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Artificial Intelligence: Empowering Smaller Navies

By Richard A. Bitzinger

SYNOPSIS

Artificial intelligence (AI) has the potential to revolutionise military power and effectiveness. Smaller militaries – in this case, navies – should be able to cherry-pick AI technologies in order to gain new capabilities, particularly in intelligence, surveillance, and reconnaissance (ISR) and unmanned systems.

COMMENTARY

MANY KINDS of emerging technologies have the potential to shape and influence future military power and effectiveness. Few of these have attracted more attention than artificial intelligence (AI). As machines that are able to carry out tasks that traditionally require human intelligence, AI promises to revolutionise the way future wars could be fought and therefore determine what comprises military advantage.

At first glance, it may sound that exploiting AI for military effectiveness will be the exclusive domain of large militaries that possess the resources needed to exploit such technologies. This need not be the case, however, and while many smaller states may not be able to adopt a fully AI-enabled military, they can still cherry-pick AI technologies to gain specific new capabilities.

AI in the Maritime Sphere

This is especially critical in the maritime sphere. Many smaller navies – especially in Southeast Asia – have, over the past 20 years, acquired modern warships increasingly equipped with state-of-the-art sensors, combat management systems, and communications. As such, these frigates, corvettes, offshore patrol vessels, and submarines increasingly function as forwardly deployed nodes in national intelligence, surveillance, and reconnaissance (ISR) systems.

Developments in AI could particularly improve these capacities for ISR and therefore enhance the abilities of regional maritime forces. For one thing, AI could greatly assist humans when it comes to collecting, processing, and interpreting the large amounts of data being collected by these new and more capable sensors in order to help produce actionable intelligence and aid in decision-making.

According to maritime specialist Sarah Kirchberger, AI, together with other innovations like quantum computing, could provide the "immense computing power" necessary to interpret large amounts of data coming in from a wide variety of sensors and other resources, as well as enhancing datalinks that would "provide connectivity between disparate units to allow a shared situational awareness – ideally, in real-time or near-real-time".

AI could also power new sensor technologies, enhance the capacities and connectivity of existing sensor technologies, or degrade the cyber security of encrypted datalinks of the enemy. AI, especially if linked with the space and cyber domains, could therefore become "a key enabler" of naval capabilities in such areas as navigation, ISR, communication, and target acquisition.

AI, Unmanned Systems, and "Motherships"

Combining AI with unmanned systems could have a synergistic add-on effect on smaller navies. Many of these navies already possess unmanned aerial vehicles (UAVs), and AI could greatly magnify the value of data gathered from long-range ISR drones, by providing faster information-gathering and -processing; this could effectively enable the real-time monitoring of difficult maritime environments such as the littorals.

AI could also permit smaller navies to make more use of other types of unmanned systems, particularly unmanned underwater vehicles (UUVs) and unmanned surface vehicles (USVs). Most current UUVs are physically tethered to a surface vessel for control, and thus have relatively short ranges. AI would permit UUVs to operate with true autonomy, for extended operations (particularly important for carrying long-range ISR missions or offensive taskings).

For their part, USVs could undertake surface-protection patrols – perhaps armed with a gun or rockets – or be used for as decoys or electronic warfare platforms (e.g., spoofing and jamming).

AI would also enable maritime drones to operate in autonomous swarms, compensating for their relative simplicity. A 2019 RAND report argues that AI could permit UUVs or USVs with the expanded capabilities to function in "cooperative multi-agent teams," which in turn could have "significant advantages over using a single, more sophisticated agent, particularly to achieve robustness and large-scale spatial coverage". The swarming of armed maritime drones could become an effective offensive weapon, therefore.

In the process of combining such emerging technologies as AI and autonomous maritime systems, one model that smaller navies might consider is the so-called "mothership". The mothership concept revolves around a main surface ship (e.g., a

frigate) which in turn is linked to several different types of autonomous vehicles: UAVs for aerial reconnaissance; UUVs for underwater surveillance; and USVs for surface operations, including maritime surveillance, mine countermeasures, electronic warfare, and force protection/precision fires.

Using these assets, plus other sources of intelligence, and linked together and synergised by AI, such vessels would have expanded maritime awareness and the ability to respond faster to potential threat scenarios.

It is worth noting that the Republic of Singapore Navy (RSN) is actively exploring the mothership concept, in conjunction with its new Multi-Role Combat Vessel, due to be deployed in the next decade.

Operating in Contested Environments

Combining AI with increasingly more autonomous naval systems could greatly expand the potential maritime domain awareness of smaller navies. This is particularly critical when maritime forces must operate in "contested areas" – *such as the South China Sea* – where, according to Danish-based defence expert Ian Bowers, "the early detection of illicit activity or threats is particularly important, where the early detection of illicit activity or threats is particularly important".

Unmanned maritime vehicles, "if networked correctly…will be able to provide states with a consistent real-time aerial, surface and subsurface picture of their maritime territory and area of operations with less investment in terms of platforms and personnel".

Overall, the application of AI could ultimately have a revolutionary impact on naval operational capabilities. As Diego Ruiz Palmer, defence analyst and NATO advisor, notes, "advances in precision location, targeting and strike, navigation, large data transmission and discrimination, and weapon-system range and manoeuvrability, as well as the growing importance of the outer space and cyber domains, are altering the spatial dimensions of naval warfare".

To be sure, there are sizable technological hurdles to smaller navies effectively exploiting these new technologies. Issues such as navigation, command and control, and sensors pose significant challenges for AI, particularly for unmanned undersea vessels. Nontechnical issues – such as how much autonomy should be devolved to an unmanned system (especially an armed one) – must also be resolved.

Consequently, the application of AI to militaries, especially smaller militaries, may turn out to be much slower and more narrowly applied, at least initially. Nevertheless, there are many areas where AI – and other so-called "fourth industrial revolution" technologies – can have a dramatic impact on military innovation and effectiveness.

Even if smaller navies that may not be able to adopt all the possibilities of AI as sweepingly or as quickly as can large navies, they can still skim significant benefits from these technologies so as to have a real impact.

Richard A. Bitzinger is a Visiting Senior Fellow with the Military Transformations Programme at the S. Rajaratnam School of International Studies (RSIS), Nanyang Technological University (NTU), Singapore.

Nanyang Technological University
Block S4, Level B3, 50 Nanyang Avenue, Singapore 639798
Tel: +65 6790 6982 | Fax: +65 6794 0617 | www.rsis.edu.sg