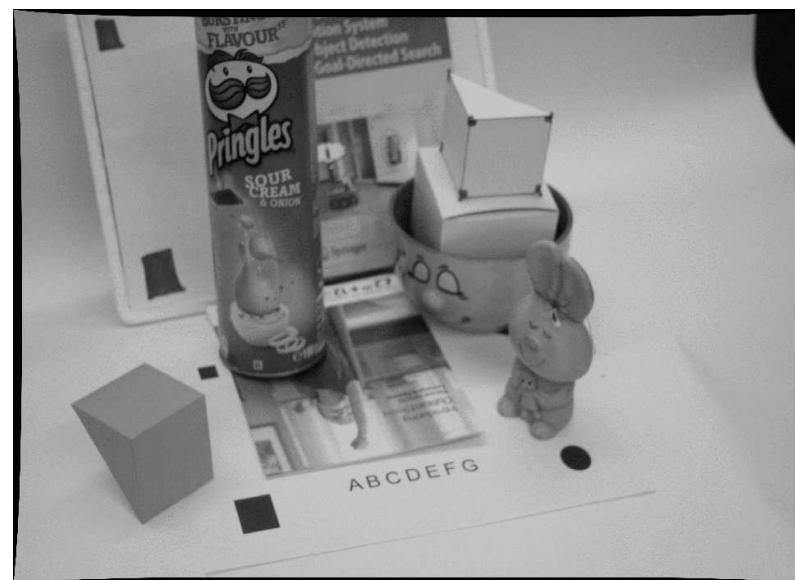# Binocular Stereo Introduction

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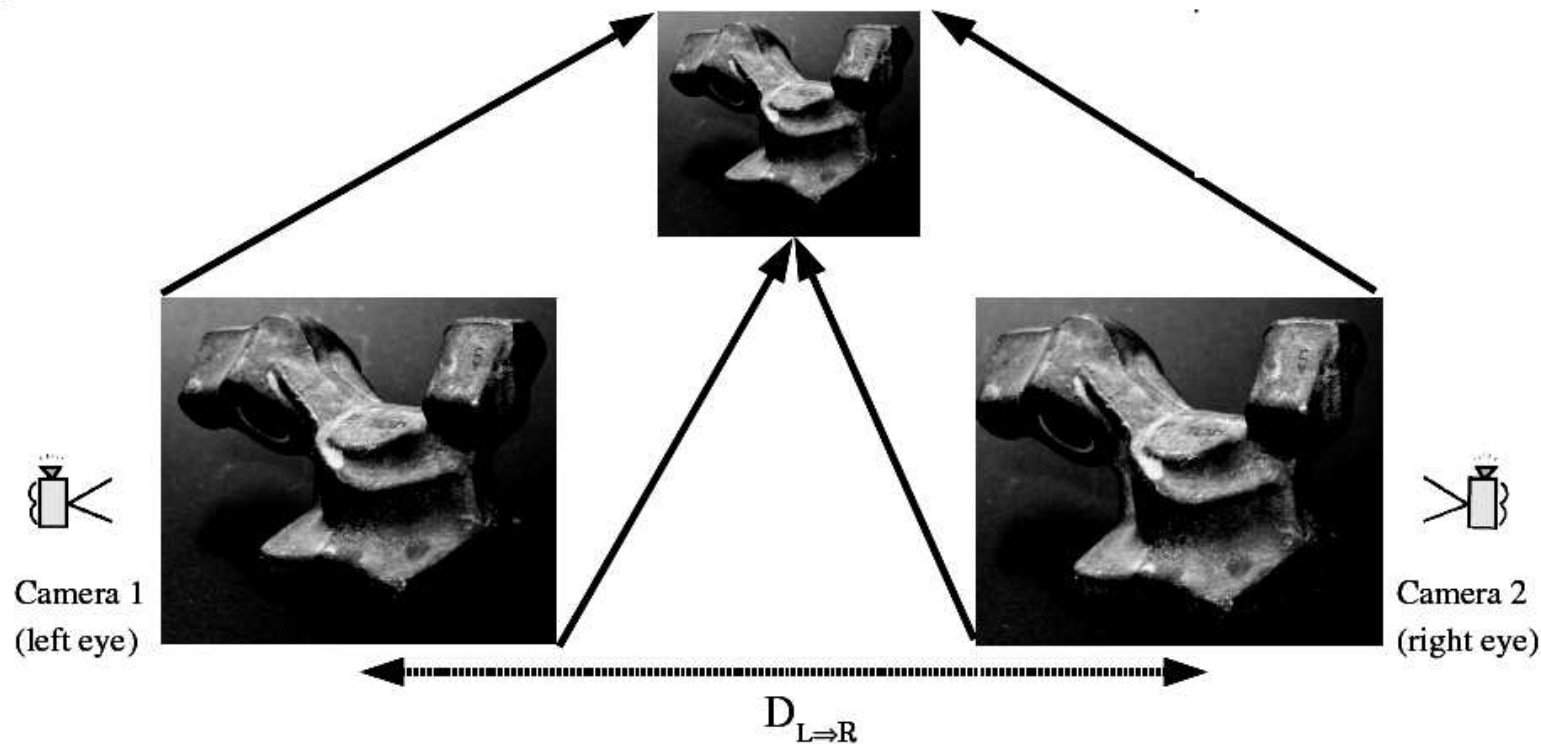
# Binocular Stereo System Introduction

Is there a Wedge in this 3D scene?



