

Modelling and Simulation for Autonomous Systems 2015 (MESAS 15)

Prague – 29 April 2015



The Human Component of Autonomous Systems

Andy Fawkes – Academic Liaison

My Background

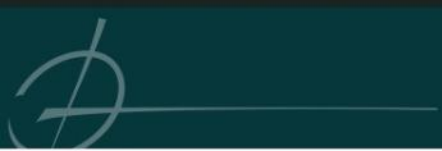


Human Factors can be the “Poor Relation” in Research & Acquisition

- and yet
 - Training can be 20% of a Defence Budget
 - Warfare is (still) essentially a Human Centric Activity



Wikipedia



- Recent Journey
- The Future of Humans and Machines?
- The Human Component of Autonomous Systems



Recent Journey

SCI-274

Workshop on Verification & Validation of Autonomous Systems

24 – 25 June 2014



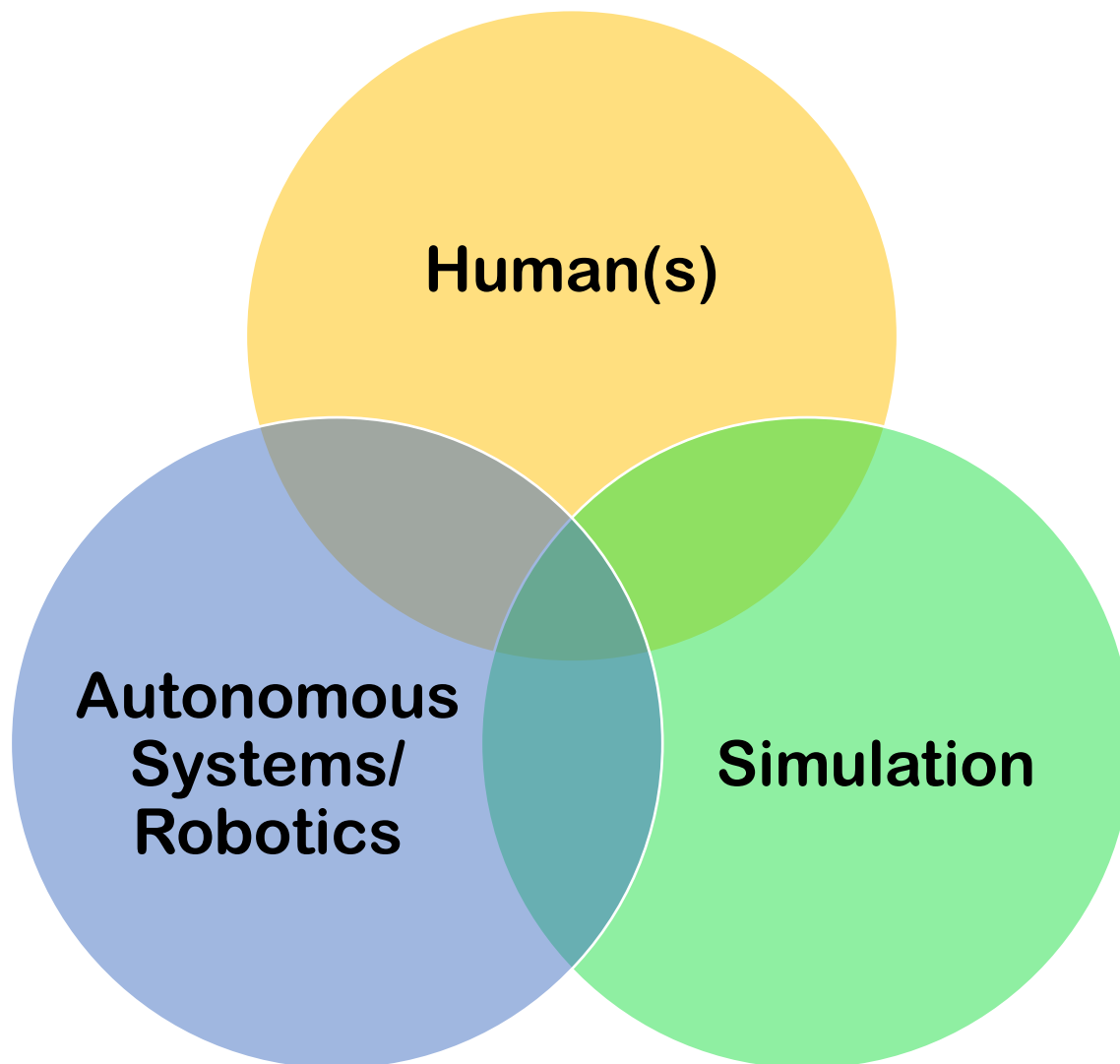


Finding...

