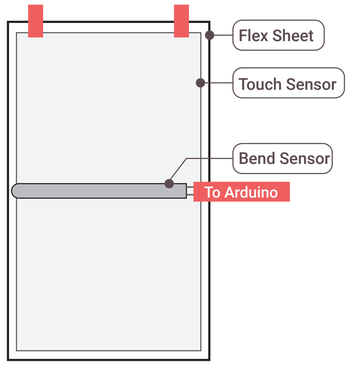
# BendSwipe : One Handed Target Zooming for Flexible Handheld Device

## Introduction

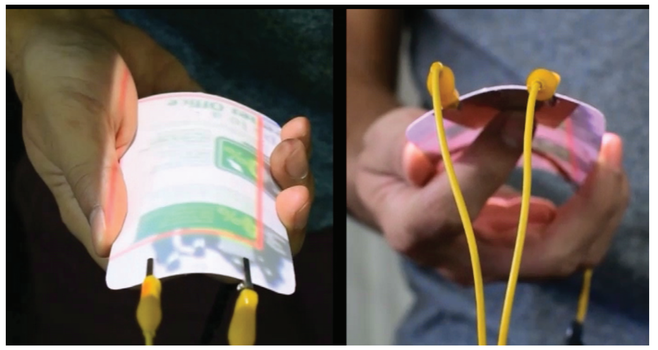
One handed usage of handheld devices is commonly observed in situational impairments, where standard handheld devices pose several challenges such as limited reachability, re-gripping of the device, reduced accuracy and increased occlusion.
BendSwipe is a new set of input interactions for target zooming of an image. The interactions combines touch and deformation gestures to zoom in to a specific area of an image.

## Prototype

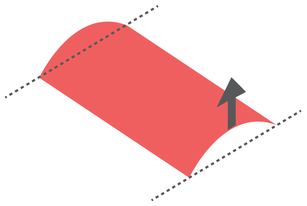
The flexible sheet is made out of thin laminated paper. A bend sensor is located horizontally on the rear side to detect the bending direction. A conductive touch sensor is used to detect the direction of swipe gestures.




Rear of the handheld prototype

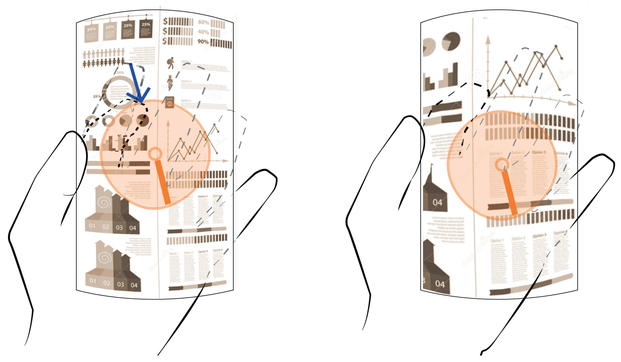


Working prototype

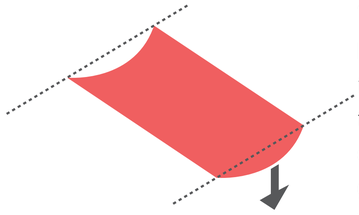


## Zooming In

**Bending In** the center of the display surface towards the user triggers a navigation wheel that is displayed as an overlay on the center of the flexible device. Performing a swipe gesture in any direction on the rear side triggers a zoom-in in the direction of swipe gesture.

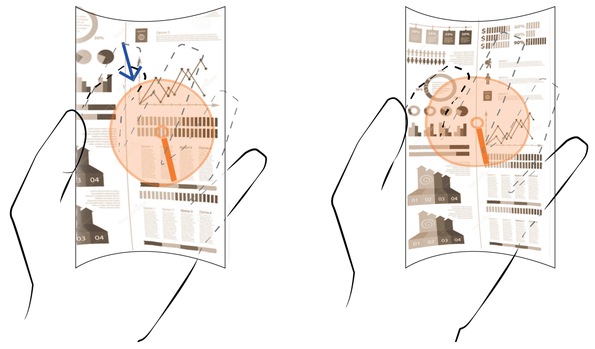


Bending in and swiping in the SE direction for Zoom-In in the same direction



## Zooming Out

**Bending Out** the center of the display away from the user triggers a navigation wheel that is displayed as an overlay on the center of the flexible device. Performing a swipe gesture in any direction triggers a zoom-out in the direction of swipe.



Bending out and swiping in the SE direction for Zoom Out in the same direction

## Design Rationale

- We chose a combination of bend gesture and touch supported swipe gesture on the backside of flexible handheld device to reduce problems of occlusion and regripping.
- We chose center bend gestures due to its proven ease of use and intuitiveness in the literature.
- Swiping the index finger in specific direction aides in identifying the zooming direction naturally.


Aditi Singh
aditisingh3@cmail.carleton.ca
Carleton University

Mayank Chhabra
mayank.1si12cs156@gmail.com
Indian Institute of Technology, Guwahati

Keyur Sorathia
keyur@iitg.ernet.in
Indian Institute of Technology, Guwahati


Carleton UNIVERSITY
Creative Interactions Lab
EMBEDDED INTERACTION LAB