



Frontiers of Artificial Intelligence — how AI is transforming humanity for the global good

Presentation to the ISO/IEC AI workshop sessions

Professor Michael Blumenstein – Acting Dean
University of Technology Sydney

ARTIFICIAL INTELLIGENCE – FACTS/MYTHS

- AI/ML has been around for a long time
- There is no 'general' AI technology currently available
- Designing and developing a good AI system is not easy
 - There is no silver bullet
 - Beware of start-ups and companies that say they have the answer
- Cutting-edge technology is sitting in our University research labs



DEEP LEARNING – THE NEURAL REVIVAL

- Deep learning is a revival of one of the most revolutionary concepts in computing: artificial neural networks (ANNs)
- ANNs are loosely inspired by the brain's interconnected neurons, and which exhibit seemingly intelligent behaviour
- Thus, deep learning enables the processing of massive amounts of data to assist computers in cracking the most difficult problems that humans can solve intuitively (*Nature*, 2014)
- What about **ChatGPT**?
 - Large language models (LLMs) are algorithms for natural language processing that use deep learning / neural networks



SELECTED RECENT ARTICLES



Stop Calling Everything AI, Machine-Learning Pioneer Says

By Kathy Pretz

Posted 2021-03-31 17:00 GMT

Michael I. Jordan explains why today's artificial-intelligence systems aren't actually intelligent

Photo: Peg Skorpinski

MIT Technology Review

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Artificial intelligence

“We’ll never have true AI without first understanding the brain”

Neuroscientist and tech entrepreneur Jeff Hawkins claims he’s figured out how intelligence works—and he wants every AI lab in the world to know about it.

by **Will Douglas Heaven**

March 3, 2021

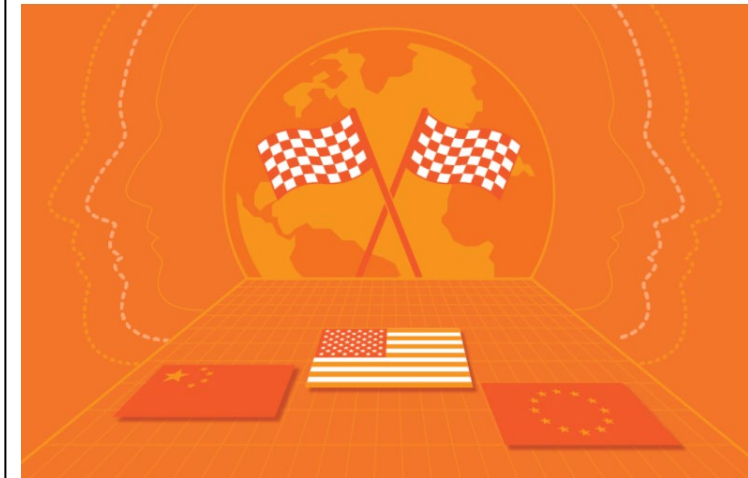


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Who Is Winning the AI Race: China, the EU, or the United States? — 2021 Update

by Daniel Castro and Michael McLaughlin | January 25, 2021



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‘The Godfather of A.I.’ just quit Google and says he regrets his life’s work because it can be hard to stop ‘bad actors from using it for bad things’

BY PRARTHANA PRAKASH
May 2, 2023 at 3:55 AM GMT+10



BUSINESS May 2, 2023

IBM pauses hiring, plans to replace 7800 jobs with AI

IBM chief Arvind Krishna mentioned back-office roles, including human resources, which currently consist of approximately 26,000 workers

by Staff writer



IDEAS • TECHNOLOGY

The 'Don't Look Up' Thinking That Could Doom Us With AI



Hologram of the artificial intelligence robot showing up from binary code. Getty Image/Yuichiro Chino



BY MAX TEGMARK APRIL 26, 2023 6:00 AM EDT
Tegmark is a professor doing AI research at the Massachusetts Institute of Technology

THE RISE OF AI ETHICS & SUNDRY

- Ethical AI

- “The *dangers and risks associated with AI* needed to be acknowledged and addressed now...I believe that only by acknowledging and confronting this reality can we ensure that the *darker aspects of AI* do not tarnish both the value and the virtue of our scientific progress...As such, ambiguity over the principles that govern AI’s application *threatens our way of life...*” (emphasis added) – Alan Finkel, Chief Scientist (2019)

- Coded Bias (2020)

- Trusted Autonomous Systems

- Humanising AI – why?

