

Topsides UK 2023

Artificial intelligence for Engineers and Managers – will we all be out of a job in 5 years?

Presentation for our future robot overlords



07 November 2023

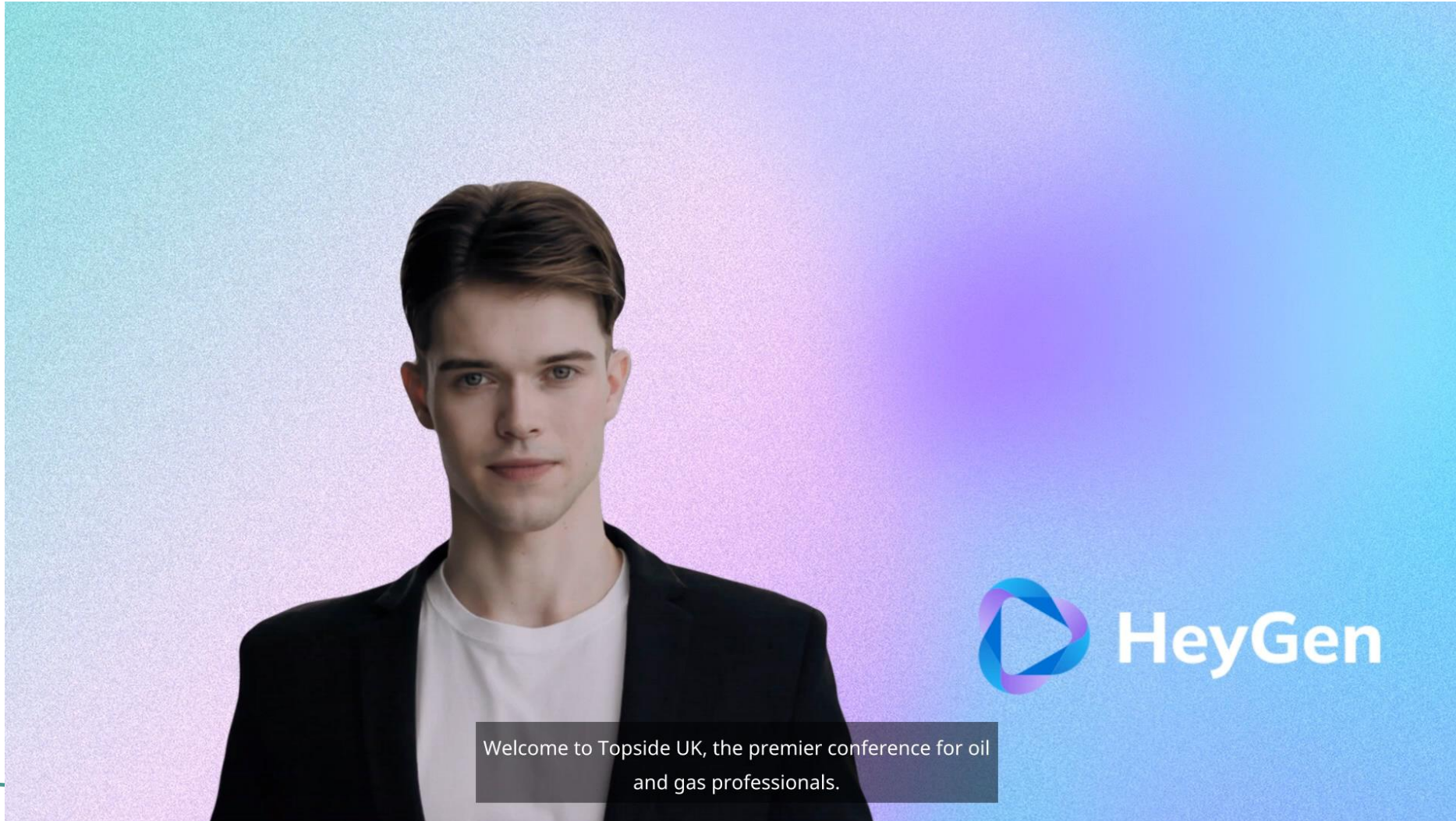
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QMF66



Introduction



Welcome to Topside UK, the premier conference for oil and gas professionals.



