

# SPECIAL REPORT

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## Assessing the Submarine Training Capacity of the Chinese Navy

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# Abstract

**C**hina is building nuclear submarines at an estimated rate of 4.5 to six per year. These are in addition to the two or three conventional submarines it has been commissioning each year. Submarines in general and nuclear boats in particular, apart from being expensive to construct and maintain, require highly trained crews to operate. It is therefore imperative for the

People's Liberation Army (PLA) Navy to invest in such capabilities to be able to exploit them to their full potential. This study endeavours to assess the submarine-training capacity of the PLA Navy and examine whether it is adequate to meet its future requirements, as the number of submarines it operates increases significantly.

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# Training Academies of the PLA Navy

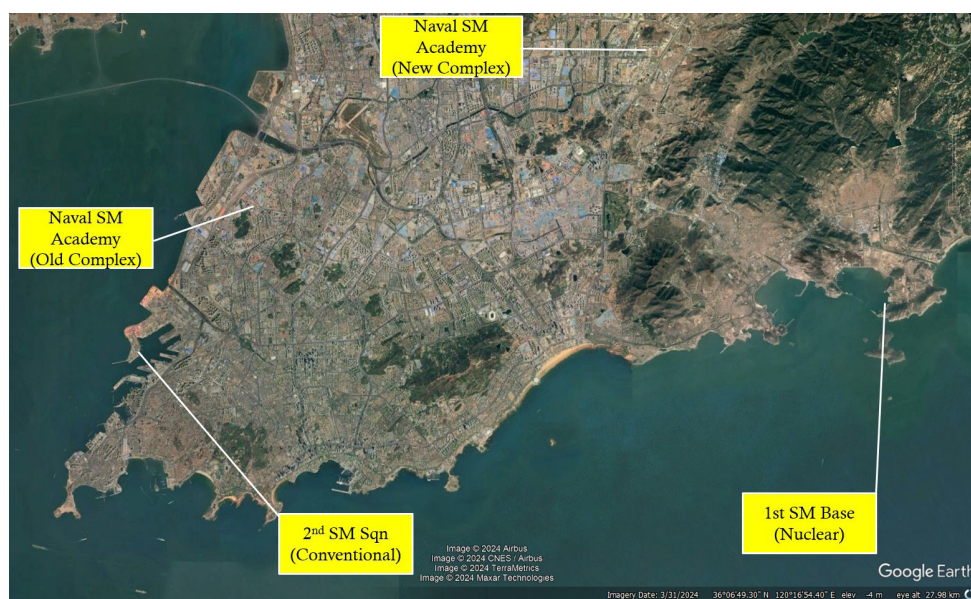
The PLA Navy has a unique training system, wherein each of its branches has its own training academy/university that conducts *ab-initio* training for selected officers and sailors. Some of the training establishments follow:

- Naval Engineering University, Wuhan
- Naval Aviation University, Yantai
- Dalian Naval Academy, Dalian (Surface Warfare, Political Officers and Hydrographers)
- Naval Submarine Academy, Qingdao
- Naval Service Arms Command College, Guangzhou (Marines)

While this does create silos within the service, the upside is that branch-specific professional training can be imparted to a higher degree in the *ab-initio* stage itself. For instance, the four-year undergraduate degree programme that cadets undergo at the Naval Submarine Academy (NSA) includes subjects that are relevant for submarine operations and maintenance. The same applies to cadets undergoing training in academies that are feeders for the aviation, ships, marines, and engineering branches.

Insofar as submarine training is concerned, the hub of all such activity for the PLA Navy is Qingdao. The broad layout of the establishments involved in submarine training is shown in Figure 1.

**Figure 1: Submarine Training Facilities at Qingdao**



Source: Google Earth<sup>a</sup>

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a All images in this article are from Google Earth Pro. Analysis pertaining to size and area is done using tools available in Google Earth Pro.

# History of Submarine Training in the PLA Navy

**T**he PLA Navy has focused on the acquisition and operation of submarines since its inception in 1949, when acquiring this capability was identified as its top priority. In April 1951, the PLA Navy formed a ‘submarine learning group’ comprising about 270 officers and men handpicked from all branches of the PLA,<sup>1</sup> who were sent to Lvshun (Port Arthur) to be trained by the Soviet Union Navy Pacific Fleet.<sup>2</sup> At the time, Lvshun, as a consequence of the Yalta agreement<sup>b</sup> and the 1945 Sino-Soviet Treaty,<sup>c</sup> was under Soviet control. The selection process for the first batch of submarine soldiers was rigorous, with almost all of them ultimately being recruited from the Communist Party of China (CPC) or the

Communist Youth League.<sup>3</sup> Thus, from the start, loyalty to the Party was as important for selection for submarine service as aptitude.