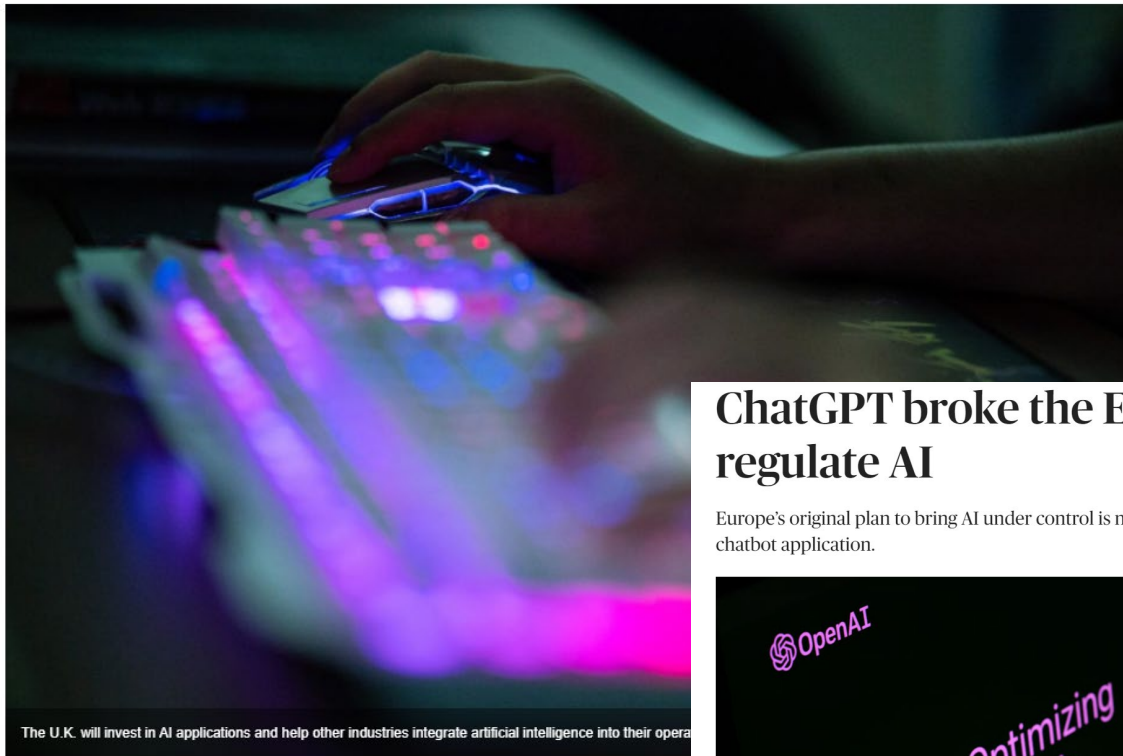
- Over-regulation = Less Innovation

- Precautionary Principle vs. Innovation Principle

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UK charts post-Brexit path with AI strategy

Digital minister says the government's plan is to keep regulation 'at a minimum.'



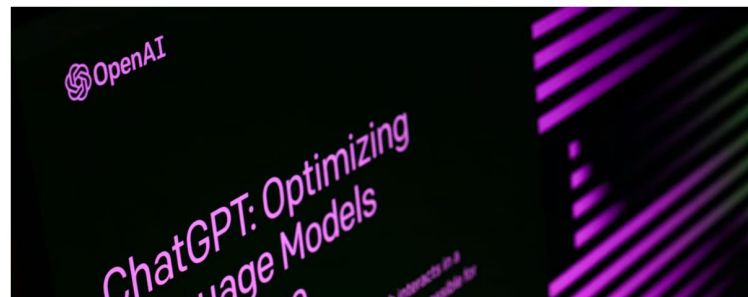
BY MELISSA HEIKKILÄ

September 22, 2021 | 8:05 pm



ChatGPT broke the EU plan to regulate AI

Europe's original plan to bring AI under control is no match for the technology's new, shiny chatbot application.



