

Pin Hole Imager Lock Down Project

Why?

Potential for interesting imaging/ rendering

Think about the image, not clinical sharpness/ contrast

Target resolution approaching our digital projection levels

Try and combine the abstraction of true pinhole photography with modern imaging technology

Hasn't been done before to my knowledge, so really *different*!

Why not?

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Northampton Camera Club 27th July 2020

Commercial example....



Pinhole Pro

Pinhole Pro X is the world's first **pinhole** zoom lens, designed for modern digital cameras and made for video making. In order to produce a zoom lens with an aperture less than 0.25mm, the **pinhole** wall has to be less than 0.1mm to eliminate the tunnel effect, or dark corners on the picture. 21 Jan 2020

www.kickstarter.com/projects/bozzou/pinhole-pro...

[Pinhole Pro X 18-36mm – pinhole zoom lens for video & photo ...](#)

Neat, portable, expensive, sensitive (short exposure time) BUT very low resolution

My target – around 1MPixel central resolution

Film versions, with large format film have better res but hard to compose, very hit and miss

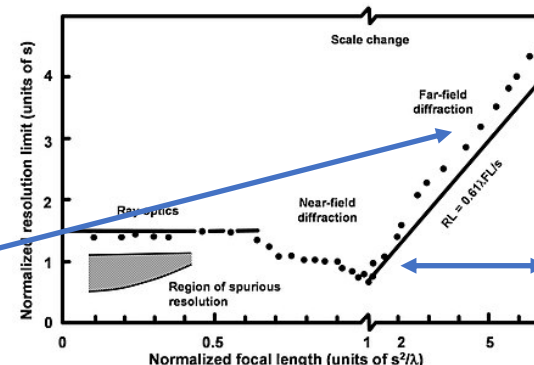
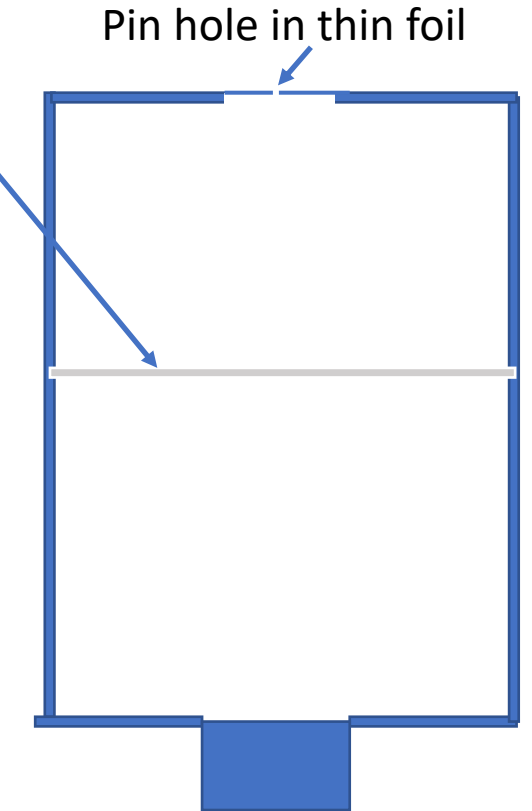
Quite a bit on wiki... resolution first worked out by Petzval, of swirly Bokeh fame! Resolution can scale with image size when far field diffraction limited

How to achieve high res? ... need to make the imaging plane much larger than the digital camera sensor. Need to emulate a large format film. Needs a good intermediate imaging screen...

Transmissive imaging surface
Target A4 size

Difficulty is the screen. Ground glass will have fall off at the edges. Paper is rather opaque and has texture

Thicker material will blur the image (spot size can't be much less than the thickness)





Version 1!

I underestimated the difficulty!!!

Cardboard is NOT opaque!

