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Center for Research on Globalization

# The iWars Survey: Mapping the IT Sector's Involvement in Developing Autonomous Weapons

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Global Research, April 08, 2021
Drone Wars 7 April 2021

Region: Europe
Theme: Intelligence



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*A new survey by Drone Wars has begun the process of mapping the involvement of information technology corporations in military artificial intelligence (AI) and robotics programmes, an area of rapidly increasing focus for the military. 'Global Britain in a Competitive Age', the recently published integrated review of security, defence, development, and foreign policy, highlighted the key roles that new military technologies will play in the government's vision for the future of the armed forces and aspirations for the UK to become a "science superpower".*

Although the integrated review promised large amounts of public funding and support for research in these areas, co-operation from the technology sector will be essential in delivering 'ready to use' equipment and systems to the military. Senior military figures are aware that 'Silicon Valley' is taking the lead in the development of autonomous systems for both civil and military use'. Speaking at a NATO-organised conference aimed at fostering links between the armed forces and the private sector, General Sir Chris Deverell, the former Commander of Joint Forces Command explained:

> "The days of the military leading scientific and technological research and development have gone. The private sector is innovating at a blistering pace and it is important that we can look at developing trends and determine how they can be applied to defence and security"

The Ministry of Defence is actively cultivating technology sector partners to work on its behalf through schemes like the Defence and Security Accelerator (DASA). However, views on co-operation with the military by those within the commercial technology sector are mixed. Over the past couple of years there are been regular reports of opposition by tech workers to their employer's military contacts including those at Microsoft and Google.

A small study conducted recently in the US by the Center for Security and Emerging Technology at Georgetown University suggests that artificial intelligence professionals hold differing views about working on Department of Defense (DOD)-funded AI projects. 39% of those surveyed reported being "neutral" with 38% perceiving it positively and 24% as a negative. Concerns about how DOD will use the technology and concerns about causing harm were the most common reasons not to work on DOD-funded AI projects. Respondents

who felt positively about working on DOD-funded AI projects considered the ability to influence DOD's work in this field to be an important benefit, and were more willing to work on DOD-funded AI projects with humanitarian applications, as opposed to battlefield or back-office applications.

The iWars survey takes an overview of the UK's information technology and robotics sector, with the aim of identifying companies in the sector on which the government will have to rely if it is to achieve its goal of automating the armed forces. The results are published in the form of a spreadsheet outlining the specific areas of expertise of each company and an indication of its involvement to date in the development and sale of technology intended for security and military purposes.

The spreadsheet gives summary information for 70 companies in the UK tech sector and the extent of their involvement in the development of military technology. A further 100 companies based in the US, other NATO or allied countries from which the UK may wish to purchase services or equipment are also covered in the spreadsheet, but in less detail than UK-based companies. Although not comprehensive, the survey looks at a wide range of companies in the sector – ranging from long established military contractors through to newcomers which have taken clear ethical positions against the use of their products for military purposes. Companies based in nations which the UK military considers to be its rivals, such as China and Russia, have not been included.

The iWars Survey has allowed us to identify a number of trends within the information technology sector.

- **Military applications of robotics, autonomous systems, and artificial intelligence are of great interest to both traditional arms and weaponry manufacturing companies and companies in the information technology (IT) sector.** Almost all military equipment contractors are to a certain extent involved in manufacturing automated and / or AI products, or upgrading their product lines to incorporate robotic and AI technology. In the case of the IT sector there is across-the board involvement ranging from long-established traditional giants in the IT sector such as IBM, the Big Five internet companies (Amazon, Apple, Facebook, Google, and Microsoft), through medium-sized companies and on to small start-ups and specialist niche companies.