European AI needs strategic leadership, not overregulation

Mark Minevich @MMinevich / 8:12 PM GMT+10 • May 15, 2021

Comment



Global Opinions and Expectations – AI

TRUST IN A.I. IS CORRELATED WITH PERCEIVED UNDERSTANDING;
BOTH ARE HIGHER IN EMERGING COUNTRIES THAN IN HIGH-INCOME COUNTRIES



Base: 19,504 online adults aged 16-74 across 28 countries, Nov.-Dec. 2021

Online samples in Brazil, Chile, mainland China, Colombia, India, Malaysia, Mexico, Peru, Russia, Saudi Arabia, South Africa, and Turkey tend to be more urban, educated, and/or affluent than the general population.

The "Global Country Average" reflects the average result for all the countries and markets where the survey was conducted. It has not been adjusted to the population size of each country or market and is not intended to suggest a total result.

Global Opinions and Expectations – AI (cont.)

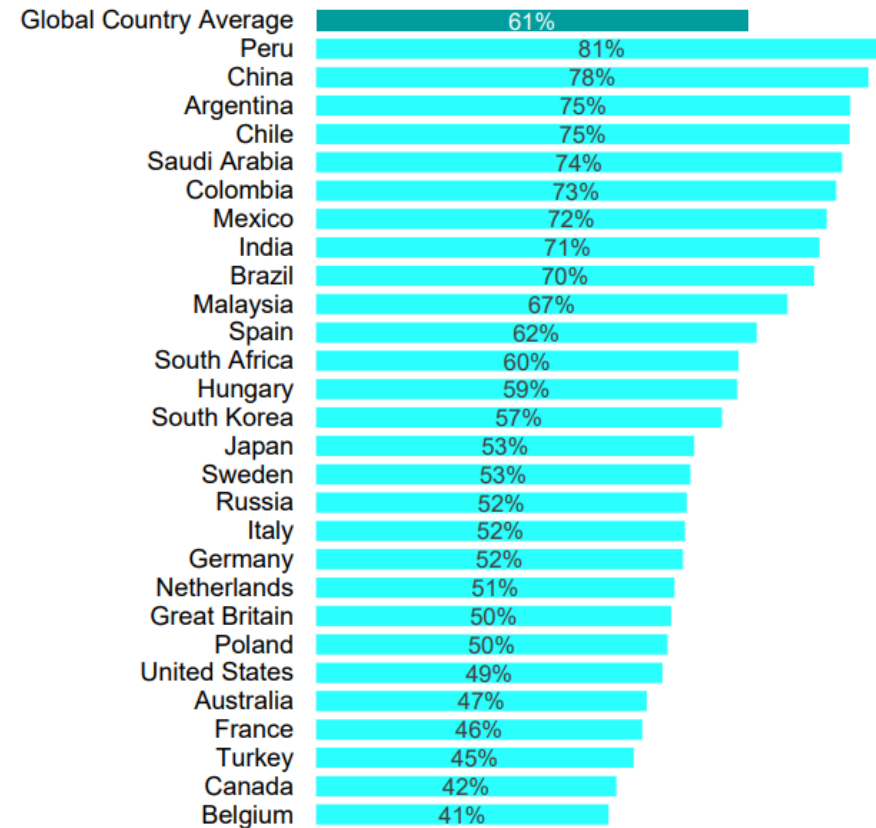
OVERALL EXPECTATION OF LIFE IMPROVEMENT BECAUSE OF A.I. (AVERAGE FOR 13 AREAS)

Q. Please indicate whether you expect that the increased use of artificial intelligence will make each of the following better or worse for you and your family?