Data a stereo pair of images!

3D part recognition using geometric stereo
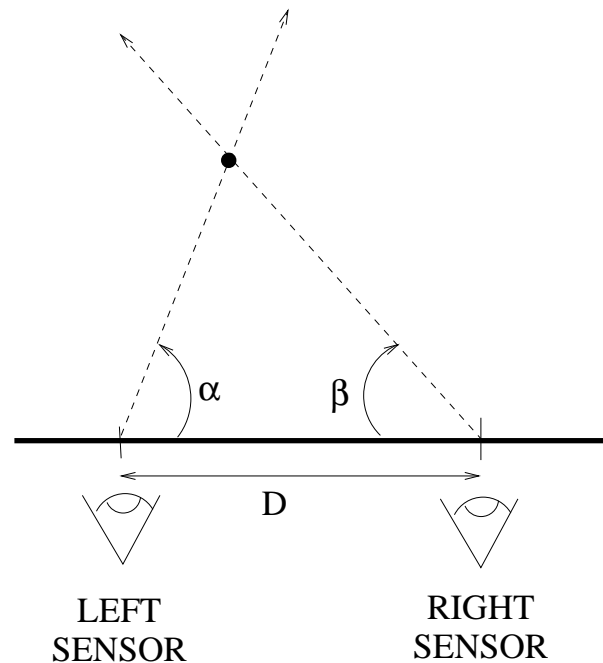
# Binocular Stereo Vision



Given two 2D images of an object, how can we reconstruct 3D awareness of it?

# Binocular Stereo

Goal: build 3D scene description (eg. depth) given two 2D image descriptions
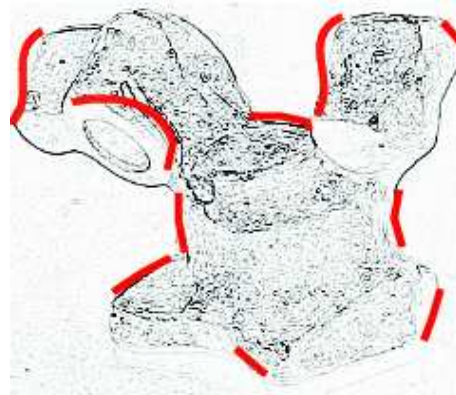
Useful for: obstacle avoidance, grasping, object location
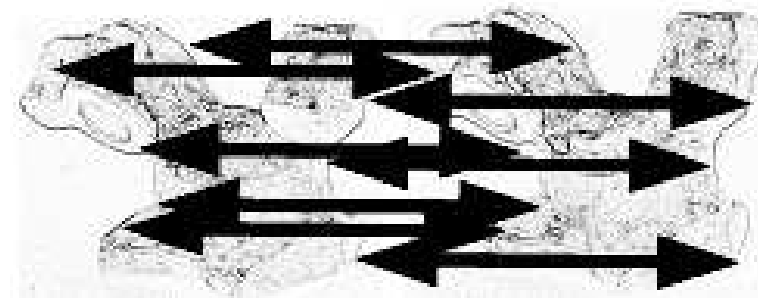
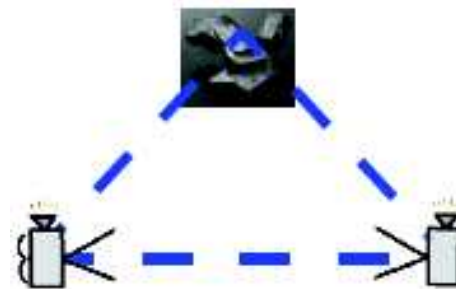Key principle: triangulation