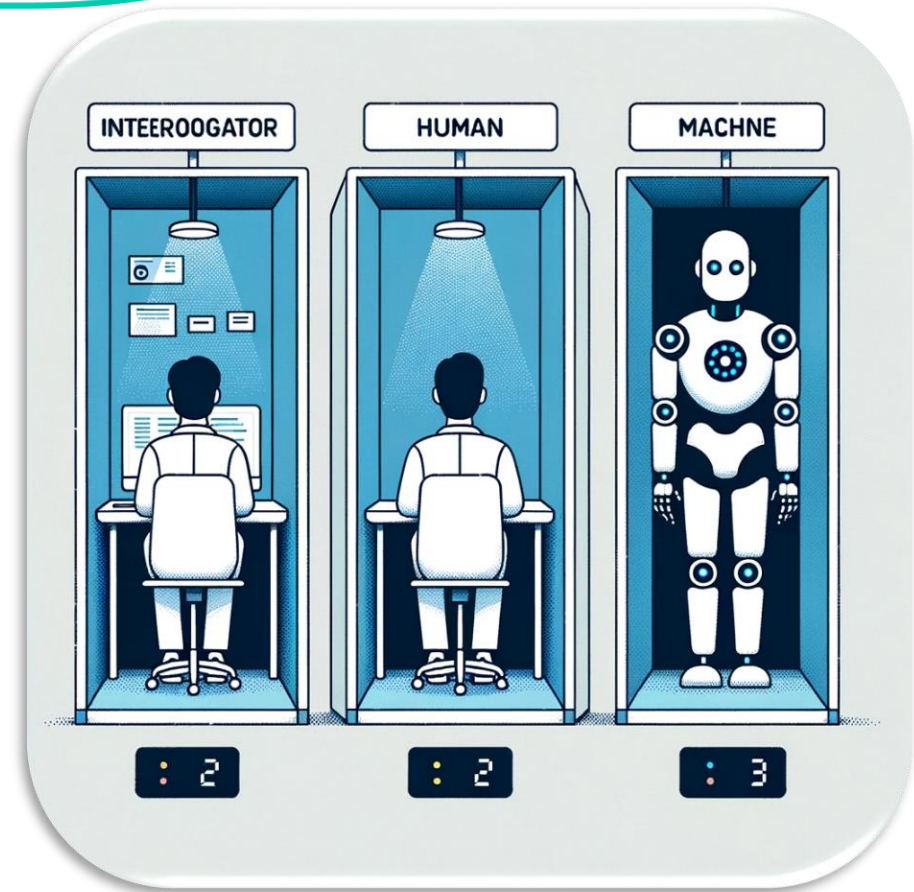
What is AI



Pioneer - Alan Turin



- Alan Turing is often know as the father of modern computing
- He developed the concept of a universal machine, now known as Turin complete
- In 1950 he developed the Turin test, originally called the imitation game
- Alan Turing realized that, when combined with a human's unlimited creativity, machines could solve problems much faster and more reliably.