Average of % “Better” for 13 areas:

Education/learning new things
Safety
Employment
Shopping
Transportation
Entertainment
Cost of living
Home
Income
Environment
Food/nutrition
Personal and family relationships
Freedom/legal rights

Base: 19,504 online adults aged 16-74 across 28 countries, Nov.–Dec. 2021
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Australian Artificial Intelligence Institute: Intelligent Drone Lab (iDL)

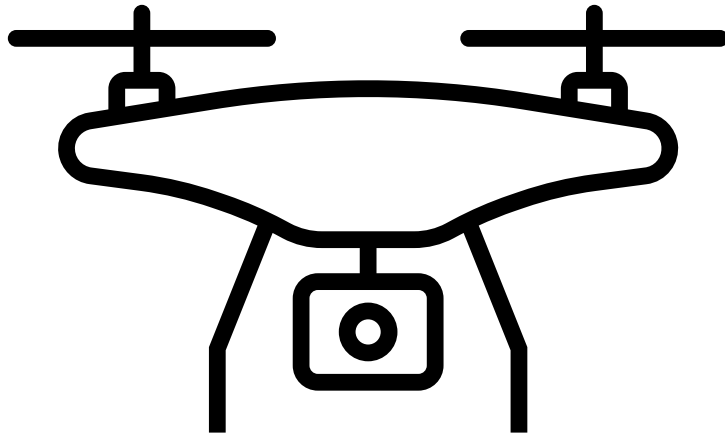
intelligent Drone Lab (iDL)



Prof. Michael Blumenstein
Lab Co-Director

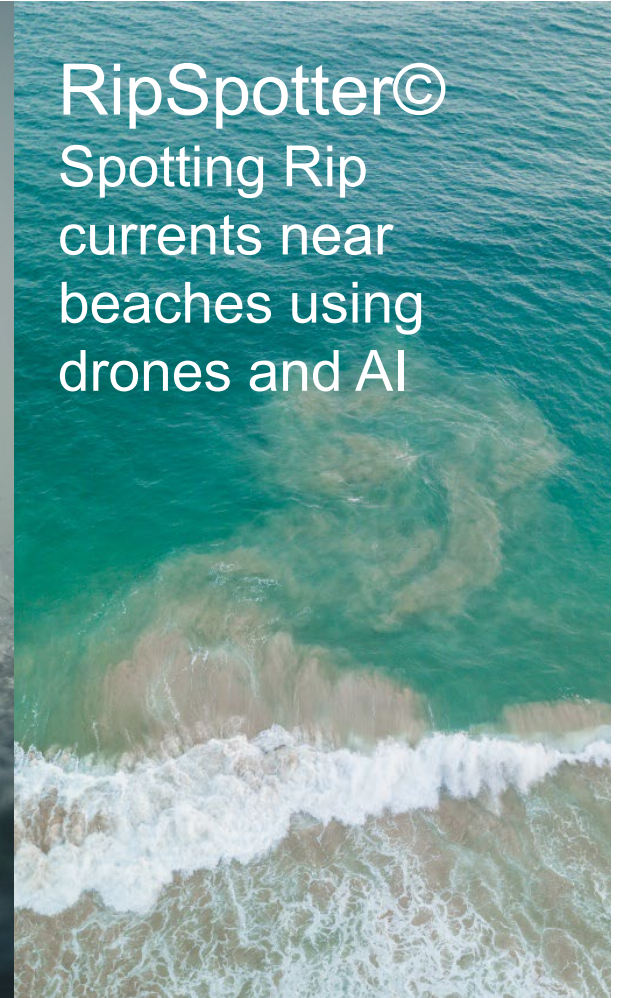
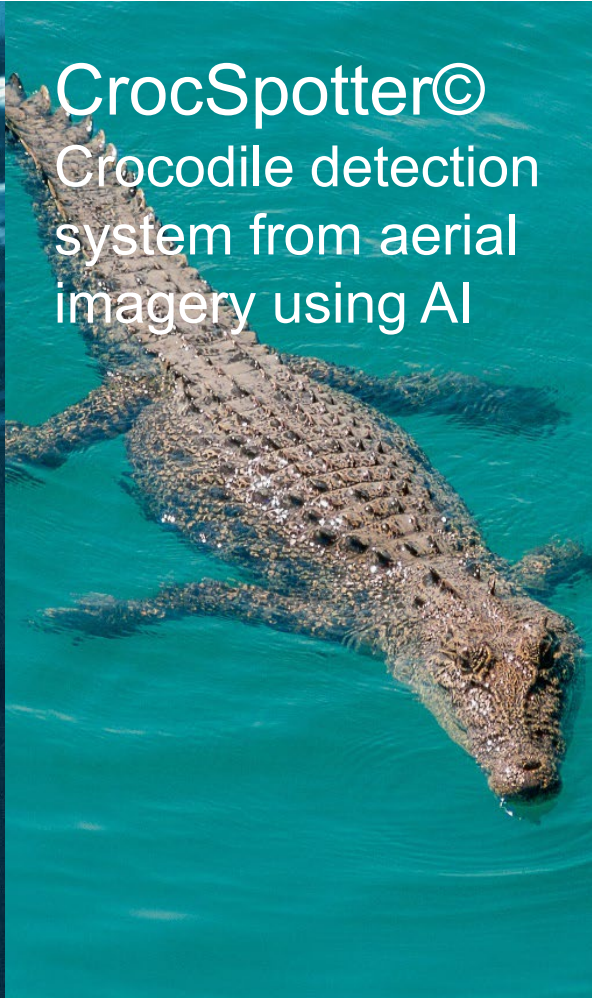