- **Among the large companies in the IT sector, most are willing to undertake military and national security work and have a number of national security projects in their portfolios, although these may only be a small portion of their overall revenue**. For example, among the Big

Five internet companies, Amazon, Google, and Microsoft are co-contractors in the CIA's Commercial Cloud Enterprise project. Google's software was used in the US DOD's controversial 'Project Maven' algorithmic warfare programme until staff concerns forced the company to withdraw from the programme, and Google is involved in various AI projects led by the Defense Advanced Research Projects Agency (DARPA). Microsoft has been awarded the US Department of Defense's Joint Enterprise Defence Infrastructure cloud computing contract.

- **However, a few of the largest players (for example Apple) apparently have little interest in military or national security contracts.** On the other hand, some newer but growing AI companies are unambiguous about wanting to use their products exclusively for military purposes – for example Palantir (which has picked up Google's work on Project Maven) and Anduril in the USA, and Adarga in the UK.

- **As well as including businesses active in the artificial intelligence (AI), software development, and robotics sector, the spreadsheet lists businesses working on computer hardware development, military electronics and communications, and sensors. These are all important in the develop of military autonomous systems and there is often considerable overlap between these various elements in the business portfolio of larger companies.**

- **Partnerships on military robotic systems and AI are common, both between arms companies and IT companies and within the IT sector.** "We see these smaller companies who don't have their own computational resources licensing them from those who do, whether it be Anduril with Google or Palantir with Amazon", said Meredith Whittaker, a former Google AI researcher.

- **Many traditional defence companies have established their own AI / information technology subsidiary companies or operating divisions to undertake work in these fields** (for example General Dynamics Information Technology, BAE Systems Applied Intelligence). There is often a 'blurring' of disciplines within companies, for example a company such as MBDA which manufactures guided missiles will develop sensors and software for target identification / fire control purposes as part of the overall missile system.

- **The military technology sector remains fairly fluid and there has been an ongoing trend of mergers and consolidations over many years among the larger players in the sector**. For example, United Technologies Corporation and Raytheon Corporation announced a merger in 2019 to form Raytheon Technologies and in the same year L3 Technologies and Harris Corporation merged to form L3Harris Technologies.

- **A number of the companies listed in the spreadsheet are playing an important enabling role in driving forward investment in this area, as well as shaping political opinion and government policy on artificial intelligence and robotics.** Multinational consultancy companies such as

Deloitte (represented on the Advisory Board of the All-Party Parliament Group on Artificial Intelligence) and Accenture (heavily involved in the UK government's Alan Turing Institute for AI Research) are notable examples. However, smaller and more specialist companies are also involved, for example Rebellion Defence, which funds the All-Party Parliamentary Group on Technology and National Security.

- **Virtually all software development companies have an interest and involvement in cyber security, by virtue of having to safeguard their own products**, and many provide cyber security products and services to the government and military sectors, particularly among smaller specialist cyber security companies.

**How to use the iWars Survey spreadsheet**

- The **iWars Survey spreadsheet** gives an overview of the military – and broader – information technology sector as represented in the UK. Information is accurate as of February 2021.
- The spreadsheet consists of three pages:

1. Entries for UK technology sector companies.
2. Entries for other 'Western' companies (mainly US based) who are important in the sector. This list does not include any Chinese or Russian companies, which are beyond the scope of the study.
3. A list of tags categorising various areas of activity for the various companies in the spreadsheet. Each company listed in pages 1 and 2 of the spreadsheet is categorised by up to three tags to broadly indicating its most important and relevant areas of business. In the case of larger companies, activities may cover a wider range of areas than is shown.

- The lists in pages 1 and 2 of the spreadsheet are far from comprehensive, but include the main players in the technology sector with an interest to the UK Ministry of Defence and a representative selection across the broader sector. Companies listed were identified on the basis of reports in daily military sector news briefings and news stories on IT and computing in the broader media.
- The first column on these pages is colour-coded to give a rough indication of the extent of involvement each company has in the military sector:

**Red: Established presence representing a substantial element of business.**

**Amber: The company undertakes work in the sector but only to a limited extent.**

**Green: No known military involvement.**

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