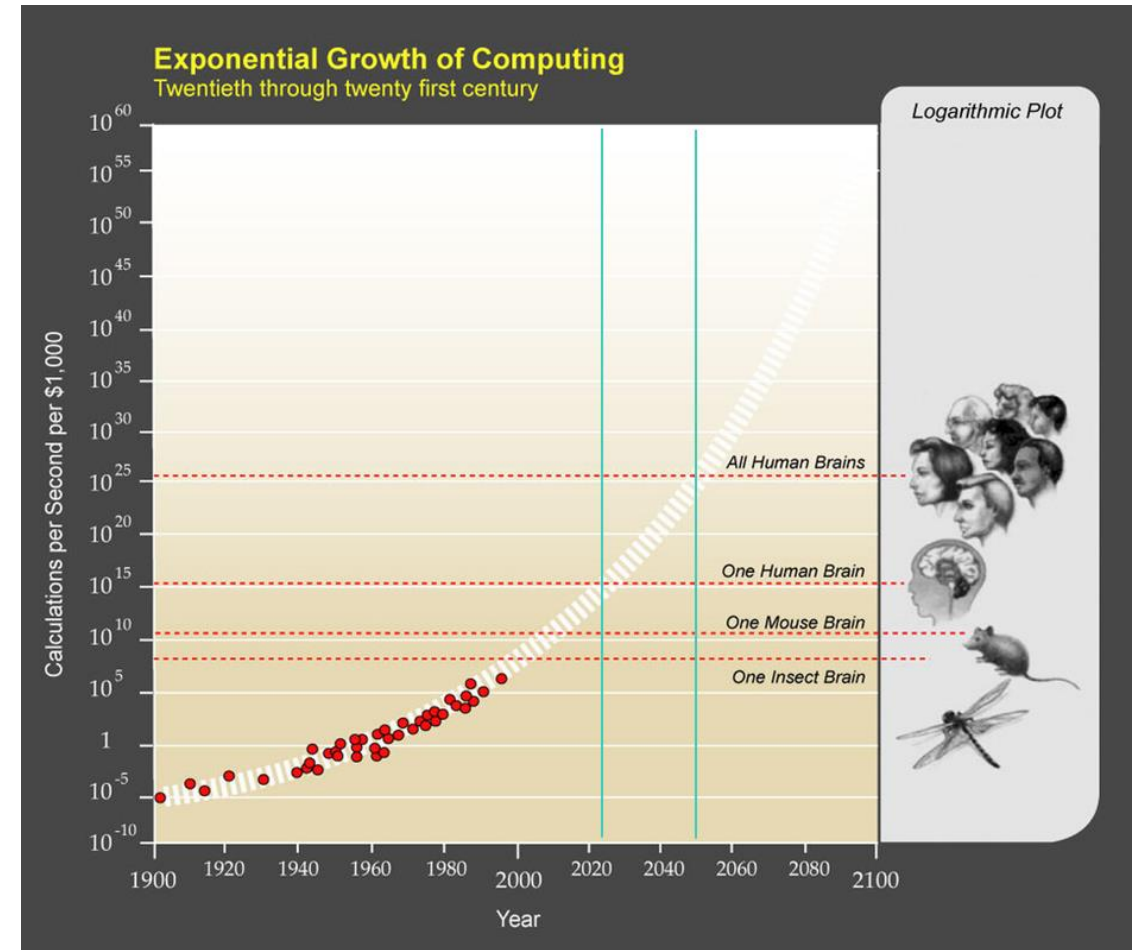


“The original question, can machines think? I believe to be too meaningless to deserve discussion”