# Stereo vision - a solution
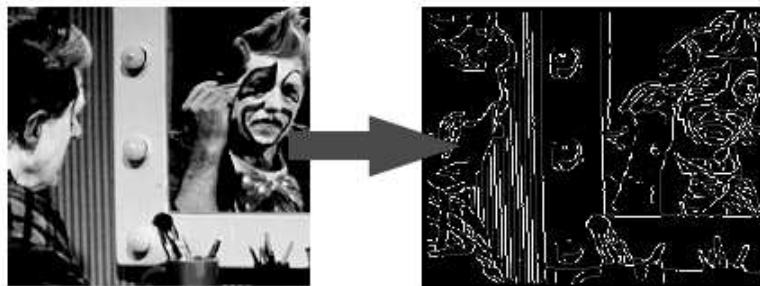


1) **Feature extraction**
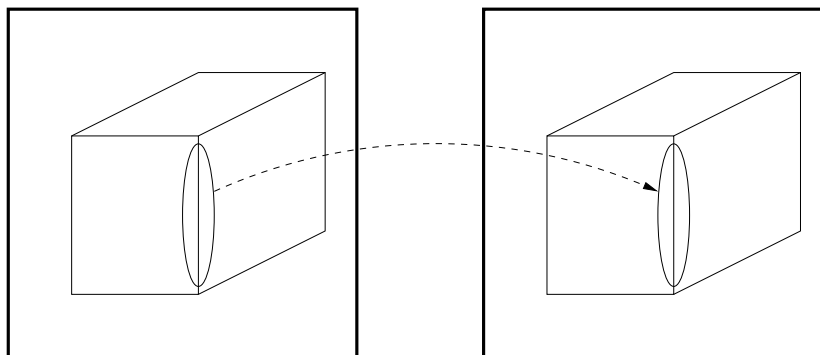


2) **Feature matching**:
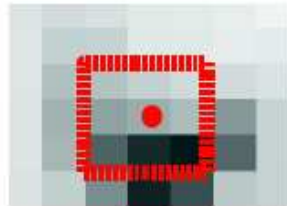


3) **Triangulation**:

# Possible image features

## 1) Edge fragments



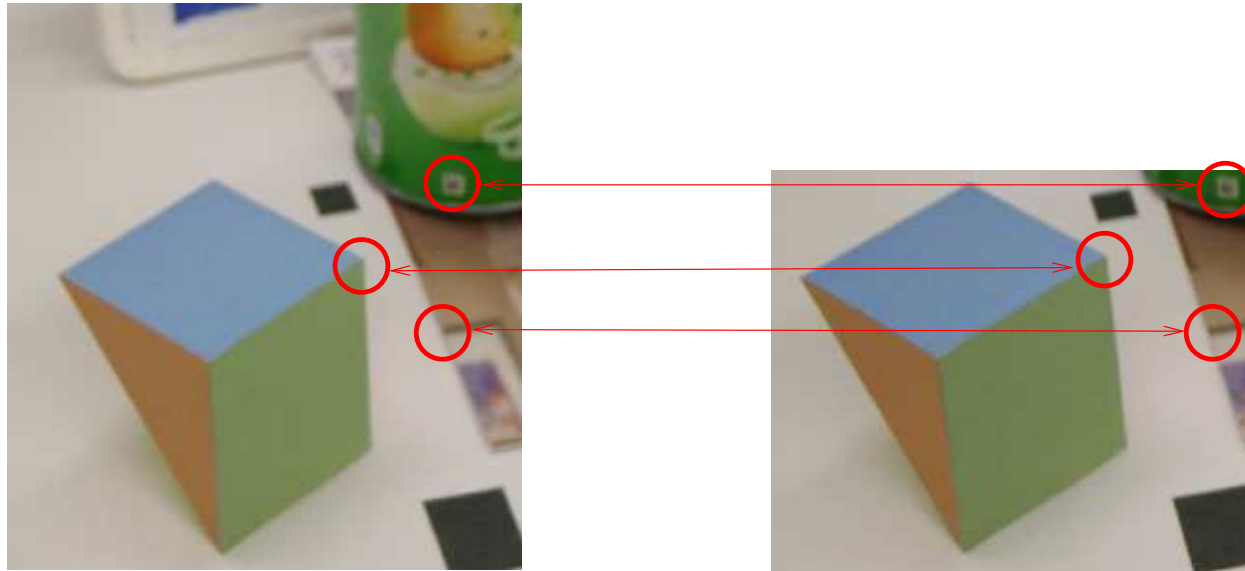## 2) Edge structures (eg. vertical indoor lines)

## 3) General interest points (eg. SIFT)

4) **Image intensity patches** - everywhere in image



Larger features easier to match but harder to get and less dependable

Human visual system thought to work at edge fragment level

# Stereo Recognition System Overview

1. **Feature extraction**:

   Canny edge detector

   RANSAC straight line finding

2. **Feature matching**:

   Stereo correspondence matching lines

3. **Triangulation**:

   3D line feature position estimation

4. **3D object recognition**:

   3D geometric model

   Model-data matching

   3D pose estimation

# What We Have Learned

- Core steps in stereo: find features, match features, geometry

- Geometry trivial

- A variety of matchable features: points, edges, lines, patches