**A Valid and Verified Autonomous System must
Include Human(s), and Simulation has a Key
Role in Developing, Testing and Training both
the Autonomous System and Human(s),
Separately and Together**



Mutually Supportive



- Assistive systems, including robotic agents, to support indoor journeys and living for the Visually Impaired
- Uses a gaming environment for extensive “scenario”-training of assistive technologies



- **UK MoD/Dstl Autonomous Systems Underpinning Research (ASUR) Programme**
 - 'What elements of Unmanned System operations can be delegated to autonomous systems?'
- **Demonstrate how simulation can be used to explore those elements of UAS operations that can be delegated to the AS**
- **The novel aspect is the exploration of a clearly defined pipeline to gather and process the data required to build a visual representation of the operational environment that can be used for simulation, mission planning, rehearsal and execution.**



The Future of Humans and Machines?



US Navy X-47B Drone



April 2015

August 2014

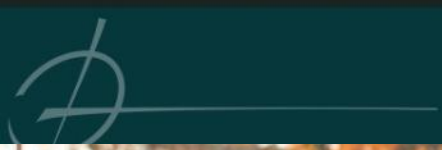


US Navy Media Content Services

Who is Driving Technology?



Source:- Aeryon Labs & Amazon



Google Car



Google Dec 14

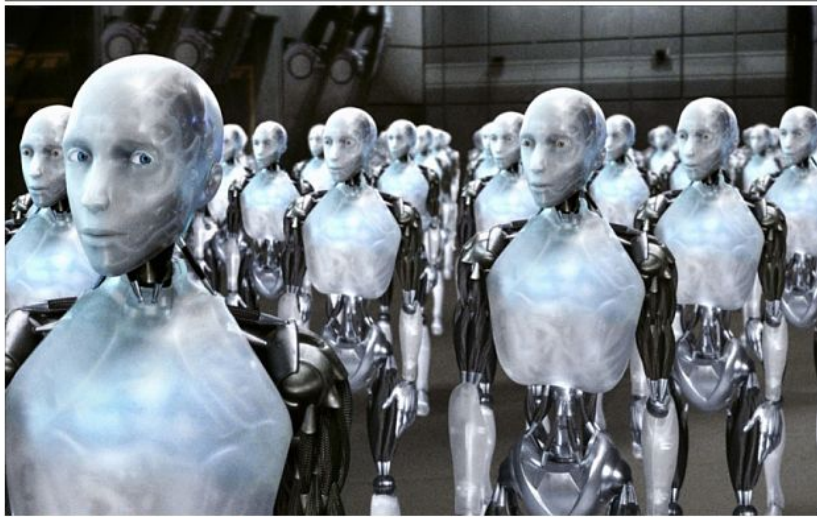
The Telegraph

Home Video News World Sport Finance Comment Culture Travel Life Women Fa
Apple iPhone Technology News Technology Companies Technology Reviews Video Games Te

HOME » TECHNOLOGY » GOOGLE

Is Google building a robot army?

Google has been awarded a patent for a system that would allow it to issue instructions to robotic devices en masse



Army of robots in dystopian science fiction film I, Robot



How about a trip to Marrakech in Morocco?
You can discover this vibrant and bustling Moroccan city on Thomson Cruises' Colourful Coasts itinerary

Sponsored by Thomson Cruises



By **Sophie Curtis**

4:27PM BST 15 Apr 2015

[Follow](#) 6,044 followers



HOME TECHNOLOGY SECURITY NEWS ▾ INTERNET ▾ LAWS AND LEGALITIES

YOU ARE AT: Home » Google » Google Army to become a reality : Google awarded a patents for a method to control a Ro



Google Army to become a reality : Google awarded a patents for a method to control a Robotic army

0

BY MAYA KAMATH ON APRIL 15, 2015

GOOGLE TECHNOLOGY

[Like](#) 20k



Google won a new patent which designs methods to connect the Robots over a Cloud by a smartphone and complete any assigned task.

New Procurement Models

ars technica

MAIN MENU MY STORIES: 25 FORUMS SUBSCRIBE JOBS ARS CONSORTIUM

LAW & DISORDER / CIVILIZATION & DISCONTENTS

Ukrainians turn to crowdfunding for border surveillance drone

Octocopter "People's drone" would watch border with Russia.

by Sean Gallagher - Jun 30, 2014 8:39pm BST

Share Tweet 27



The "People's UAV," paid for by crowdfunding, will watch the Ukraine-Russia border.

narodny.org.ua

In a strange case of crowdfunding meets national defense, a group of Ukrainians have launched a website to help fund the construction of a fleet of drones to patrol the country's border with Russia. The **People's Project** has **successfully raised approximately \$36,000** to build an initial squadron of 10 "People's UAVs"—autonomous octocopter drones equipped with cameras.

sign in search

jobs more UK edition

the guardian
Winner of the Pulitzer prize 2014

home > tech UK election world sport football opinion culture business all

Technology

Crowdfunding a war: Ukraine's DIY drone-makers

In a David versus Goliath-like battle, Ukrainian forces look to private companies and crowd-funded volunteer organisations to develop defence software and drone hardware in their fight against Russia



Ukrainian volunteers practice drone operations, not far from Kiev, before being sent to the eastern-Ukrainian conflict zone for aerial researching. Photograph: Oleg Petrasjuk/EPA



Rift Drone

AR.Drone 2.0 + Oculus Rift + Unity + Xbox 360 Controller



Rift Drone is open source: <https://github.com/scopus777/RiftDrone>



GIZMODO

Search

"Mind-Controlled" Airplanes Might Just Be A Thing



Pranav Dixit

Filed to: MIND-CONTROL 6/01/14 5:58pm

9,630 2 ★



A [mind-controlled](#) iPhone? Sure, we'll take it. A [mind-controlled](#) Samsung Galaxy Note 10.1? Why not? A mind-controlled airplane powered by the pilot's brainwaves? Hold on for a moment while we look for the nearest emergency exit.