## First Naval Submarine Academy

Almost simultaneously, the PLA Navy began constructing its own submarine school in central Qingdao (36° 08.2'5 N, 120° 21'6 E) on land of approximately 90 acres.<sup>d</sup> In April 1953, the Navy Submarine School, Qingdao, was formally established as the fourth school of the fledgling PLA Navy.<sup>4</sup> This was completed just before

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- b The Yalta agreement was signed between the United States (US), the United Kingdom, and Russia in February 1945 and led to Russia entering the war in the Pacific Ocean against Japan. In return, Russia was promised large parts of Manchuria once it had been recaptured from the Japanese, as well Lvshun at the southern tip of the Liaodong peninsula.
- c The Sino Soviet Treaty was signed in August 1945 between the Soviet Union and the Kuomintang government in China (which was overthrown by the Communists in late-1949).
- d As measured on Google Earth Pro.

the Soviet Union formally handed over four submarines to the CPC government in July 1954. As the submarines were also based in Qingdao, practical training on these platforms was seamless.

Since 2006, with the completion of the acquisition of the Song and Kilo classes of submarines, while the number of conventional boats operated by the PLA Navy has been more or less constant at around 50, they have evolved

substantially in their adoption of technology. To keep up with these changes, the school too has been steadily upgraded with the bulk of the infrastructural changes taking place between 2009 and 2011 (Figure 2).

**Figure 2: Enhancement of Infrastructure of NSA (2009-11)**

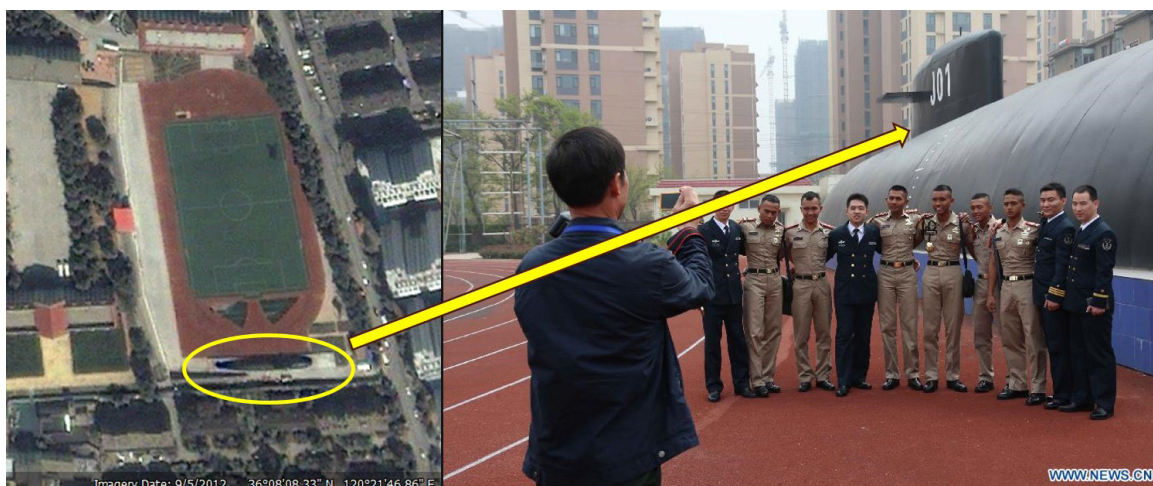


Source: Google Earth

In 2011-12, a scale model of a submarine (pennant no. J-01) was built south of the stadium at this complex. It is now regarded as a defining landmark of the school (Figure 3).