A/Prof Nabin Sharma
Lab Co-Director



- Nation's first laboratory that focuses on research and development for making drones intelligent by incorporating computer vision and machine learning techniques.
- R&D emphasis is on Computer Vision and Machine Learning Techniques for enhancing UAVs.
- Drone Pilot License training, degrees, diplomas, certificates for flying, maintenance and drone management.

iDL Projects





■ **SHARKspotter[®]**

Case Study

The world's first automatic, real-time artificially intelligent shark detection system for Unmanned Aerial Vehicles



Visual (non-automated) Shark Detection





SHARK spotter[©]



Customized End-to-End
Deep Learning
techniques developed



Intelligent real-time video
frame processing

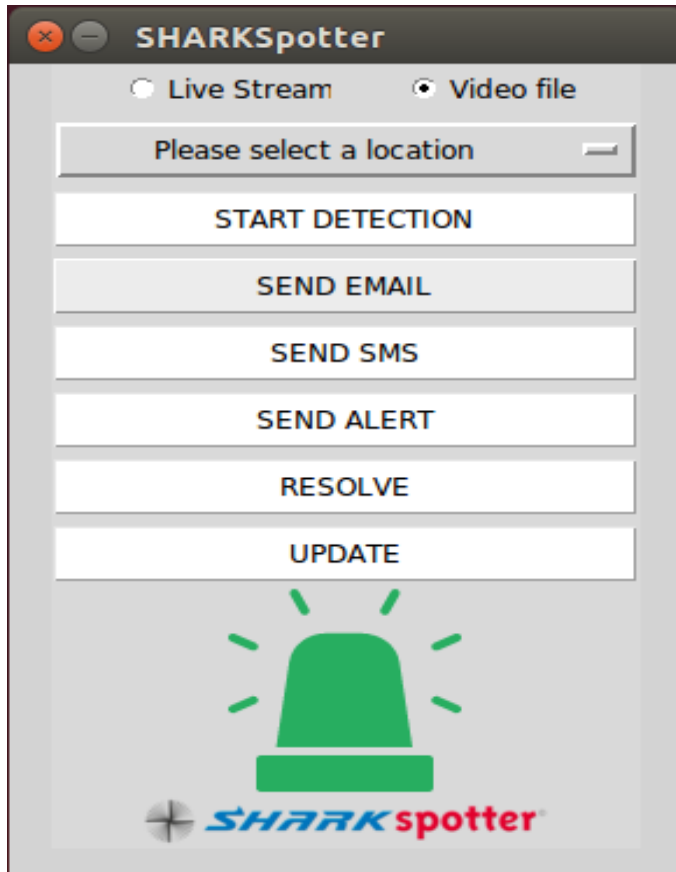


**Augment Human
performance**

**>90% accuracy
16 objects**

The SharkSpotter[®] AI solution

Empowered
with
Intelligence!