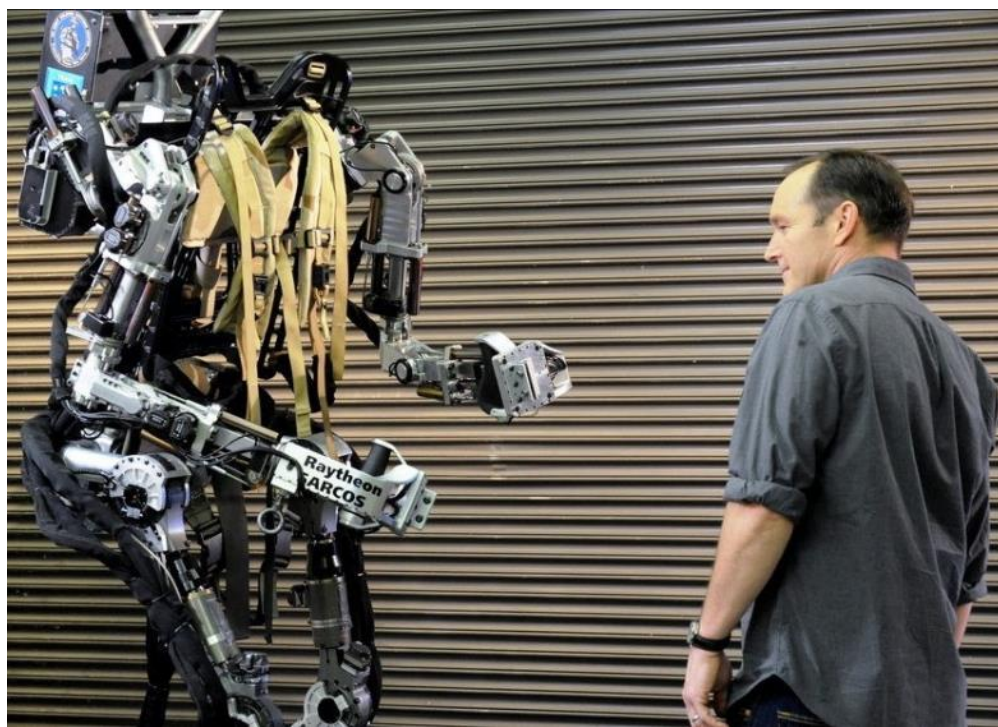
Using your mind to control an airplane sounds bonkers, but according to this [CNET report](#), researchers are working on just that. A team from the Technische Universität München (TUM) in Germany strapped electroencephalography electrodes to the heads of participants, put them in a flight simulator - not a real aircraft, thank heavens - and instructed them to control the plane using only their minds.

Even though few of the participants had any cockpit experience, the experiment was apparently a success since they were all able to fly so well that they could have gotten a pilot's licence.



Source - Wired - May 13 and <http://youtu.be/baEYCberLUA>

Raytheon's Second-Generation Exoskeleton (XOS 2)



“Pibot” Robot Pilot (Oct 14)



Source: South Korea's Advanced Institute of Science and Technology – Oct 14



Google DeepMind AI (Feb 15)

100 Training Episodes

Technological Singularity?

THE INDEPENDENT WEDNESDAY 22 APRIL 2015



NEWS VIDEO PEOPLE VOICES SPORT TECH LIFE PROPERTY ARTS + ENTS TRAVEL MO

UK ▾ / World ▾ / Business ▾ / People / Science / Environment ▾ / Media ▾ / [Technology](#) / Education ▾ / Images / Obit

News > Technology

A third of UK jobs to be replaced by robots and computers in next 20 years



Low-paid, repetitive roles are most at risk, following an established global trend for automated systems to replace human labour