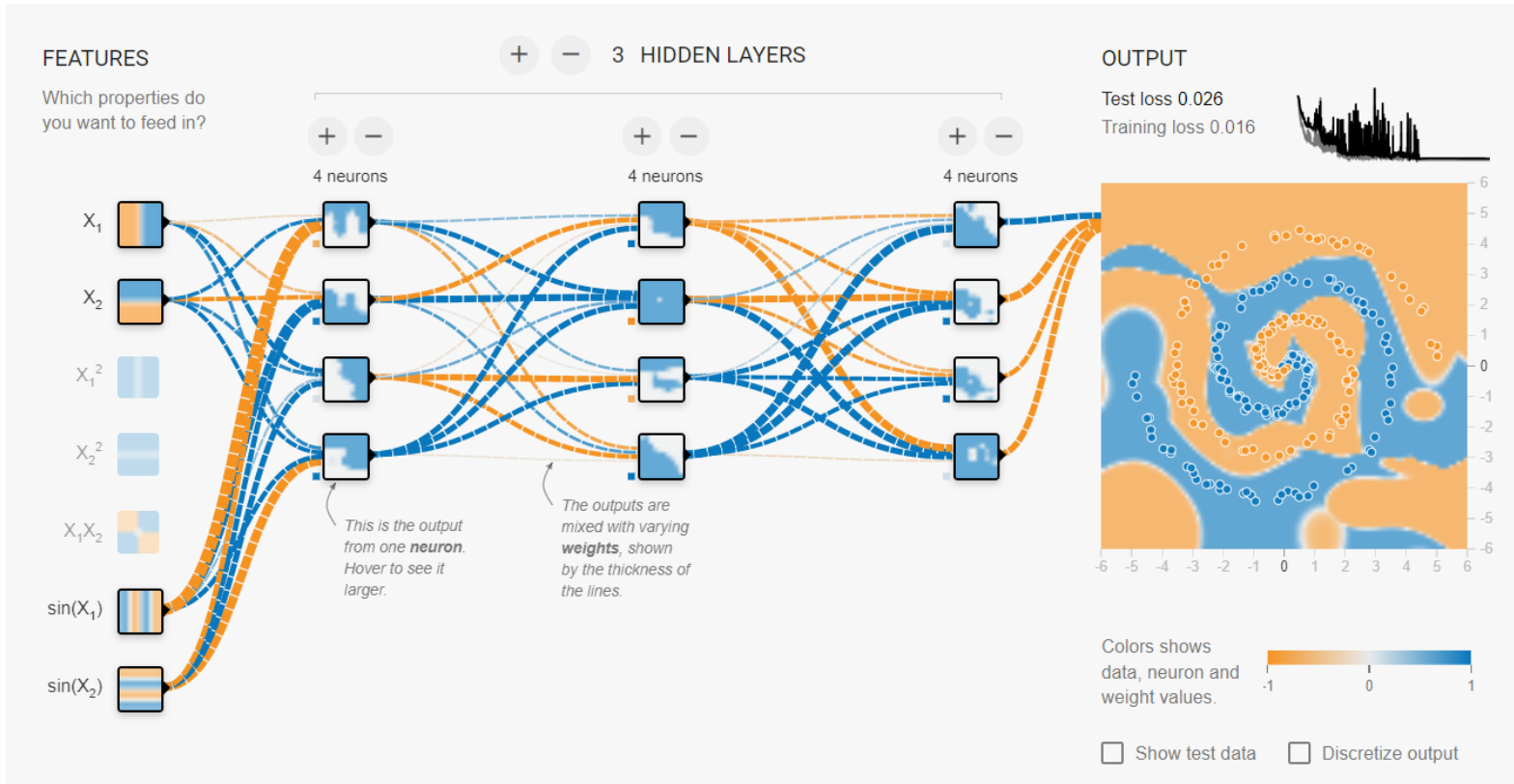
What is AI



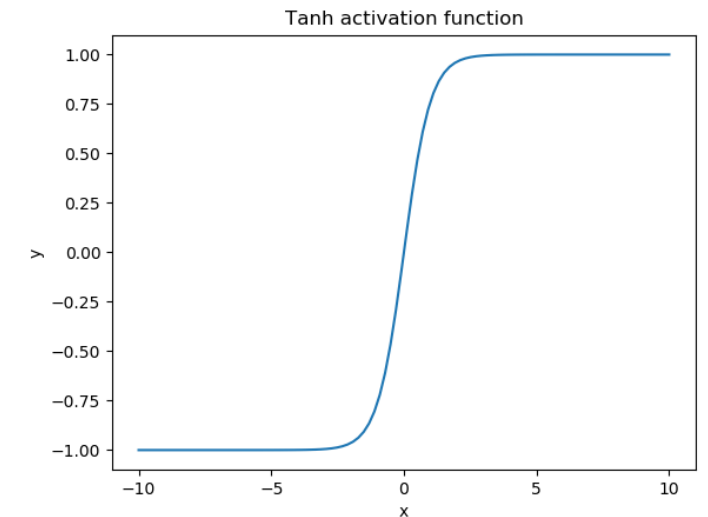
- AI is a very general term, covers a wide range of techniques and models
- Could be a character in a computer game, chess engine, linear regression to calculate house prices based on bedrooms or a “intelligent” chat bot
- When AI works people stop calling it AI
- AI is improving exponentially
 - Gpt2 ~ honeybee brain
 - Gpt4 ~ squirrel brain



Deep neural network



- A simple example is trying to predict the colour of dots in a spiral using a neural network
- Each Neuron is a simple function, however out of this can come complex predictions



<https://playground.tensorflow.org/>

Generative AIs



ChatGPT



- GPT is a large language model (LLM) trained on a huge dataset from the internet from OpenAI
- It has been around for several years but with larger models it has become much more useful
- It “understands” context
 - It puts “attention” on the important part of a sentence and what goes together
- In the given sentence, "it" refers to the pizza. The sentence means that the pizza is too large to fit inside the box.

GA can you explain chatGPT in 3 bullet points?



- Advanced AI model: ChatGPT is a state-of-the-art language model powered by OpenAI's GPT-4 architecture, designed to understand and generate human-like text based on input.
- Versatile conversational agent: It can engage in diverse conversations, answer questions, offer suggestions, and provide information on a wide range of topics.
- Continually evolving: Built on a large dataset and refined through ongoing research, ChatGPT is a constantly improving model designed to offer increasingly accurate and relevant responses.



Model: Default (GPT-3.5)



The pizza cant fit in the box, it is too big. What does the it refer to?



In the given sentence, "it" refers to the pizza. The sentence means that the pizza is too large to fit inside the box.



