

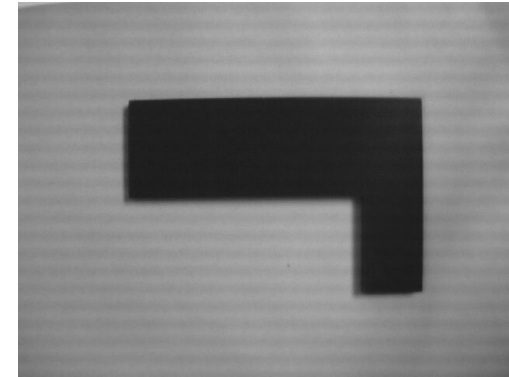
# Image Capture and Problems

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## A reasonable capture



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## Image Capture: Focus problems



<http://www.cambridgeincolour.com/tutorials/depth-of-field.htm>

Focus set to one distance, and other nearby distances in focus (depth of focus). Further or closer not so well focused. Compare 'identical' lines.

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## Image Capture: Shadow problems

False colour to emphasise the shadow location.  
Often hard to separate from part.



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## Image Capture: Saturation problems

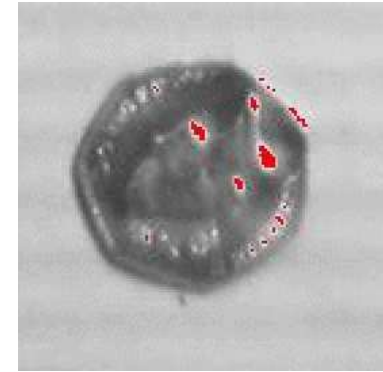


Pixels clip at 255.

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## Image Capture: Specularities/highlights



Saturated pixels set to red.

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## Image Capture: Non-uniform illumination

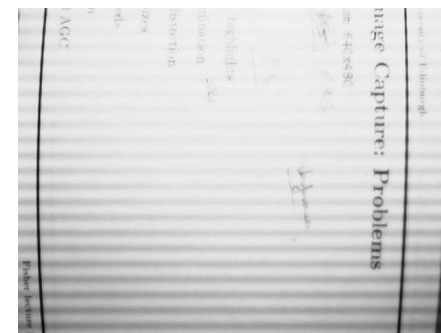


Contrast on background enhanced: may cause analysis problems.

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## Image Capture: Radial lens distortion



Note 'straight' lines at image edge. May make accurate measurements hard.

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# Image Capture: Overcoming Problems

- **Shadows, specularities, non-uniform illumination:** increase ambient lighting by using light diffusing panels or lots of point lights
- **Depth of Focus:** use smaller aperture and brighter light
- **Motion Blur:** use shorter capture time and brighter light
- **Saturation:** use smaller aperture, reduce gain and adjust gamma

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- **Lens Distortion:** more expensive lenses, view from further away
- **Aliasing:** use incandescent lights

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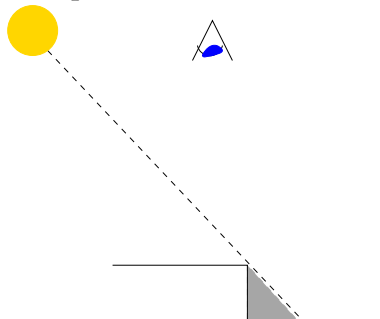
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## Illumination control techniques

Main cause of problem: point light sources

$$\text{Brightness} = B / (\text{surface distance from source})^2$$

Sharp shadows:



Strong illumination variations

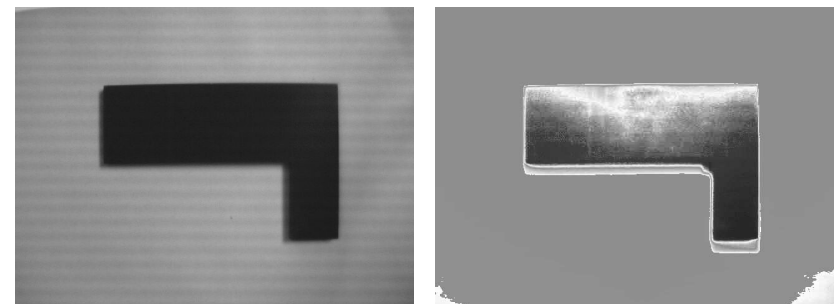


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## Shadow Example

Figure and shadow at bottom left emphasised



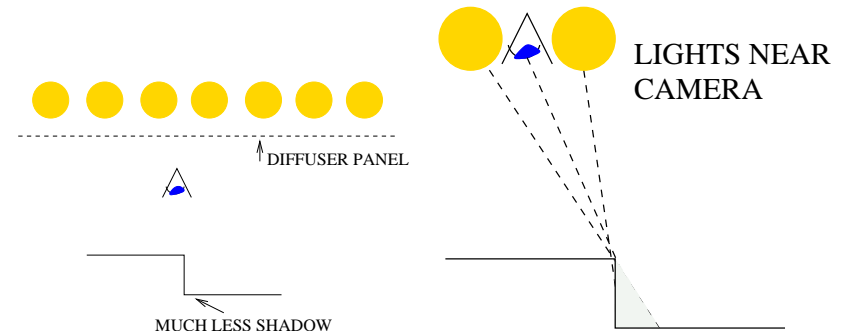
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## Lighting control

To reduce complications arising from illumination:

- Increase ambient (all direction) light with light diffuser panels
- Illumination by camera to move shadows to non-visible places
- Backlighting panel



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## Lecture Overview

- A set of typical image capture problems: focus, saturation, specularities, shadows, lens distortion, illumination
- Some approaches to overcoming the problems

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