

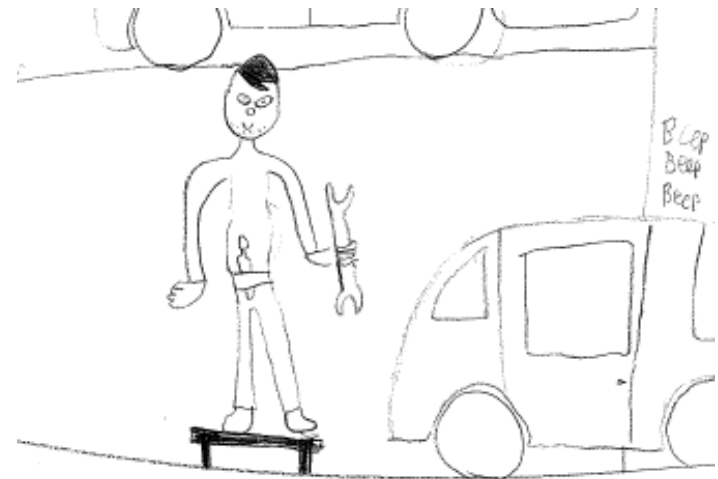
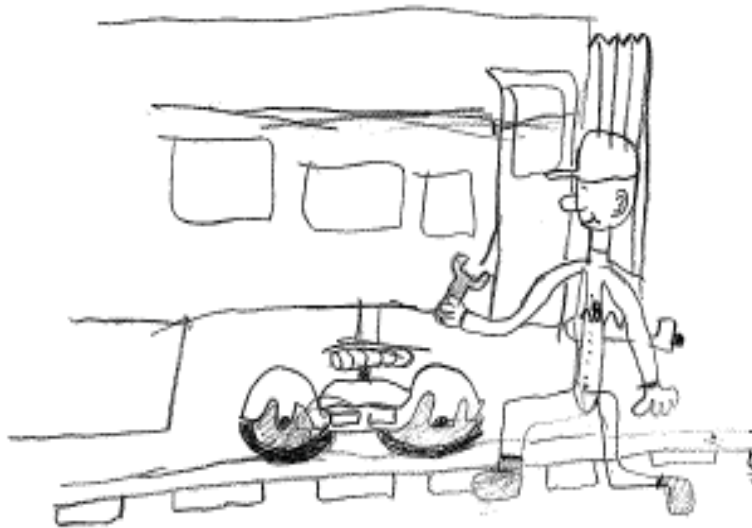
# Turning ideas into reality

Roberto Cipolla  
Department of Engineering

<http://www.eng.cam.ac.uk/~cipolla/people.html>  
<http://www.toshiba.eu/eu/Cambridge-Research-Laboratory/>

# What is Engineering?

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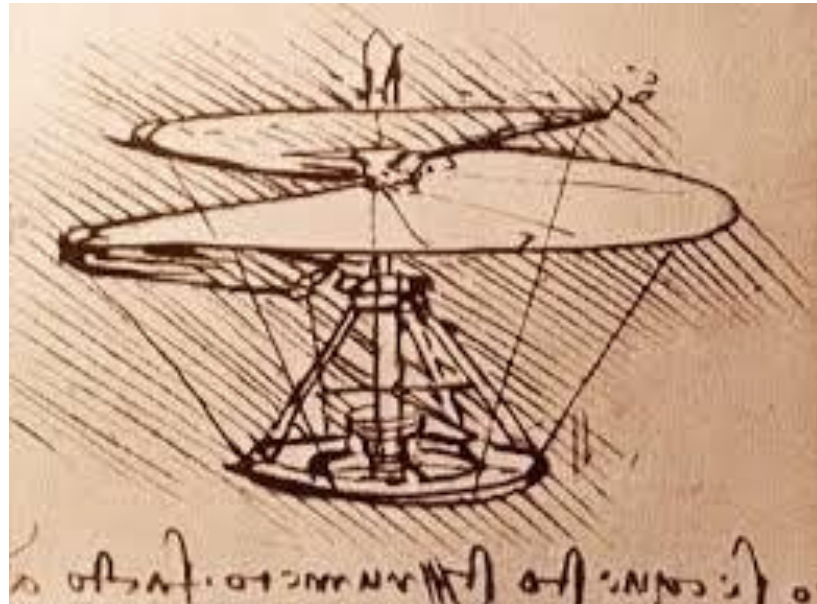
# What is Engineering?