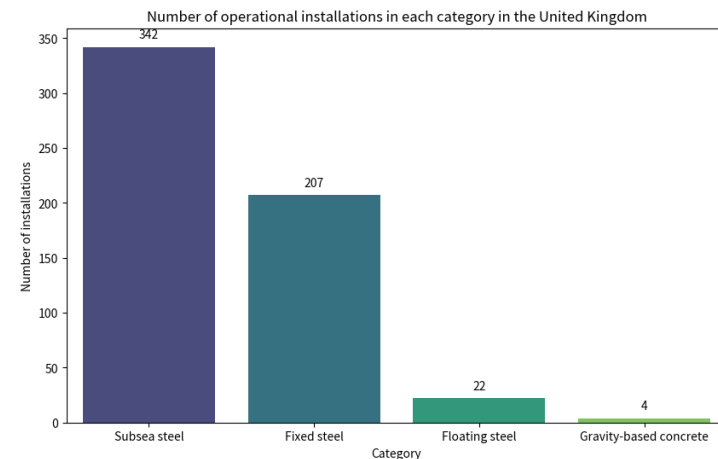
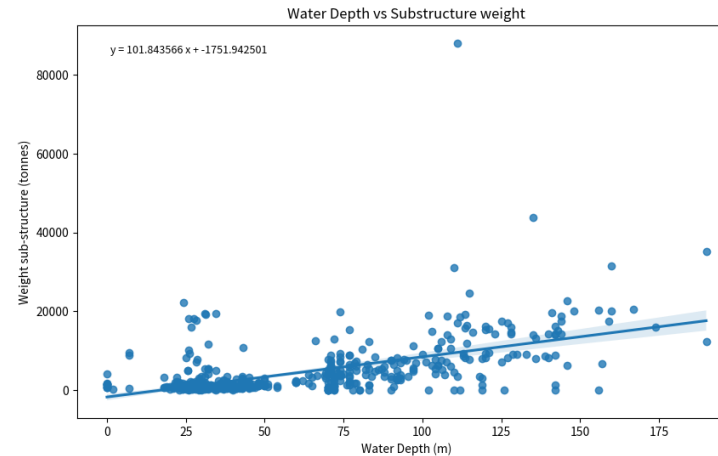
<https://chat.openai.com/>

ChatGPT – additional capabilities



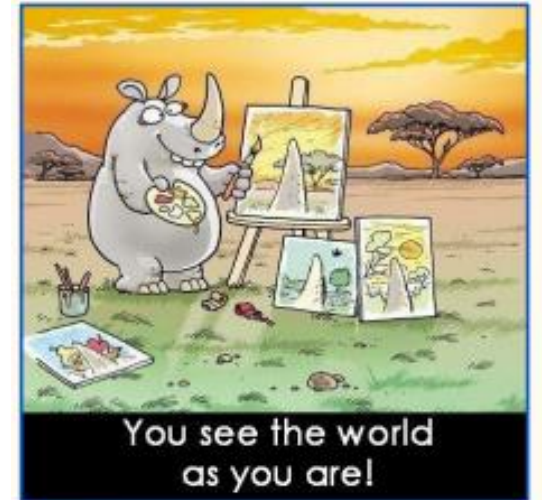
- ChatGPT plus has add-ins for paid users

- Vision
- Generate images with DallE-3
- Data analysis – run python code
- Browse the internet
- Plug-ins
 - Video avatars
 - Draw flowcharts
 - Wolfram Alpha
 - Upload pdfs
 - Notable – python
- Custom instructions



AI in engineering

Prompt:
What is funny about this image?



GPT-4V:
There are a couple of things that people might find funny about this image:
- It is a cartoon of a rhinoceros painting, which is an unexpected and silly concept in itself.
- The rhinoceros is painting a picture of itself, which adds an extra layer of humor.
- The caption, "You see the world as you are!", is a joke about how we all have our own unique perspectives and can be a little self-centered at times.

Image generation



Midjourney prompt: very short hair middle age scottish man wearing a tie portrait photo studio smiling front view -s 750 -v 5



DALL-E Prompt: A photo realistic oil rig in a storm

Bing AI



- Microsoft has invested in OpenAI and is bringing functionality to their products
- Already available in Bing incorporating search results
- Contains references and links
- Free access to some of the capability of ChatGPT plus
- Copilot for Office will help write email

Create content with Copilot

draft a proposal from yesterday's meeting notes

Choose a conversation style Preview

More Creative More Balanced More Precise

New topic Ask me anything...

0/4000

Microsoft Bing SEARCH CHAT

The grid will benefit from lower carbon emissions and lower electricity prices as offshore wind becomes cheaper and more efficient. This will help the UK meet its net-zero targets and reduce its dependence on fossil fuels and imports ³.