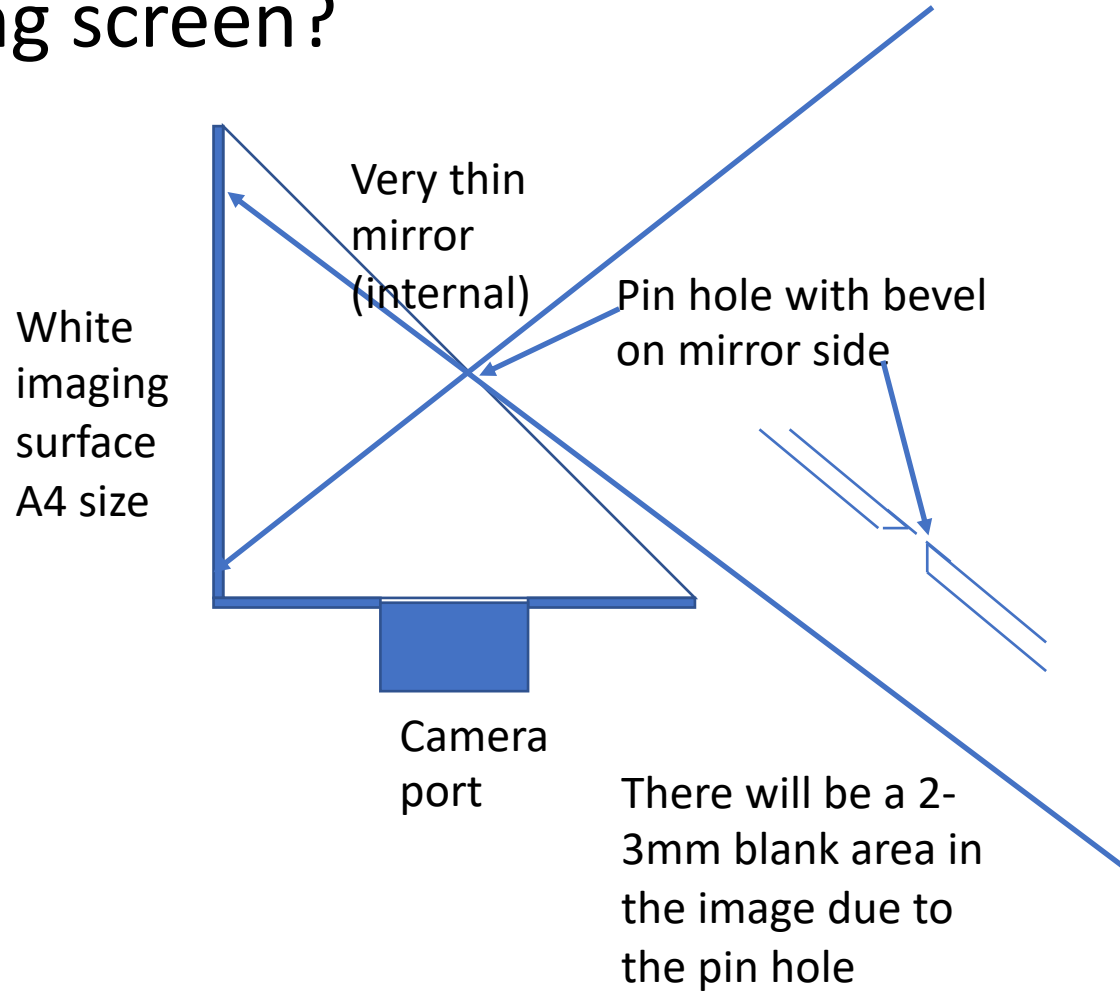
Stray light from the camera port and internal scattering must be suppressed



Best I could achieve with version 1. Covered with cloths and screens to reduce stray light

Interesting rendering from paper intermediate screen

Version 2 - Is it possible to avoid the difficult intermediate imaging screen?



Avoids a transmissive imaging screen (as in first trial)

Should require several stops less exposure

Much better resolution but severe vignetting and blank area, even with $f/1.4$ imaging lens

Abandoned.



Version 2

Much more compact with expected better resolution

Good 'dreamy' rendering and contrast

Terrible vignetting and side cut off

Horrible spot in image centre

Could be reconfigured without the hole, but would be much larger and require a very wide angle re-imaging lens

Final Version

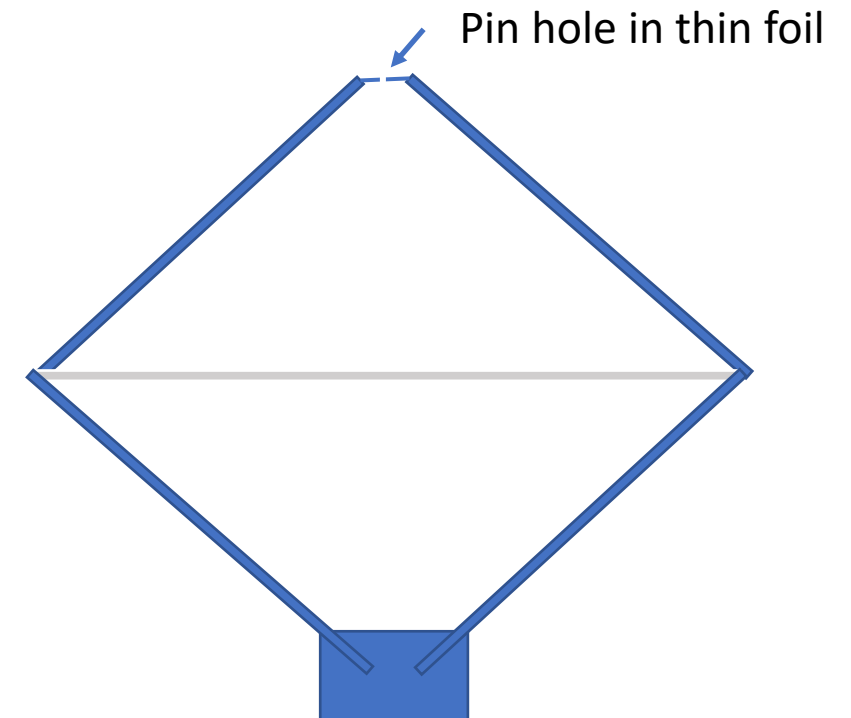
Scale up the intermediate screen, so I can use available material. Thin diffuser from LED ceiling panel is almost ideal, but thickness will reduce resolution, maybe by a factor of 2