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## 1. In the beginning - *Homo Faber*:

*Ingenium* – clever idea/invention

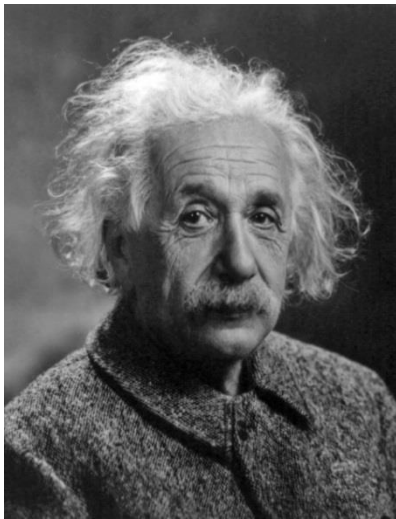
*Ingeniare* – design, devise or construct



# What is Engineering?

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## 2. Building a better future:

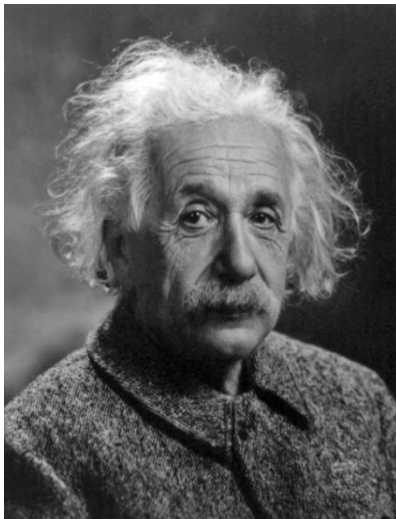


“Scientists investigate that which already is,  
Engineers create that which has never been.”

# What is Engineering?

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## 2. Building a better future:



“Scientists investigate that which already is,  
Engineers create that which has never been.”

“The greatest scientists are always artists as well.”

# What is Engineering?

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## 3. Problem solving:

Product design – idea, design, realise ....

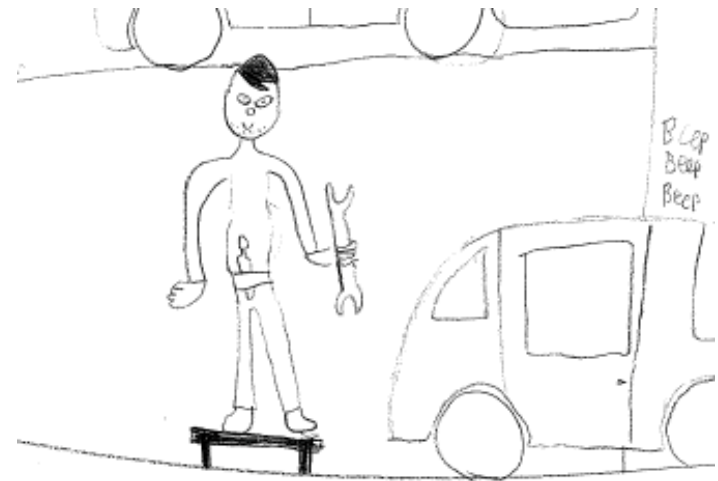
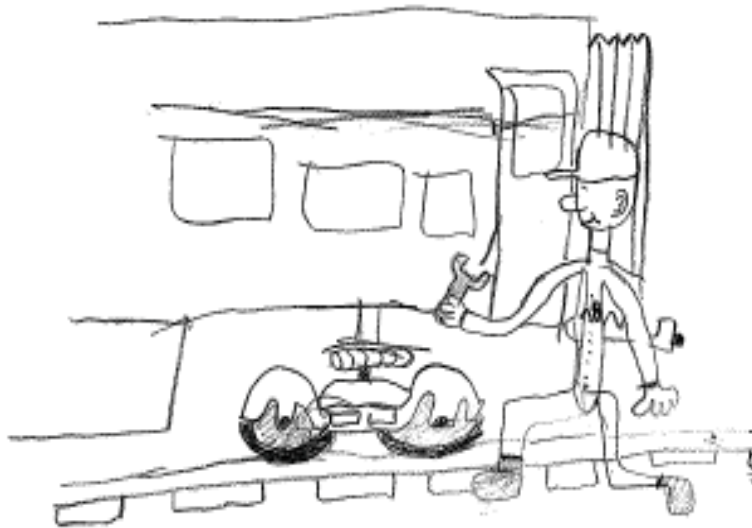
Multidisciplinary thinking