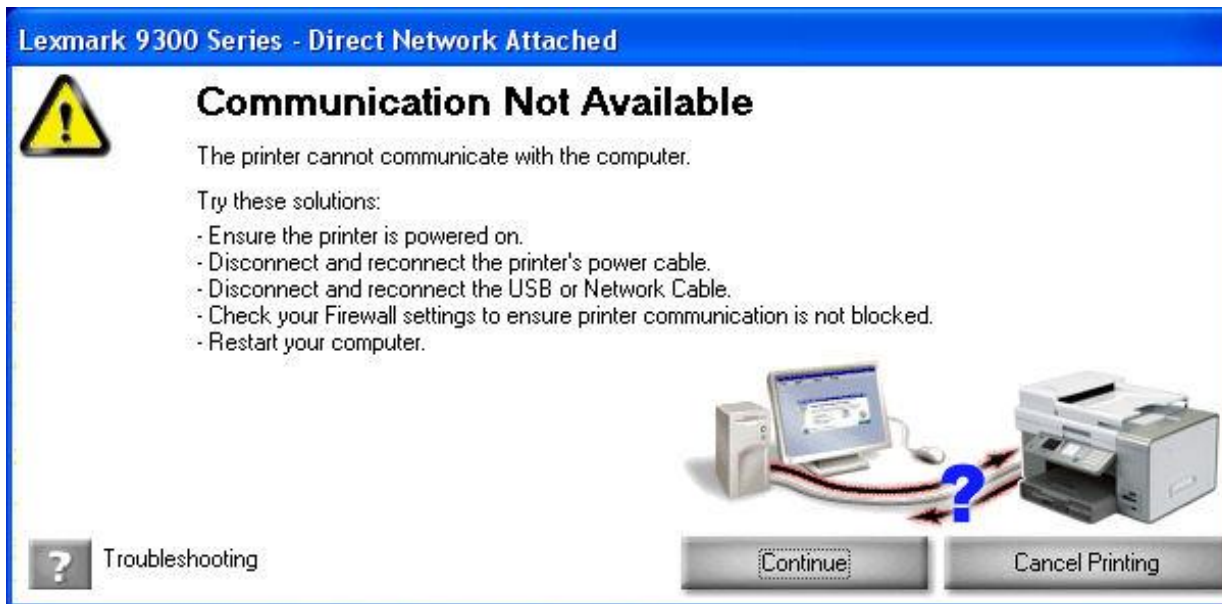
JAMES VINCENT | Monday 10 November 2014



Two Views of Technology



Some Basic Hurdles Remain!





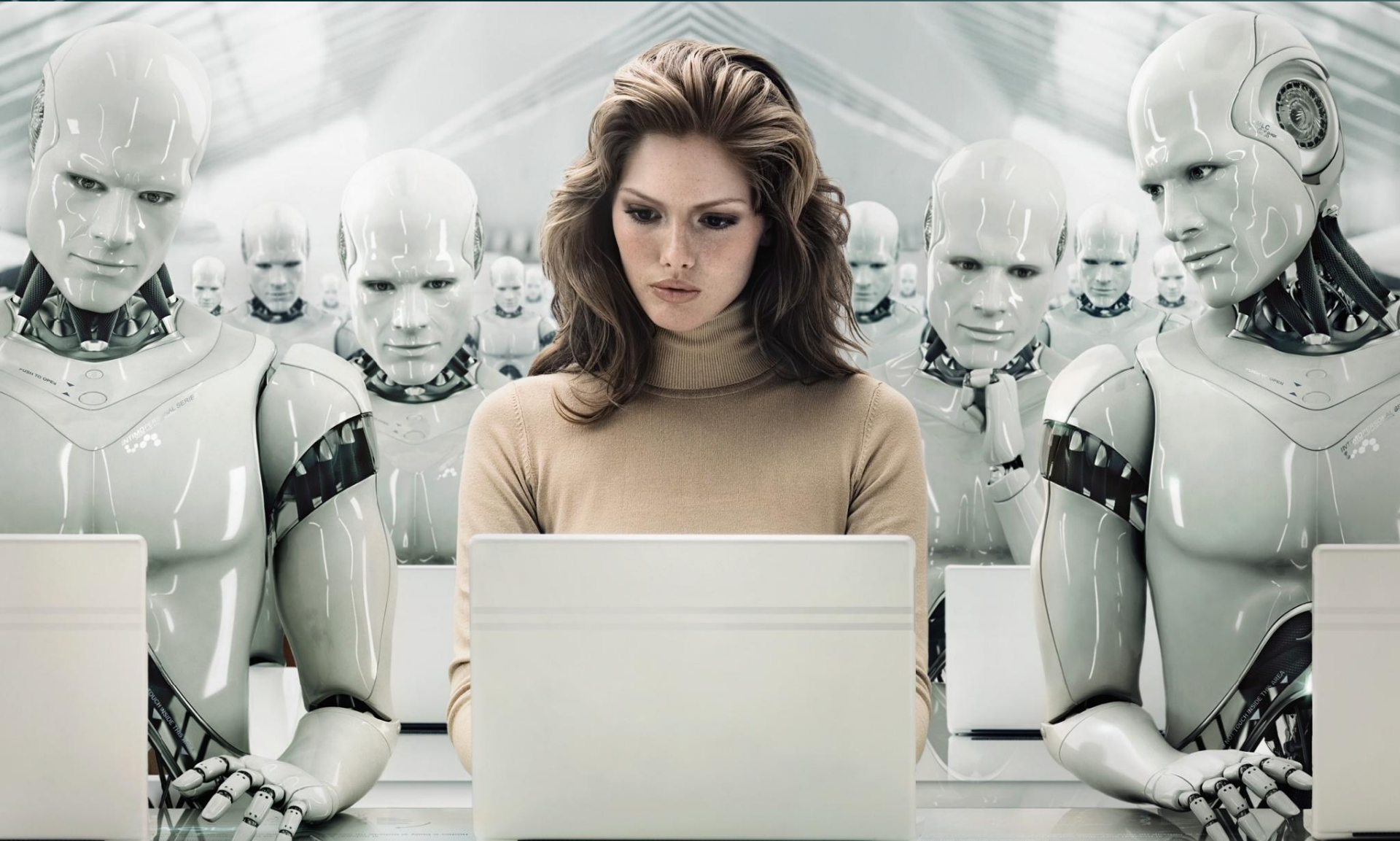
Communication and Trust





The Human Component of Autonomous Systems

What is the Future Role of the Human?