The *SharkSpotter*® – Story to-date

- Dec 2017: *SharkSpotter* was deployed at 15 NSW and QLD beaches
- May 2018: successful trials conducted at Reunion Island
 - This contributed to the safety of swimmers & beachgoers
- Two deployment solutions developed:
 - SharkSpotter computing box – in operation
 - Cloud based deployment: Software as a Service (SaaS) – under testing
- International pilots conducted at Reunion Island, Cape Cod, Hawaii, to mention a few

SharkSpotter© – Demo Video

18



THE SHARKSPOTTER DRONE SPOTS
SHARKS IN THE OCEAN AND SENDS
AN ALARM SIGNAL TO THE BEACH.



UTS



Little Ripper
LifeSAVER®

to the rescue

SharkSpotter[®] – Awards

19

Community
Service
Markets –
**NSW State
iAwards
2018**

AI or Machine
Learning
Project of the
Year – **NSW
State
iAwards
2018**

R & D Project
of the Year –
**NSW State
iAwards
2018**

AI or Machine
Learning
Project of the
Year –
**National
iAwards
2018**

Merit in Asia
Pacific ICT
Alliance
**(APICTA)
Awards 2018**

**AAUS
Industry
Champion
Innovation
Awards 2020**



SharkSpotter[©] – in the media

REUTERS World Business Markets Politics TV

Pyeongchang 2018 The Trump Effect Politics North Korea Earnins Myanmar

ENVIRONMENT AUGUST 25, 2017 / 11:06 PM / 6 MONTHS AGO

Shark-detecting drones to patrol Australian beaches

Reuters Staff 3 MIN READ

SYDNEY (Reuters) - Drones equipped with a shark detection system powered by artificial intelligence will start patrolling some Australian beaches from next month in a bid to improve safety.

THE VERGE TECH SCIENCE CULTURE CARS REVIEWS LONGFORM

SCIENCE US & WORLD TECH

Shark-detecting drones take to the skies over Australia

'Little Ripper' drones use artificial intelligence to identify sharks from the sky

By Amar Toor | @amartoo | Aug 28, 2017, 4:58am EDT

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BY LULU MORRIS 21 JANUARY 2018

DRONE SAVES TEENAGERS FROM DROWNING IN NSW

The two teenagers were body surfing at Lennox Beach Near Ballina

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Meet Australia's beach-protecting, AI-powered shark drones

The SharkSpotter uses artificial intelligence to detect underwater dangers. Image: REUTERS/David Gray

04 Sep 2017 Charlotte Edmond

Jaws may have given us an irrational fear of sharks, but for Australia's swimmers and surfers the threat of attack can be very real. In a bid to make its beaches safer, a group of researchers in Australia has created a new shark-detecting

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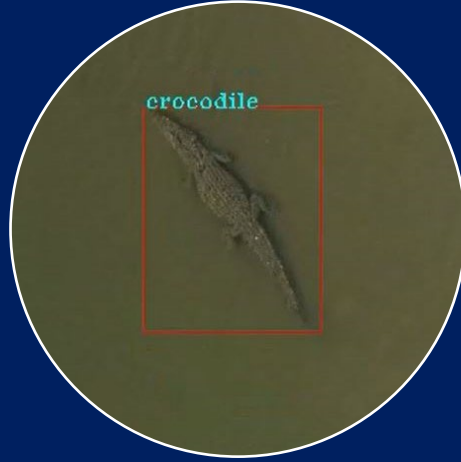
World Africa Australia Europe Latin America Middle East US & Canada

Drone saves two Australian swimmers in world first

18 January 2018 f t Share



Received IC
Grant of \$100K
CrocSpotter[©]
Initial R&D
May 2019



CrocSpotter[©]
trials
August 2019



Live streaming
with CrocSpotter
on Cloud Demo
@World of
Drones Congress
October 2019