Real problems cross many academic disciplines



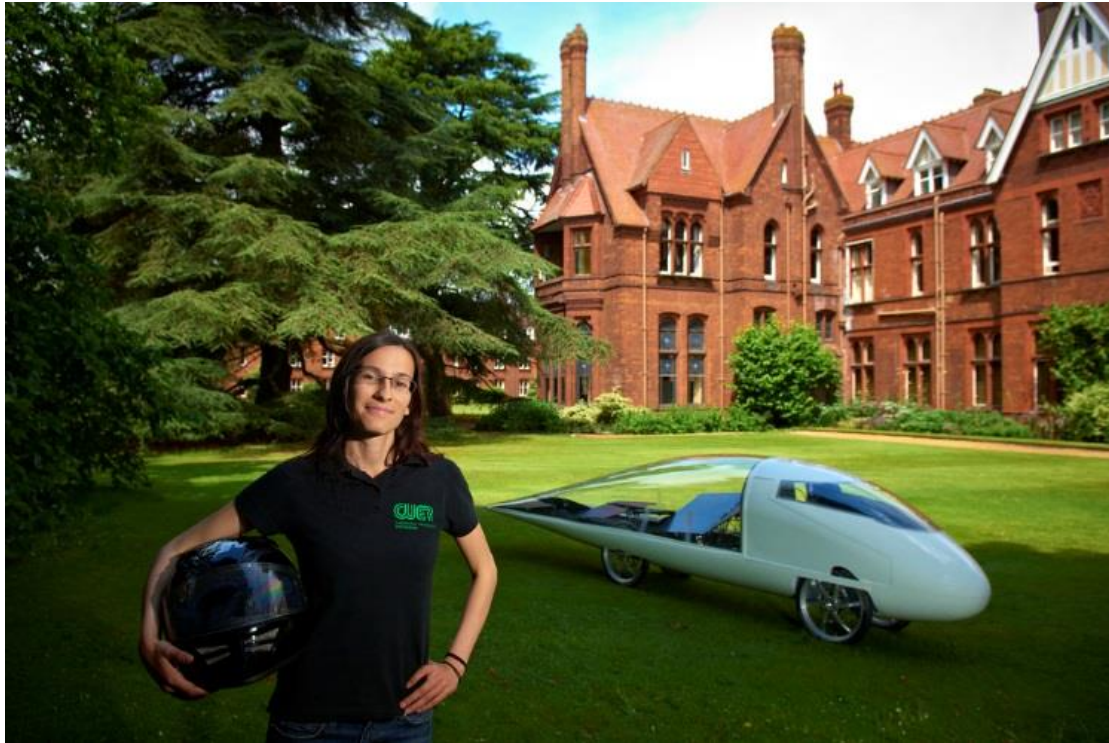
# Misconceptions

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# Engineers as super heroes

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