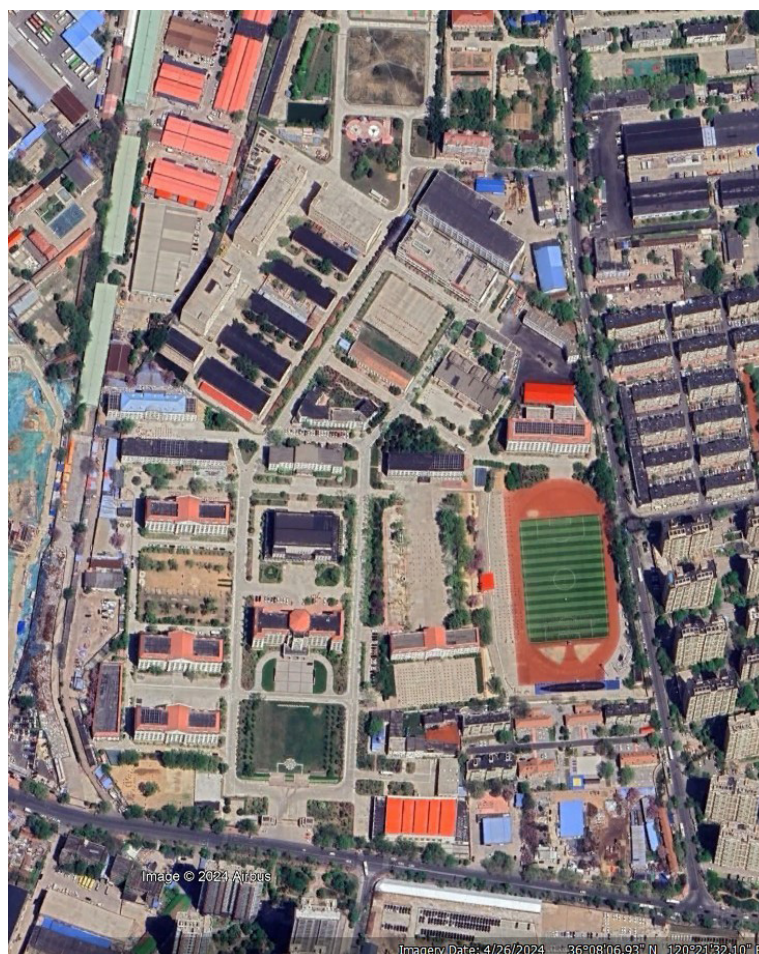
As seen from the most recent image from 26 April 2024, the infrastructure in the school continues to undergo iterative improvements (Figure 4).

**Figure 3: Model Submarine J-01 at NSA (Old Complex)**



Sources: Google Earth, 5 September 2012; [www.news.cn](http://www.news.cn)

**Figure 4: Latest Imagery of NSA (Old Complex)**



*Source: Google Earth, 26 April 2024*



It has been reported that, since its inception, the NSA has trained over 70,000 cadets, accounting for more than 80 percent of China's submarine crew members.<sup>5</sup> It is responsible for the training of submarine sailors, non-commissioned officers, weapon crews, and deputy commanders for the PLA Navy. They are trained to engage in military operations underwater and operate and command different types of submarines. In spite of stringent screening of cadets at the entry level, around 10 percent subsequently drop out.<sup>e</sup> Trainees from several other countries are also known to have undergone submarine training here with the overall number reportedly being over a 1,000 trainees from nearly 100 countries.<sup>6</sup> It can be presumed that trainees from Bangladesh and Myanmar underwent training at the academy prior to the commissioning (on 12 March 2017 and 24 December 2021,<sup>7</sup> respectively) of the Ming class submarines that the two countries bought from China.

It is reported that the NSA's training syllabus has been restructured and reorganised into seven branches of learning to produce a higher quality of submariners. These are:

- Electronic information engineering
- Hydro-acoustics engineering
- Navigation and transportation technology
- Salvage and rescue
- Marine engineering
- Weapons systems technology
- Anti-submarine warfare

The training also includes intelligence gathering, target identification, and launch of appropriate weapons systems.<sup>8</sup>

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e As mentioned by Zhang Liyan, the chief of the Submarine Academy's political section in an article that has since been removed from the internet and is no longer accessible.

Like the other PLA Navy academies/universities, the NSA is well staffed with a service and civilian faculty, several of whom hold PhD degrees. The academy conducts extensive research, with its papers being published and cited in leading journals. The faculty also has to find solutions to contemporary challenges faced by submarine services, which could be technical, operational, or even organisational in nature.

The school has enhanced its international profile by conducting international sporting (and other) events for naval cadets from different countries. It recently hosted the 'Deep Sea Warrior' international seamanship competition and the international midshipmen exchange week

on 16-21 October 2024. This included academic exchanges and seminars, visits to naval venues, midshipmen club activities and friendly sports competitions, amongst others.<sup>9</sup>

### Naval Submarine Academy (New Complex)

In 2011, the PLA Navy began constructing a new NSA about 13 km northeast of the older academy. As observed through Google Earth, work was completed by end 2015/early 2016 (Figure 5).