The grid will also enable the electrification of offshore oil and gas platforms, which is a key measure to reduce the greenhouse gas emissions from the upstream sector. By replacing gas turbines with renewable electricity, offshore platforms can reduce their carbon footprint and operational costs ⁴. However, this will also increase the demand for electricity from the grid and pose technical and economic challenges for connecting remote and deep-water platforms ⁵.

Learn more: [1. bbc.co.uk](#) [2. newstatesman.com](#) [3. theguardian.com](#) +7 more 1 of 4

Here are some articles about Electrification Of Offshore Oil And Gas Platforms

| | |
|--|--|
| <p>THE CONVERSATION · 5d</p> <p>Electrifying offshore platforms targets a tiny fraction of the oil industry's...</p> | <p>1d</p> <p>New licences granted for North Sea oil and gas projects</p> |
| <p>HazardEx · 7d</p> <p>UK offshore oil and gas emissions have fallen 24% in last five years, new repo...</p> | <p>techxplore · 4d</p> <p>Electrifying offshore platforms targets a tiny fraction of the oil industry's...</p> |

See more news

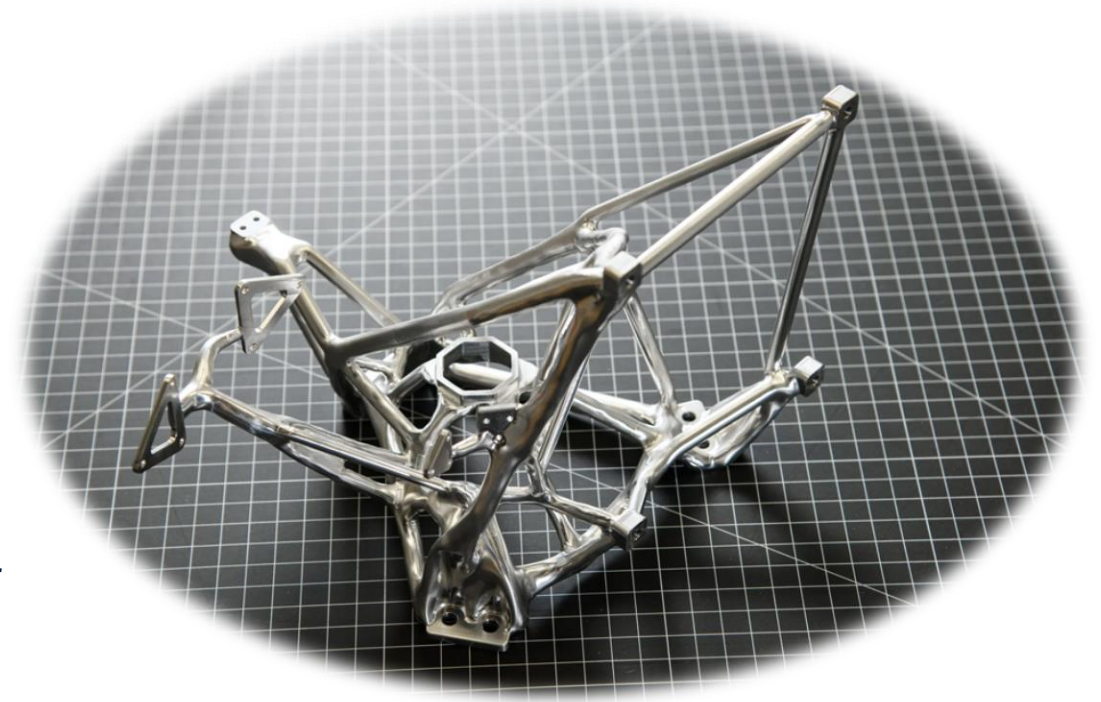
Engineering applications



AI is being used now in engineering



- AI is already doing engineering and has been for years.
- When DeepMind was used to optimise temperature control for Google data centers it managed to save 40% energy even though some of the best engineers in the world had looked at it.
- NASA has created Evolved Structures, a novel approach that AI to construct metal brackets and mounts for its space exploration missions.
 - The system's produces designs that are much stronger than human-designed counterparts while saving up to two-thirds of the weight.
 - Similar tools becoming commercially available in ANSYS discovery live etc.



ChatGPT – Beam calculation



- Can you check if a 5m long UB305x28 beam with a 5tonne point load in the center is acceptable to AISC360-16

To do this, we need to perform a beam analysis to determine if the beam can withstand the applied load without exceeding the allowable stress or deflection limits set by the standard.