CrocSpotter[©] -
SaaS
Cloud Solution
Nov 2019

CrocSpotter[©] PROGRESS

CrocSpotter footage



DistressSpotter©



SwimCounter©

Swimmers: 14
Surfers: 0



Thermal Image processing





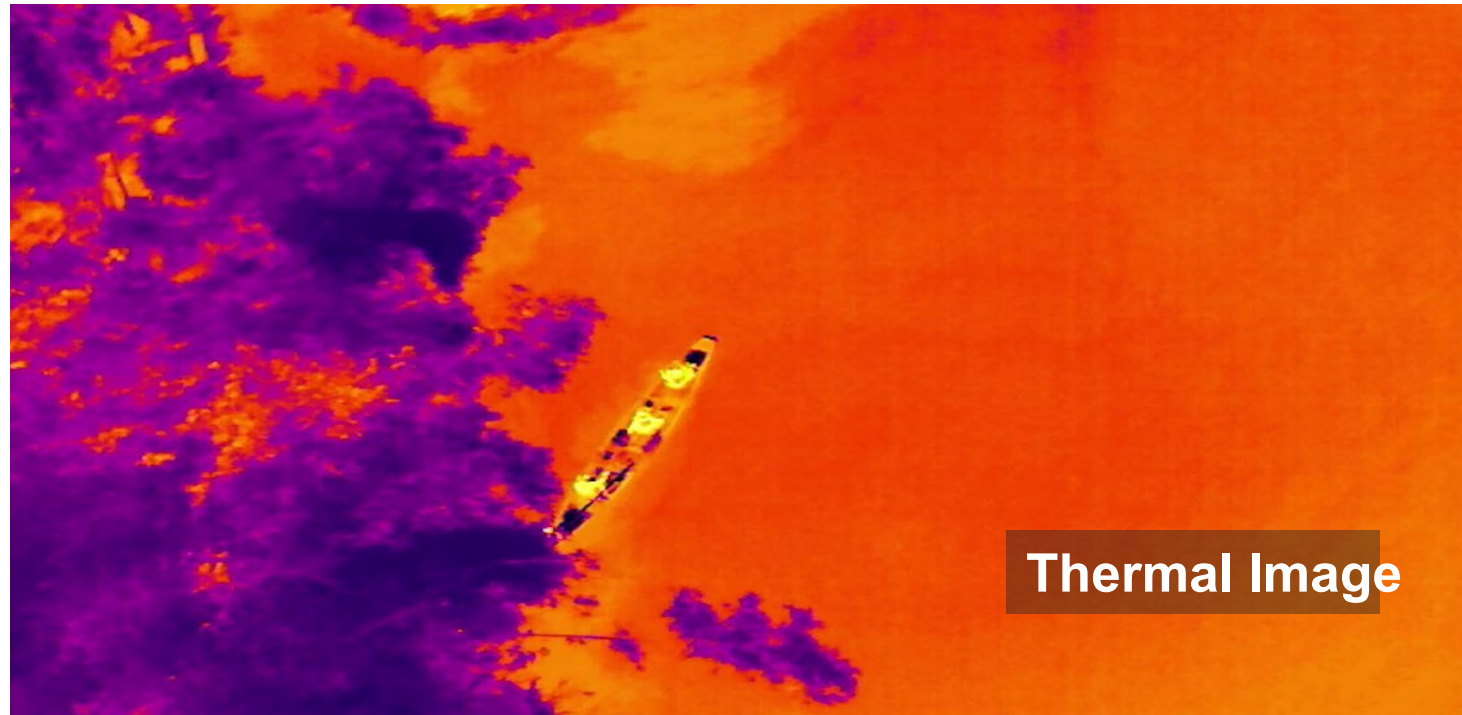
Other iDL Case Studies

Other iDL Projects



RGB Image

Aerial Search & Rescue
(ASAR), Vietnam,
AUS4Innovation Grant