**Figure 5: Construction of the NSA (New Complex)**



Source: Google Earth

The most notable feature of this facility is the enormous size of the main building, which stretches 480 metres end to end. There is another interconnected building behind it that is only slightly smaller. Together, they make up one of the largest building complexes in the world located within a university campus.

A panoramic view of the complex (Figure 7) provides a clearer picture of its scale.

**Figure 6: Imagery of Main Building of NSA (New Complex)**



Source: Google Earth, 31 May 2021

## Figure 7: Panoramic View of Main Building of NSA (New Complex)



*Source: Image from CCTV Report on Celebrating the 70<sup>th</sup> Founding Anniversary of the PLA Submarine Force (Released on 19 June 2024)*

Given the size of the new training facility and its associated administrative areas, the older facility should have been shut down or used for other purposes. However, no significant changes in its infrastructure are noticeable in recent imagery, suggesting that the two institutions may be functioning concurrently. If so, the question arises: What are each one's functions? The most likely is a division in training between the conventional and nuclear streams, wherein conventional submarine

training (including courses imparted to foreign trainees) continues at the older facility, while the newer facility is used by those training to serve on nuclear boats. The relative proximity of the second submarine squadron base (operating the conventionally powered Song class) to the old complex and that of the first submarine base, Jianggezhuang (operating the nuclear propelled Shang and Han classes), to the new academy (as seen in Figure 1) also buttresses this argument.

Having a separate academy for the nuclear stream would also enable operational security, given the higher level of secrecy associated with the programme. Keeping foreign students away from nuclear submarine training and not giving them any opportunities to intermingle with its trainees would also have been a consideration.

### **Afloat Training**

Chinese cadets undergo basic afloat training on ships of the training squadron based at Lushun, Dalian. They participate in voyages with cadets from other training academies/universities.<sup>10</sup> While there is little published material on practical submarine training in China, it may be inferred that officers and sailors assigned to the conventional stream of submarines garner their experience on Song class boats, which form part of

the second submarine squadron base in Qingdao. Similar training for personnel in the nuclear stream takes place on Shang class submarines at the first submarine base in Jianggezhuang.

### **Waterfront Training**

Apart from the *ab-initio* training at the academies, some of the bases also have waterfront training facilities that provide simulator-based training on some key aspects of submarining, such as sonar classification, damage control, and the combat exploitation of weapons. Xi Jinping visited one such centre during his visit to the first submarine base in Jianggezhuang on 11 June 2018. Later, addressing officers at the Northern Theatre Navy headquarters, he maintained that the intensity of training needed to be enhanced, modules innovated, and supervision strengthened. He stressed the need for targeted training, training for commanders, and training under combat conditions.<sup>11</sup>

# Training Capacity

China currently has a fleet of about 50 conventional submarines and 13-15 nuclear submarines. While the number of conventional submarines is expected to remain much the same in coming years, with new ones only replacing those that are decommissioned, the number of nuclear submarines is expected to rise significantly. Even if the estimated completion rate of 4.5-6 nuclear boats per year were to taper off after a few years, China may not rest till its fleet

matches (if not exceeds) that of the US Navy, which has 68 nuclear submarines (14 SSBNs, four SSGNs, and 49 SSNs).<sup>12</sup> Assuming that the number of conventional submarines operated by China continues to remain at about 50 while the nuclear fleet grows to 70, the estimated training capacity required for each stream is presented in Table 1.

**Table 1: Estimated Requirement for Submarine Training Capacity**

Stream	Conventional	Nuclear
Average crew per submarine	60	110
Additional 25 percent (needed to replace those on leave, etc.)	75	138
Estimated number of submarines in service (once overall numeric stability is achieved)	50	70
Total crew requirement (afloat)	3,750	9,660
Additional 30 percent—estimated number of submarine-qualified personnel in shore billets	1,125	2,898
Total crew requirement (afloat + ashore)	4,875	12,558
Annual throughput if average number of years of submarine arm service is 15 years	325	837

Source: As estimated by the author

Table 1 provides ballpark numbers of the throughput that will be required for each of the academies if they are functionally separated into conventional and nuclear streams. It may be noted that the number of students at each of these facilities may be significantly higher if a reasonable percentage of the trainees are undergoing multi-year programmes, such as four-year undergraduate studies. In addition, the schools

may have to cater to mid-career and professional courses to prepare officers for specific assignments such as that of a Principal Control Officer (second in command) and Commanding Officer.