Here are the steps you can follow to perform this analysis:

Step 1: Calculate the maximum moment in the beam due to the applied load:

The maximum moment in the beam occurs at the center and is equal to:

$$M_{max} = 5 \text{ tonnes} \times 5 \text{ m} / 4 = 6.25 \text{ tonne-m}$$

Step 2: Calculate the section modulus of the beam:

The section modulus (Z_x) of the UB305x28 beam can be obtained from the manufacturer's data or from standard reference tables. For this beam, the section modulus is:

$$Z_x = 810 \text{ cm}^3$$

Step 3: Calculate the bending stress in the beam:

The bending stress (σ_b) in the beam is given by:

$$\sigma_b = M_{max} / Z_x$$

$$\sigma_b = 6.25 \text{ tonne-m} / 810 \text{ cm}^3 \times 10^3 = 7.72 \text{ MPa}$$

Step 4: Check the allowable bending stress:

The AISC360-16 standard specifies allowable bending stress limits for different types of steel and loading conditions. For this beam, assuming it is made of ASTM A992 steel, and applying the load in the center, the allowable bending stress is:

.....

Since the calculated deflection (0.003 m) is less than the maximum allowable deflection (0.0139 m), the beam is acceptable according to AISC360-16.

Therefore, based on the analysis performed above, a 5m long UB305x28 beam with a 5-tonne point load in the center is acceptable according to the AISC360-16 standard, assuming it is made of ASTM A992 steel.

Impact of AI



Company culture



- Successful implementation of AI requires a culture of innovation and a willingness to experiment with new technologies.
- Companies with an environment that encourages learning and growth, and fosters collaboration between engineers and data scientists will thrive.
- Will engineers come to you with AI success stories, or use it to make their life easier or for personal success?



Quality Assurance



Engineers

- When can you use AI?
- Should you reference it?
- How do you catch hallucinations in a page of text that reads very well, especially outside your core competency?

Managers

- How do you manage people using AI?
- New staff can more easily appear competent especially combined with remote working
- Is your data safe
 - Can you use it on confidential data?



