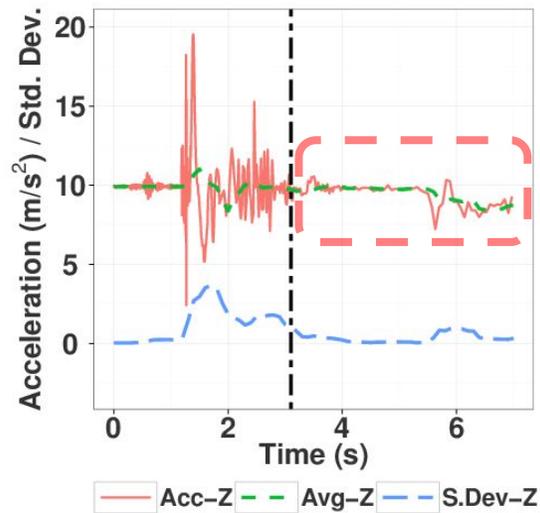
ScanShot displays overlay screen if needed

Q&A

Sensor data

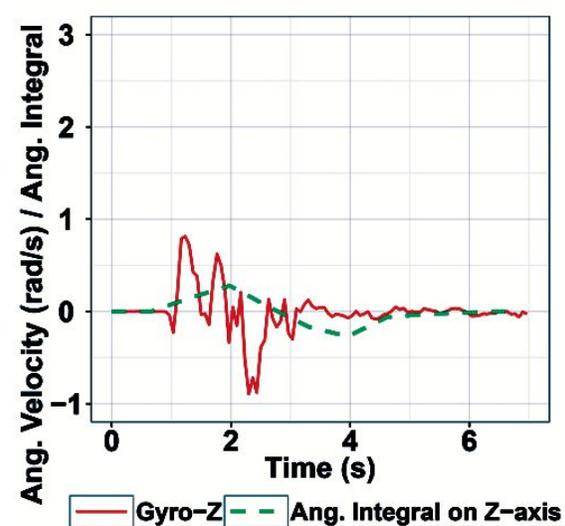


Portrait, no rotation

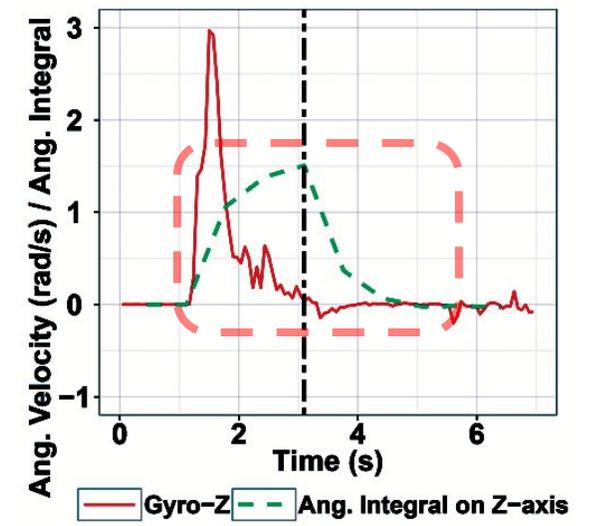


Landscape, rotation

Accelerometer



Portrait, no rotation



Landscape, rotation

Gyroscope

CV-based approach

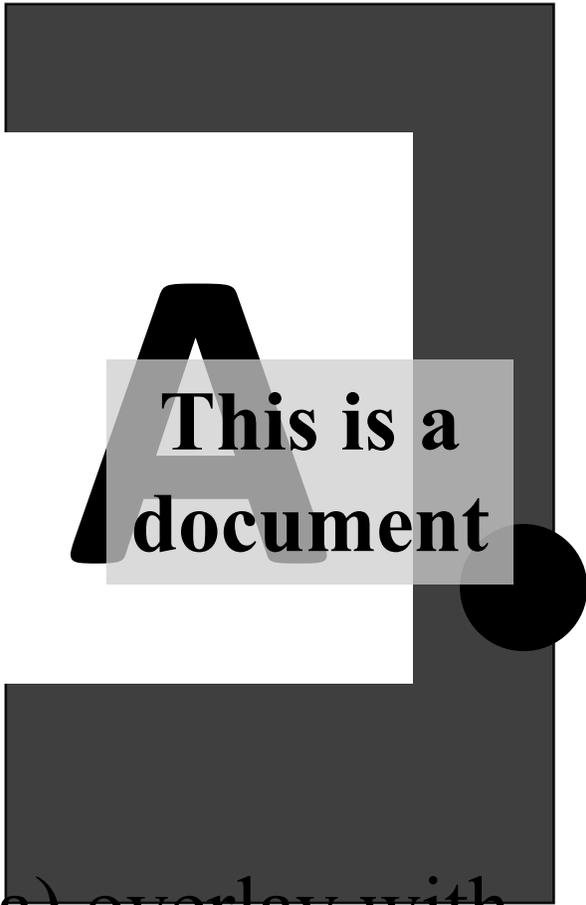


Grips for document capturing task

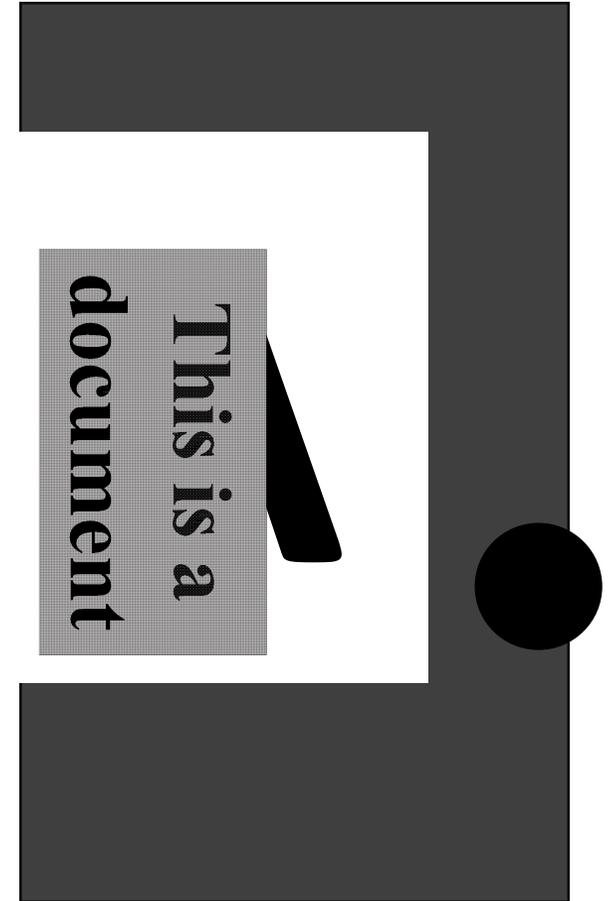
- External H/W



Variation of overlays



(a) overlay with
correct orientation



(b) overlay with
incorrect orientation

