

Introduction

This webinar is essentially an AI masterclass from a practitioner working in this field. It was recorded with the staff and students from Priestley College on 21st May 2021.

The speaker is Nick Tudor who is the CEO of D-RisQ which is a leading UK software and verification system provider based in Worcestershire. Originally used by the UK government, D-RisQ have adapted their own intelligent software verification products for many industries, including aerospace, autonomous systems (air, land, sea and underwater), automotive, marine, defence, cyber-security and nuclear decommissioning.

Nick discusses his experiences working with AI in various applications.

Students were asked to contribute some questions in advance, with additional questions posed at the end of the video.

Discussion topics/group exercises include:

- The process of developing assured software
- The importance of abstraction
- Applications of AI in critical systems

Video length: approximately 63 minutes

Questions are set at the points shown below:

00:00	Introduction Nick introduces himself and explains his military and educational background that has brought him to his current activities.
02:53	Developing Assured Software In this section Nick examines the development lifecycle and explains why projects fail. He begins by talking about poor identification of requirements. But what other reasons are there for IT Project failure. This article examines nine key reasons why projects fail: https://www.atspoke.com/blog/it/reasons-for-it-project-failure/ Each 'reason' has both a case study for discussion and an interesting image to illustrate the point.
09:55	Limitations of Testing
11:18	Modelling and Maths Nick discusses abstraction in context of AI with definitions giving an example of abstraction in the context of the London Underground.
15:58	Proof Nick explains the importance of proof and shows how maths and machine models can be used to test and prove systems.

- 20:32 Assuring Behaviour
NB – at 21:23 the screen shows a YouTube video – Melanie Mitchell – The Collapse of Artificial Intelligence. Unfortunately the link is incomplete. This video can be found at: <https://www.youtube.com/watch?v=4QBvSVYotVc>
This is a 41:30 minute video from May 2019 where Melanie Mitchell discusses what Nick has described, about AI development activity being cyclical. She describes downtimes as ‘AI winters’.
This is quite an advanced lecturer and may not be of interest to all students – therefore it could be set as homework for students who are interested in the application of AI.
- 24:08 Autonomous Systems Projects
This section contains a series of examples in different contexts including a demonstration of an AI controlled flight trial with video footage at time point 28:54.
- 38:26 Summary
- 40:13 **Interviewer Question:** We saw the autonomous vehicle on dry land and then in water. Unfortunately it wasn’t possible to get a sense of scale. How big is it?
- 41:26 **Student Question:** How do you retrieve a submersible that has become tangled underwater?
- 43:45 **Student Question:** The robot uses solar technology in order to recharge. How would the robot recharge if it has to do a night-time mission?
- 45:36 **Student Question:** You described the pre-processes that you have to do before you can begin any coding – how long does it take to come up with a concept in AI?
- 47:15 **Student Question:** Which programming languages do you use when developing AI systems?
- 52:35 **Student Question:** You have already talked about some of the things you have been working on, but what else do you think is coming in terms of autonomous systems?
- 55:30 **Interviewer Question:** A BBC news article in the last week talked about using AI to help a paralysed man to use ‘mindwriting’ to compose sentences. Do you think there will be more applications like this?
To see the article, go to:
<https://www.theguardian.com/science/2021/may/12/paralysed-man-mindwriting-brain-computer-compose-sentences> It contains a 1.5 minute video.
- 57:48 **Student Question:** Do you ever recruit apprentices?
- 59:25 **Interviewer Question:** When you recruit, what behaviours and transferable skills do you look for?
- 62:50 Thank you and webinar close.

Teacher suggestions:

You could use the whole, or parts of the video using the time stamps above.

To set the scene you could consider playing the following 5 minute video which introduces the AI in autonomous submersibles project with input from Chris Ballard, Robotics and Artificial Intelligence Manager and Craig Branney, Engineer – Specialist Equipment, both at Sellafield Limited and Nick Tudor from D-RisQ.

<https://www.drisq.com/case-study-autonomous-aquatic-inspection-intervention-a2i2>

Below are some useful background articles and videos you could use to stimulate discussion:

Elon Musk: Superintelligent AI is an Existential Risk to Humanity:

<https://www.youtube.com/watch?v=iIHhI6HLgp0> This 10 minute video from December 2020 examines increasing concerns about the application of AI and the potential outcomes of superintelligent AI. This is a really good video for stimulating a discussion on ethics. (NB. Has an advertisement part-way through.)

The following article, 6 Dangerous Risks of Artificial Intelligence, published by Mike Thomas in January 2019, but updated in April 2021, <https://builtin.com/artificial-intelligence/risks-of-artificial-intelligence>, the writer considers risks such as job loss due to automation, privacy violations etc. This leads to a second article published in June 2021 entitled: The NHS data grab: why we should be concerned about plans for GPs' records:

<https://www.theguardian.com/society/2021/jun/06/the-nhs-data-grab-why-we-should-be-concerned-about-plans-for-gps-records> and Plan for NHS to collect patient data from GPs should be delayed over privacy fears, also published in June 2021: <https://news.sky.com/story/plan-for-nhs-to-collect-patient-data-from-gps-should-be-delayed-over-privacy-fears-says-labour-12326648>

Below is a small group or pair activity which can be carried out in class or given as homework.

Activity: Which jobs could be automated using AI?

During the webinar Nick suggested that AI's most important contribution could be in the development of systems that can take on dangerous tasks. He also suggested that there will be some jobs that will remain safe from being automated. But what is the current thinking?

AI in Autonomous Submersibles Webinar – Teacher Notes



Work with a partner or small group and use your research to answer the following questions:

- What jobs could be automated using AI? Do you agree with the predictions?

Create one or two PowerPoint slides with the results of your research.

Teacher: The following links could be issued to students to support the activity, but will largely provide the answer.

Filtering search results for the search term “jobs that can be done by AI”, and limiting the date to results after 01/01/2021 will provide a list of recent articles, including:

12 jobs that robots (AI) will replace in the future, and 12 that won't, last updated on 25th March 2021 by Dipayan Deshmukh considers 24 jobs and explains why he thinks these activities will or will not be subject to AI drive automation:

<https://www.saviom.com/blog/12-jobs-that-robots-ai-will-replace-in-the-future-and-12-that-wont/>

Why AI will replace some jobs and others will stick around, published on 2nd February 2021 by Jennifer Shalamanov examines some of the human characteristics that she thinks would be difficult to replicate: <https://www.udacity.com/blog/2021/02/why-ai-will-replace-some-jobs-and-others-will-stick-around.html>