Exposure to AI by industry



Data processing 0.62

Management of companies 0.52

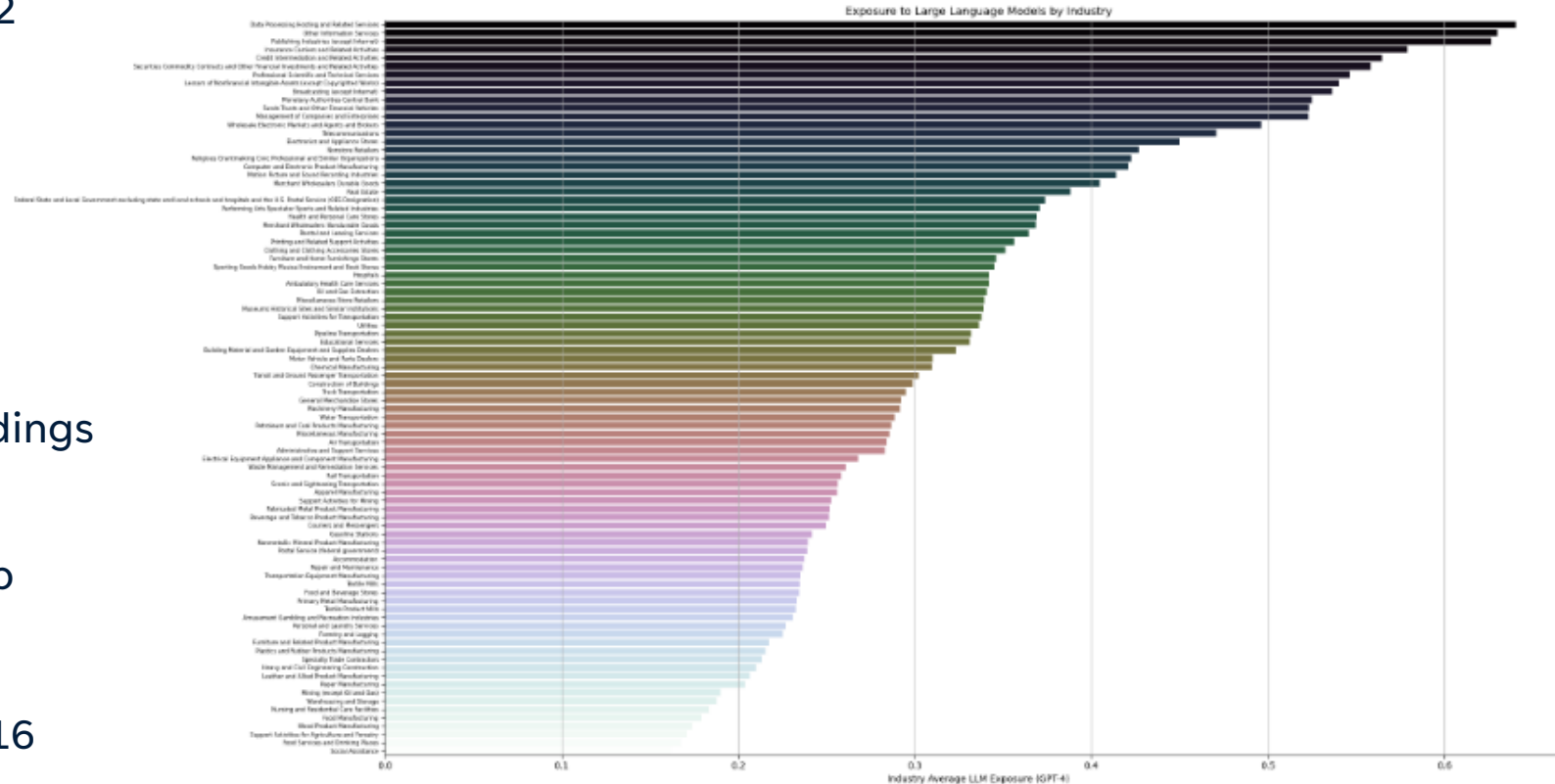
Real estate 0.38

Oil and gas 0.33

Construction of buildings 0.3

Transportation equip manufacturing 0.24

Social assistance 0.16



Exposure to of jobs to AI



- High paying jobs requiring further education more impacted than lower paying jobs
- This doesn't mean jobs will be lost, some industries can become a lot more efficient and continue to grow
- Others will require significantly less people to do the same work

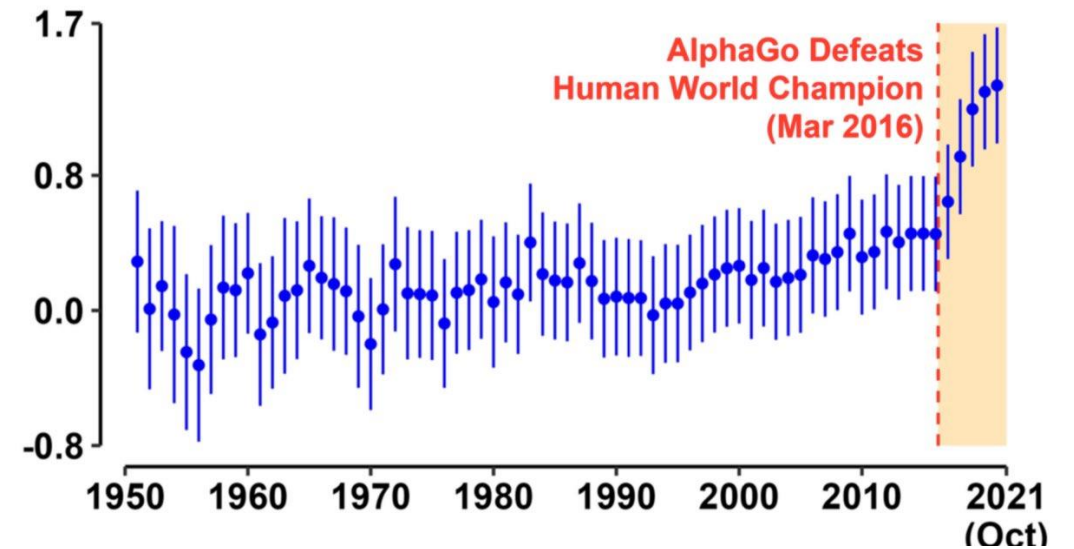


Will we all be out of a job in 5 years?



- Not too many jobs have been automated away completely
 - Elevator attendant
 - Telephone switchboard operator
- Generally, we get rid of the grind and can do a lot more with our resources
 - There are still farmers, but they are controlling expensive automated machinery
 - There are less bookkeepers but now a new industry of business analytics
- Humans have learned from strategies of AI in chess and GO
- New products, new materials and new software designed by AI will let us do things not thought feasible now

Estimated Fixed Effect of Each Year on Median DQI of Each Player in Each Year for Decisions That Differ From AI Decisions



Questions



apollo^o

Engineering tomorrow, today.