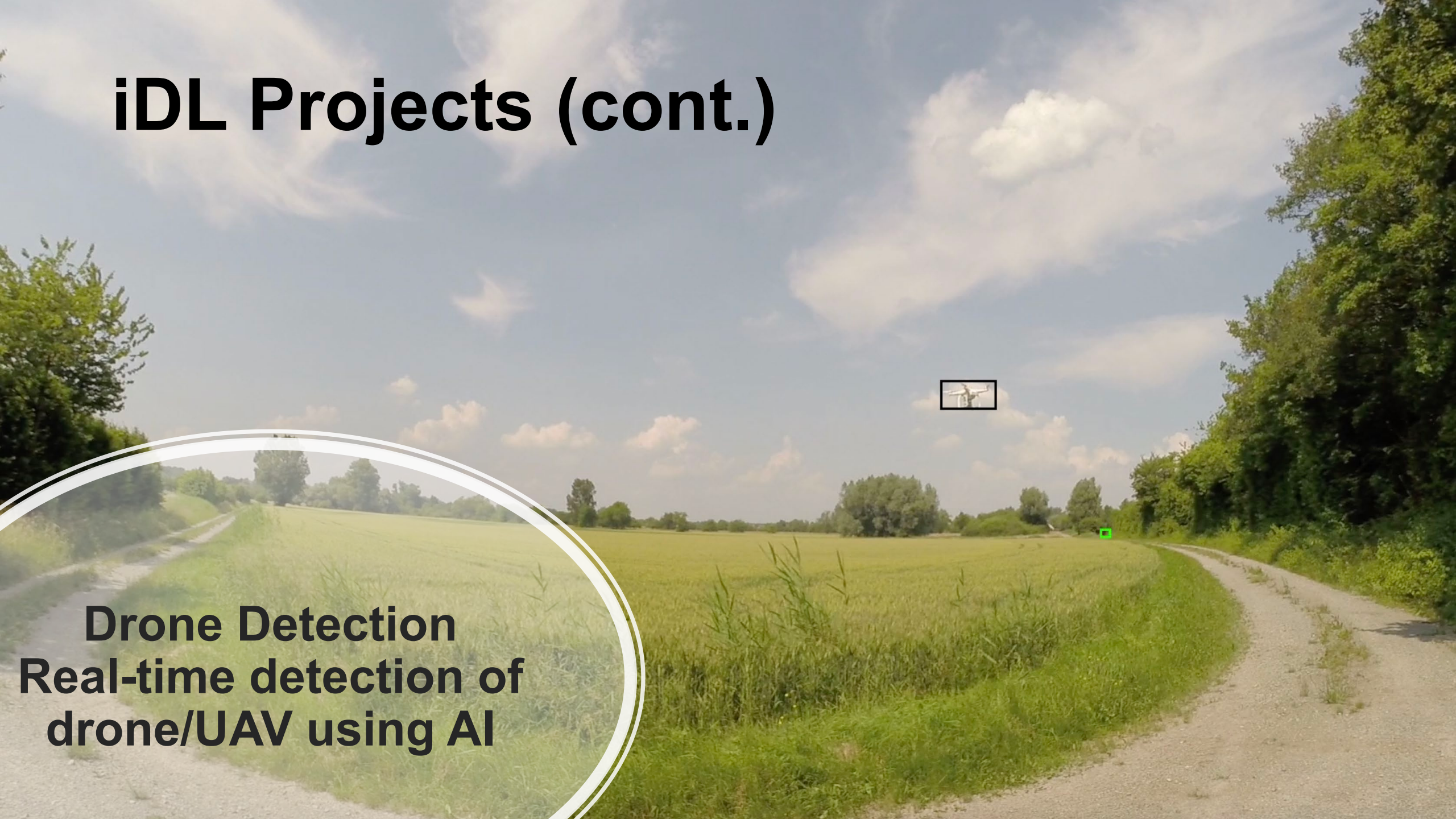


Thermal Image

Drones and AI for SAR – AUS4Innovation Grant



iDL Projects (cont.)



Drone Detection
Real-time detection of
drone/UAV using AI

Drone detection for Security and Public Safety





Questions?

Professor Michael Blumenstein
Acting Dean, Faculty of Engineering and IT