An Autostereogram Decoder

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Autostereograms
Decoding autostereograms

Observation:
- Autostereograms encode a depth image
- Depth image can be difficult to see

Goal:
Make depth image visible

Method:
Extract depth image using a computer
Making a hidden object

Eyes

Image Plane

Object
Making a hidden object

Eyes converge beyond image plane
Making a hidden object

Both eyes see same thing
A special case

Two views share a common point
Making the autostereogram

Given depth image…
For each scanline…

Object (Depth Image)
Making the autostereogram

Object (Depth Image)

Eyes

Image Plane

z = 1

z = 0

Lookup depth sample…
Making the autostereogram

Compute \( S \) using similar triangles...
Making the autostereogram

Link image pixels separated by S to be the same
At end of scanline, loop over pixels...
Choose random color if unlinked
Use linked color if linked
Decoding the autostereogram

Loop over image pixels...
Decoding the autostereogram

Recover S by searching for correspondence...
Decoding the autostereogram

Compute depth using similar triangles...
Decoding the autostereogram

Eyes

Image Plane

z = 1

Object (Depth Image)

z = 0

Store depth in depth image
Limiting the search

Use S for near and far planes to limit search.
Results

Original depth image  Autostereogram  Decoded depth image
Results

Album cover

Peace sign
Problems

Insufficient search for corresponding points
Problems

Searching nearer and farther fixes depth image
Problems

Near = 70

Wrong depths

Near = 40

Noisy background

Correct depth image