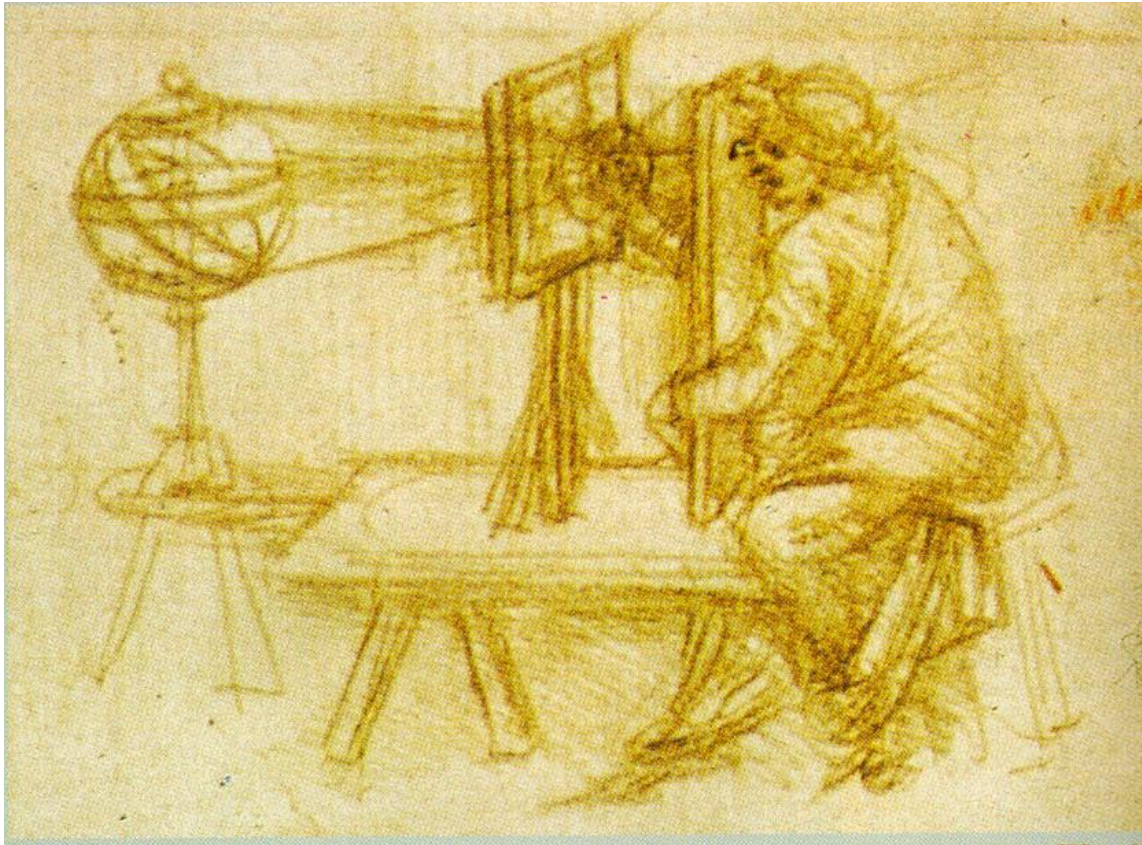
# Outline

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- Computer vision:
  - Making machines that can see
  
- Engineering:
  - Qualities of great engineers
  - What we look for in applicants