Corbis

Military of the Future?

- What will they do?
- Who will they be?
- Where will they be?
- How will they train?
- Will we need them?



Credit - Joshua Livingston

NewStatesman

Online comment site of the year



[Home](#) [The Staggers](#) [Politics](#) [CityMetric](#) [Culture](#) [Blogs](#) [Energy](#) [Events](#)
[Comment](#) | [Blogs](#) | [UK politics](#) | [International politics](#) | [Environment](#) | [Polls](#) |

[Return to: Politics](#) | [International politics](#)

If you can play a video game, can fly a drone

These eyes in the sky are so popular, everyone from farmers to thieves wants one.

BY MICHAEL BROOKS | PUBLISHED 13 JUNE, 2012 - 15:03



A Predator drone takes off on a training flight. Photograph: Getty Images

How Does a UAS Pilot Feel at the End of the Day?



Confessions of a US drone operator: 'I watched him die. It took a long time'

A drone operator for the US describes the horror of killing people remotely thousands of miles away from Afghanistan's battlefields

3K 419 0 4 4K Email



Former US drone operator Brandon Bryant Photo: CBS/TODAY

KNOW DRONES

WHAT YOU SHOULD KNOW ABOUT WAR DRONES | WHAT YOU CAN DO

HOME EDUCATION SERIES RESOURCES FOR ACTIVISTS ENVIRONMENT UNEMPLOYMENT

KNOWDRONES

provides drone replicas and educational materials to support citizen action to achieve an international ban on weaponized drones and surveillance drones - war drones.
Contact:
nickmottorn@earthlink.net

DRONES AND GLOBAL CONFLICT: EDUCATION SERIES

This series provides video interviews on fundamentals underlying US drone warfare and surveillance, intended to provide counter-drone organizers with information they need in order to more fully educate the public in their communities. It is also intended for viewing by all. Some of the interviews will be long, but we believe the content is worth the time you will spend.

TAKE ACTION USING THE RESOURCES IN THIS WEBSITE



Protesters march to challenge drone killing at CIA headquarters in Virginia, June 29, 2013. Six were arrested. Photo by Ted Majosz.

This website is intended for people who want to take action to stop drone killing, as well as war in general, and to ban drone surveillance and drone killing.

Our **RESOURCES** section provides you with basic information on drones and a variety of ways, including through art, in which people have been responding to drone violations of basic human rights, particularly the rights to privacy and life.

Included in this section is a proposed **Drone Control Act** that would, if it were to be approved by Congress, stop the bad uses of drones and impose rules to enable beneficial uses. No such rules exist.

BBC

Sign in

News

Sport

Weather

iPlayer

TV

Radio

NEWS

Home UK World Business Election 2015 Tech Science Health Education

Entertainment & Arts

Good Kill: Tackling the ethics of drone warfare on film

By Genevieve Hassan
Entertainment reporter

10 April 2015 | Entertainment & Arts



Ethan Hawke's drone pilot begins to question his orders - and his job

International Campaigns



**CAMPAIGN TO STOP
KILLER ROBOTS**

LEARN

ACT

ABOUT US

MEDIA



Recognizing the need for human control

This week at the Convention on Conventional Weapons in Geneva states have held their deepest and richest deliberations to date on the concerns over autonomous weapons systems.

[Read More »](#)

APRIL 17, 2015 CCW, GENEVA, UN

BAN KILLER ROBOTS



OUR CALL TO ACTION »

DONATE

Support the Campaign to Stop Killer Robots

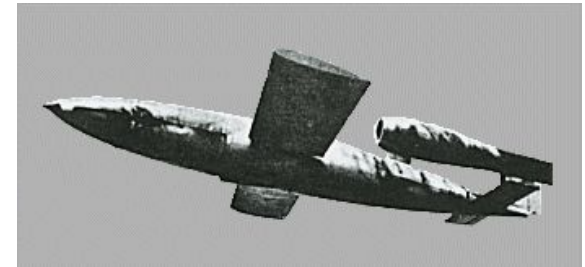
LATEST TWEETS

RT @MiriamStruyk: Go Belgium! And inform NL, Minister Vandeput: "Boezemen me angst in" www.demorgen.be/s/at9D45/27uyU... via @demorgen @bankillerrobots @paxforpeace About an hour ago