# Conclusion

**T**he PLA Navy's investment in its submarine training facilities, particularly in the NSA (New Complex), is reflective of the growing importance China attaches to the role of nuclear submarines in furthering its maritime power. It is also in keeping with the exponential increase in the build rate of nuclear submarines, as seen from the augmented facilities

created at Bohai Shipyard in Huludao. While attracting quality personnel to serve on submarines will always be a challenge, the PLA Navy has spared no effort—especially from an infrastructural and staffing standpoint—to ensure that sufficient capacities have been created to meet the growing demand for qualified submariners. [ORF](#)



# Endnotes

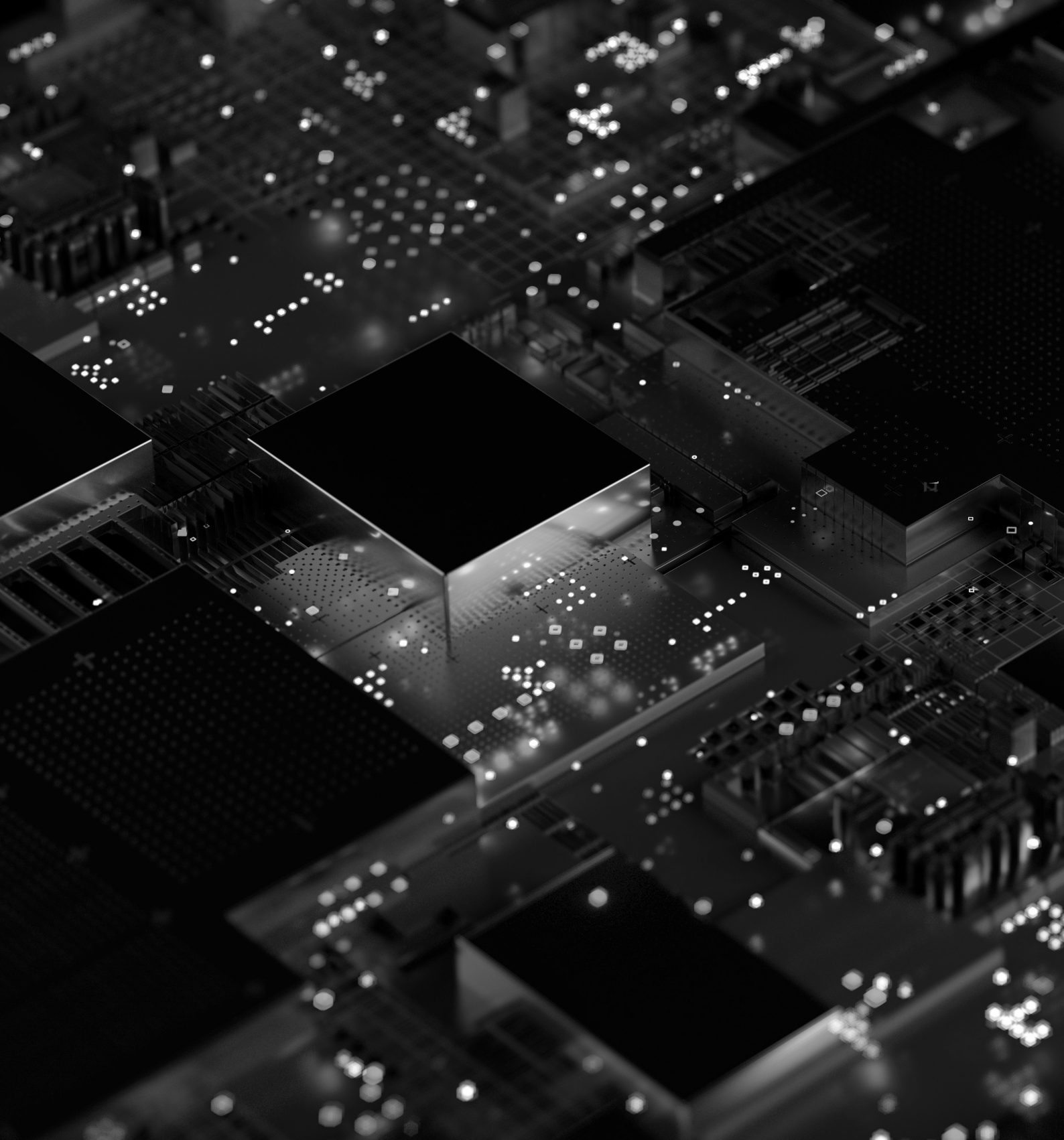
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## **About the Author**

*Rear Admiral Monty Khanna is a submariner who retired from the Indian Navy in 2019 after 37 years of commissioned service.*

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