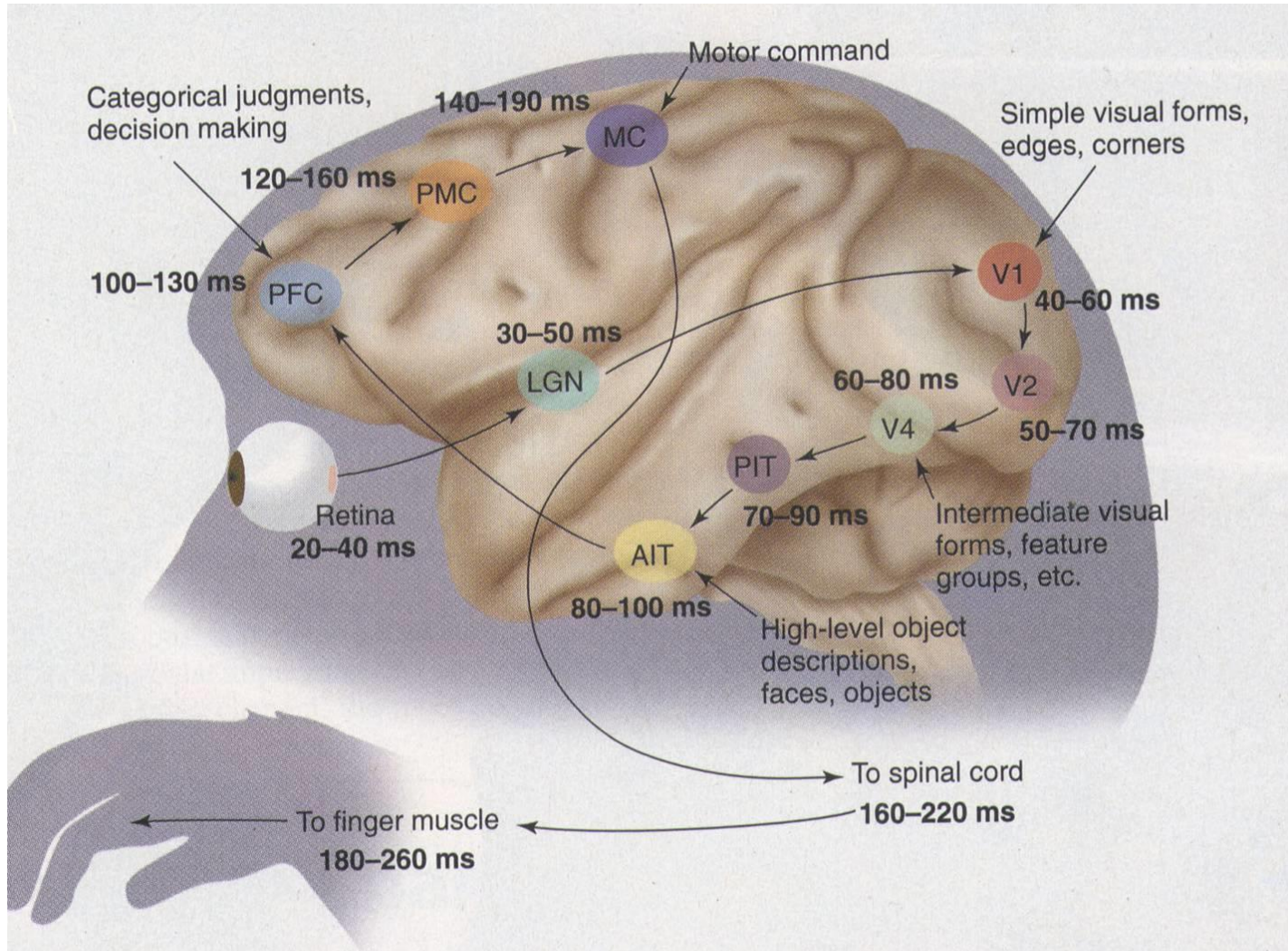
# Science and Art

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“Study the science of art. Study the art of science. Develop your senses.....”