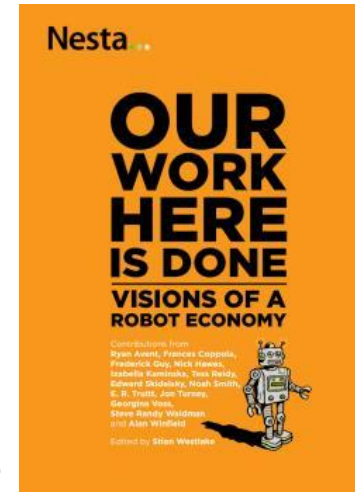
Video message by @UN disarmament chief Angela Kane for #CCWUN meeting on "lethal autonomous weapons systems" s3.amazonaws.com/unoda-video/A... About 10 hours ago

Our @Storify on last week's #CCWUN meeting on "lethal autonomous weapons systems" - an extensive but useful record:

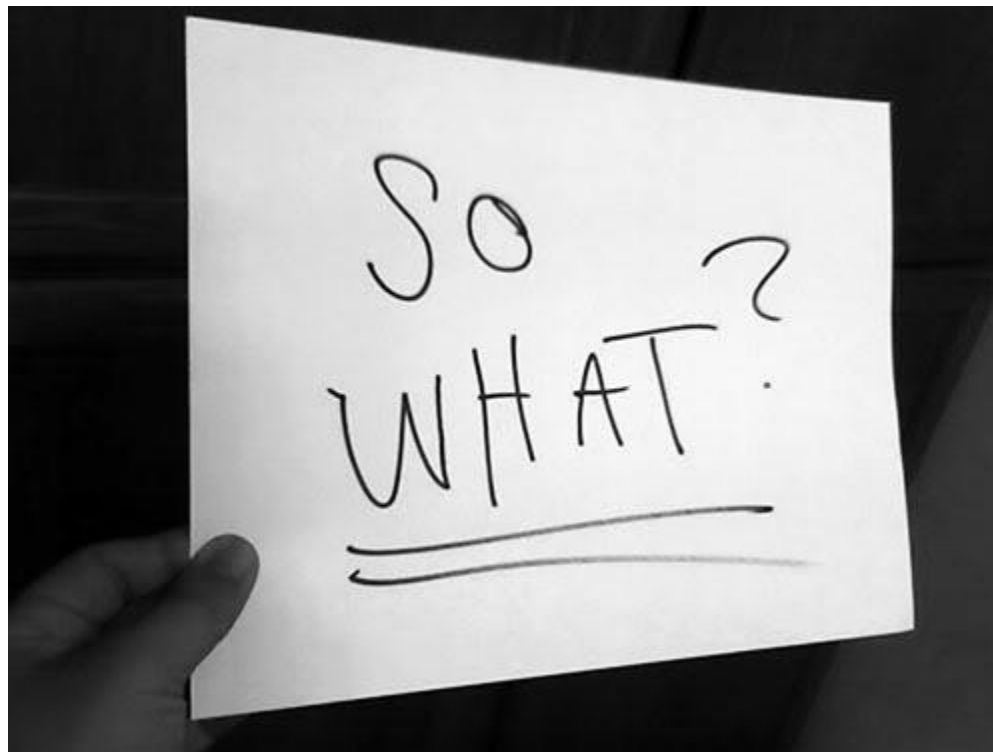
Nothing New in the World



- “How society uses new technologies is not a foregone conclusion.
- It depends on political decisions, cultural norms and economic choices as much as on the technologies themselves.”