Final imager based on 600 by 600mm imaging screen!

Geometry adjusted to use short fast lens on camera (20mm f/2.8) and target approx. 90degree field of view (approx. 20mm equivalent)

As short a front to back length as possible given these constraints, to aid portability!

Optimal image will be circular, with some fall off at the corners. With an ideal screen, central spot size will be about 0.5mm (1200x 1200 pixels full image)



Camera port; re-image screen with fast lens for short exposure



Internal black paint everywhere



Internal screen in place with large aperture showing window 'image'



'Portable' and 'compact'(!!), but doesn't fit in a gadget bag.....

Lots of aluminium tape. Gaffer tape is not opaque!



Sliding 1.5mm pinhole for composition, 0.4mm pinhole for capture



Typical 30 sec exposure at
ISO 6400

High ISO works well, adds
some noise/ texture/ grain...



Pin hole selfie

(challenge is sitting still for 30 secs)

Very pleased with...

central sharpness

Contrast

Stray light suppression

attractive vignette

colour rendering

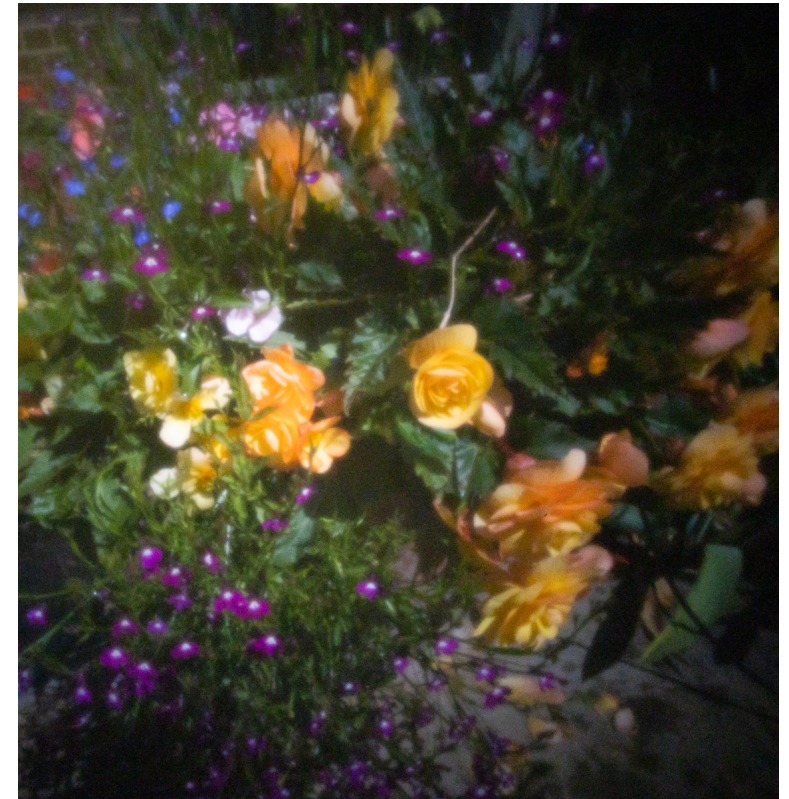
soft edge focus

Some flare when the sun is in the frame

Circular pin hole gives true Gaussian blur, so responds well to smart sharpening



A few shots in the garden....



What Next?

- This really works, and is possibly the best resolution 'portable' pin hole imagers that has been made
- Needs more ideas on what type of images would work well artistically
- A 'Brian Panel' approach would draw attention to the *rendering* rather than overall sharpness
- Forests/ Trees/ 'Carl Light'/ Fungi/ Portrait panels??
- NOT Suitable for sports, wildlife, street photography, astro....
- Ideas and comments?