# Vision: what is where by looking



# Computer Vision – What?



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# Why? Images and Video

Computer vision is now in a wide range of products

## Mobile phones



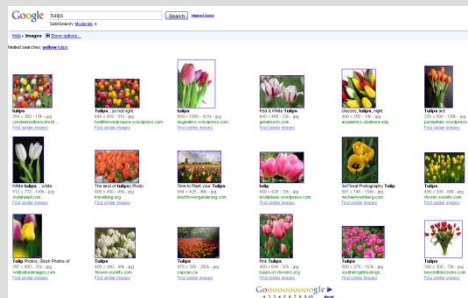
## Cars



## Inspection and measurement



## Image and video search



## Games



## Internet and shopping

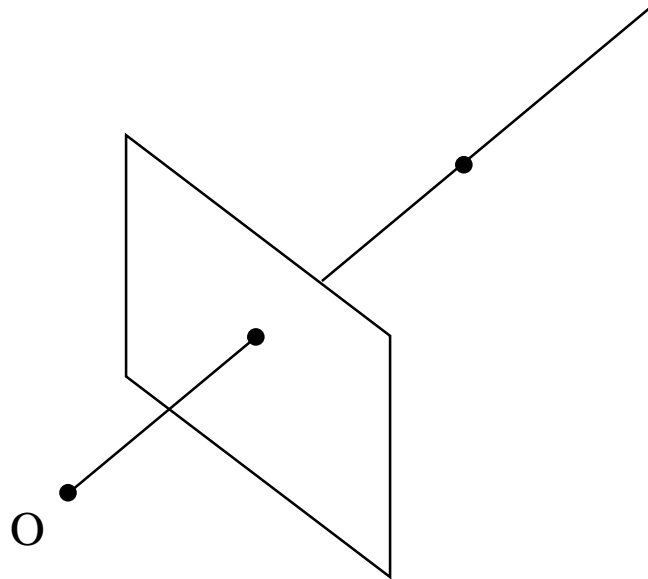


# Example from research engineering

Recovery of 3D shape from  
images

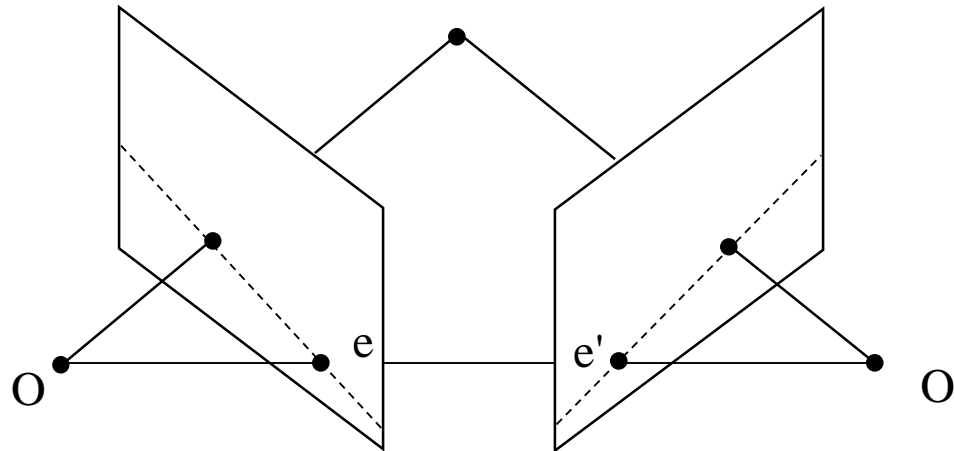
# Ambiguity in a single view

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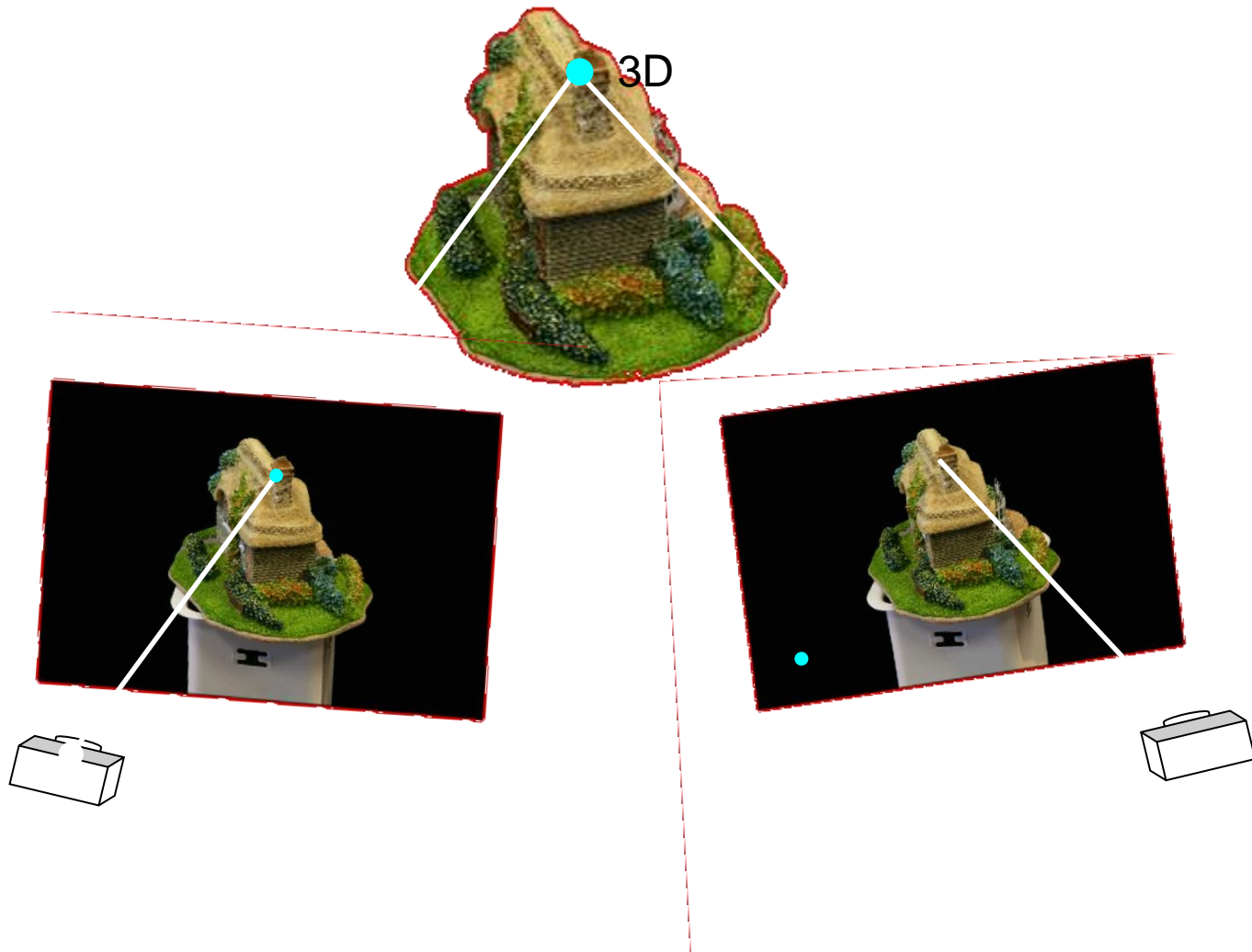
# Stereo vision