"Our Work Here is Done. Visions of a Robot Economy" NESTA June 14



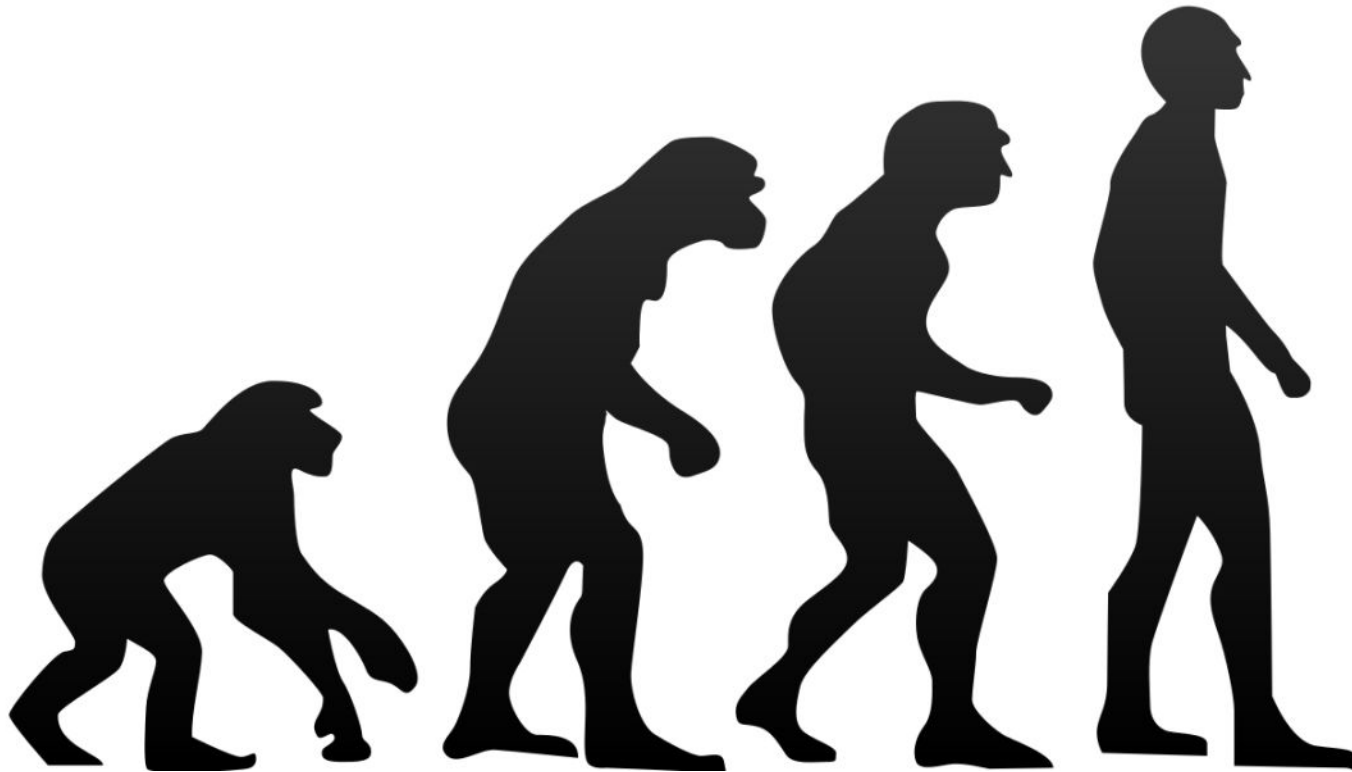
Technology is Advancing Fast



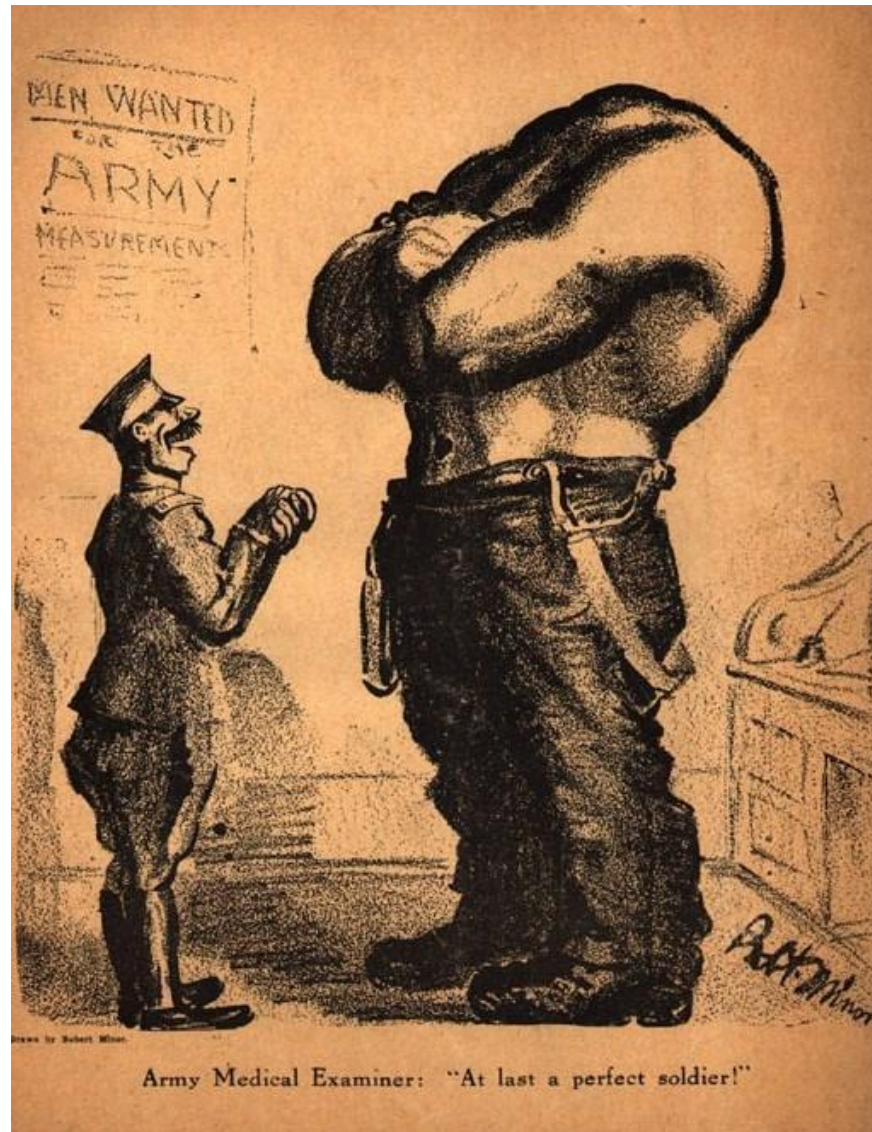
Pixabay

but...Humans are Special

- **Millions of Years of Evolution**
 - **Highly Developed Body, Senses & Mind**

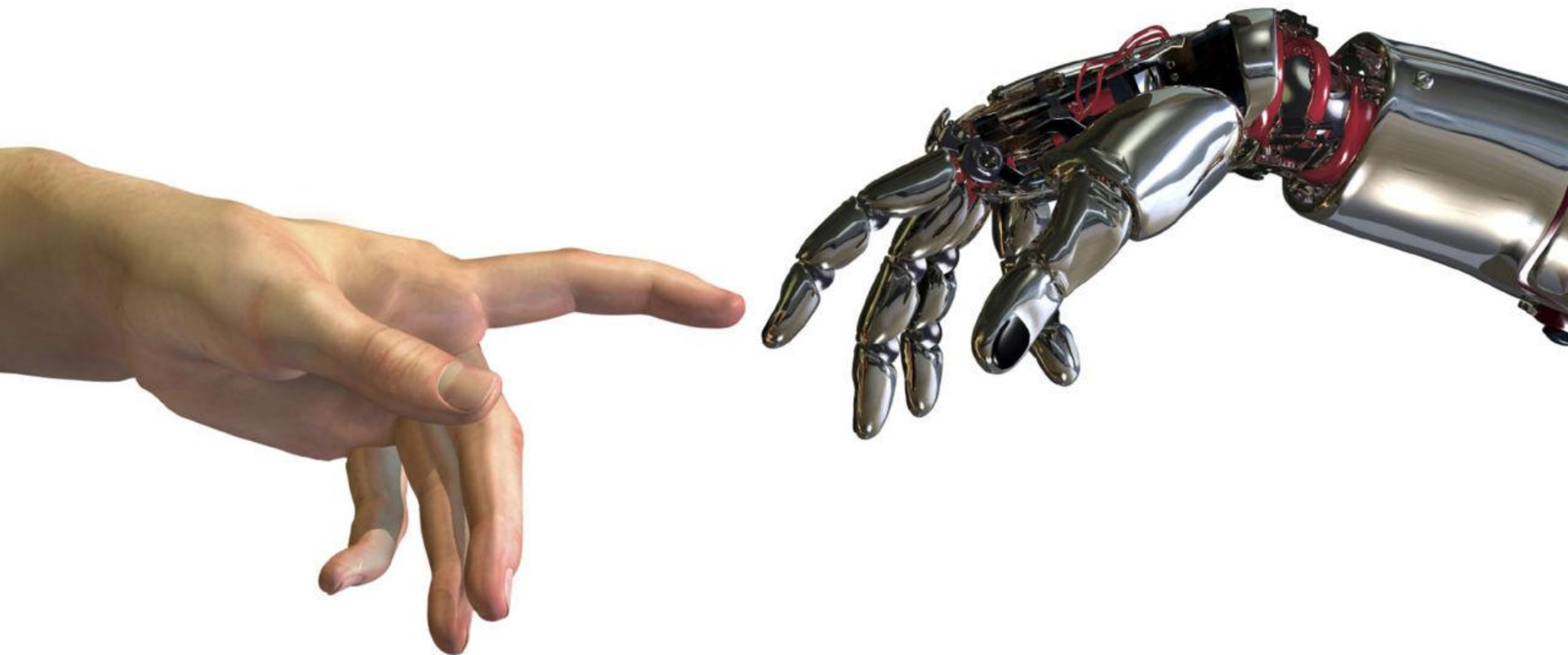


We Have Highly Effective Brains



Robert Minor 1916

- **Humans & Machines should Work in Harmony
Maximising the Strengths of Both**



- **Psychology**

- study of mind and behaviour

- **Physiological**

- study of normal function in living systems

- **Psychiatry**

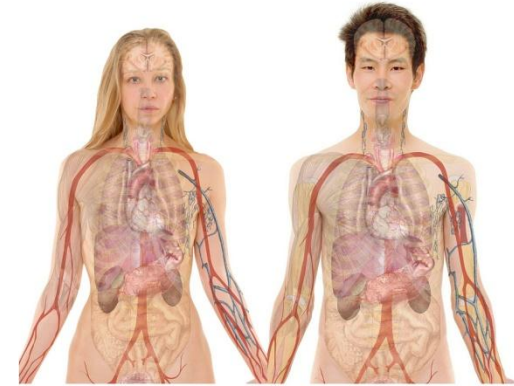
- study, diagnosis, treatment, & prevention of mental disorders

- **Philosophy**

- study of reality, existence, knowledge, values, reason, mind, and language

- **Political**

- practice and theory of influencing other people



http://commons.wikimedia.org/wiki/File:Female_with_organs.png
http://commons.wikimedia.org/wiki/File:Male_with_organs.png

**The Human Component should be at the Heart of
Autonomous System Capabilities, through-life, &
Simulation has a Key Role in Developing, Testing &
Training both the Autonomous System & Human(s),
Separately & Together**



Questions?