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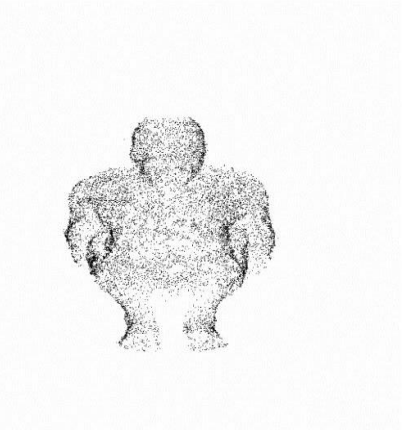
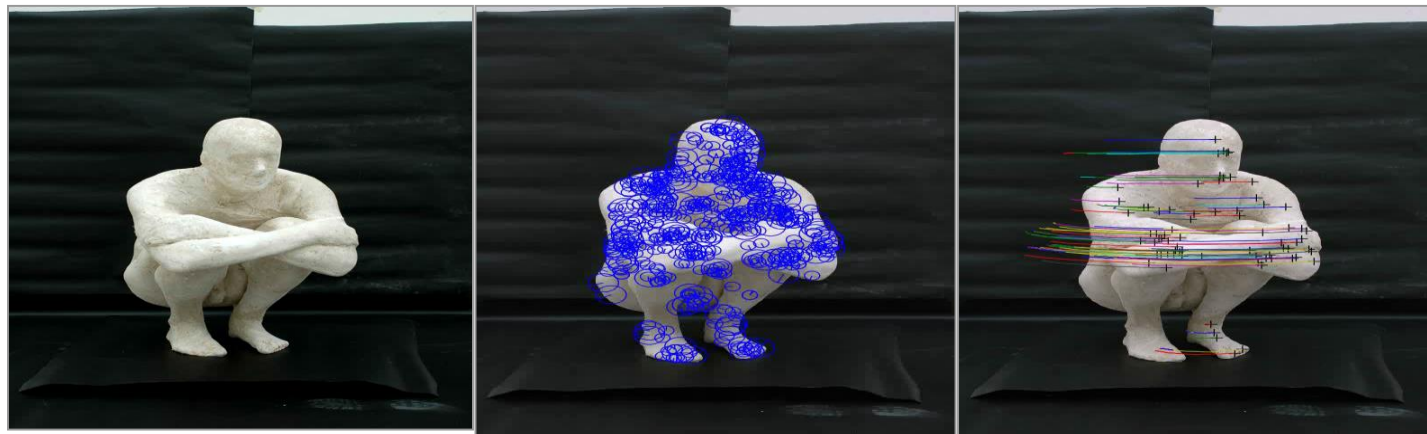


# Stereo vision



# Structure from motion

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Input sequence

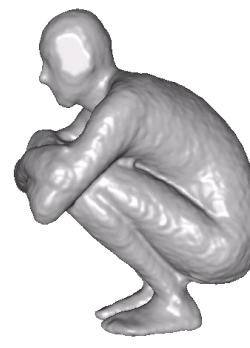
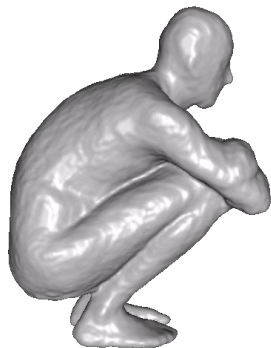
2D features

2D track

3D points

# 3D Models

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# Final installation

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# Magic Mirrors



# Qualities of an engineer

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1. Analytical and technical skills
2. Creative and thinking skills
3. Interpersonal skills

# Qualities of an engineer

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## 1. Analytical and technical skills:

- Aptitude in Maths, Physics and Computing
- Attention to detail
- Analysis of data and optimisation
- Logical thinking

# Qualities of an engineer

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## 2. Creativity and thinking skills:

- Good problem-solving skills
- Creative – curious, asking questions, new ideas
- Organising ideas
- Making plans



# Qualities of an engineer

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## 3. Interpersonal skills:

- Effective verbal and written communication
- Teamwork – listen, lead, optimistic
- Resilience – mistakes are used to learn
- Time management – working to deadlines

# Standing out at interview

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- Technical skills
- Thinking skills
- Interpersonal skills
  
- Character:
  - Passion – enthusiasm
  - Persistence – motivation and commitment
  - Extra-curricular activities – Service and Focus

# Change the world!

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“Engineers turn ideas into reality”

“They use their technical knowledge to improve people's lives, from efficient buildings, low carbon power generation, new materials and microscopic medical devices.”