



## **WEBINAR ON 'AI FOR DATA DRIVEN NAVY'**

07-09 Oct 20

### **INS Valsura as Centre of Excellence (CoE) for Big Data**

1. Located at Jamnagar city on the western coast of India in the state of Gujarat in Saurashtra region, INS Valsura is a premier Naval Establishment that imparts technical training in the field of Electrical, Electronics, Weapons/ Sensors and Information technology to officers and sailors of the Indian Navy, Indian Coast Guard and friendly foreign Nations. INS Valsura has always remained at the forefront of imbibing cutting edge technologies into Indian Navy. The unit has been designated as "Centre of Excellence" in the field of Big Data and state of the art lab on AI and BDA has been inaugurated by CNS in Jan 20.

### **Webinar on AI**

2. The Centre of Excellence (CoE) for Big Data, has been instrumental in progress of pilot projects pertaining to adoption of AI and BDA in the domain of maintenance, HR and perception assessment, in collaboration with academia and industry. The unit has also conducted maiden Tri Services AI Workshop in Nov 2019, which saw wide participation from esteemed academia and industry leading experts. Due to restrictions imposed by outbreak of Covid-19, this year's workshop is being organised as a 'Webinar on AI' from 07-09 Oct, with online participation from service personnel, academia and industry.

### **Call for Papers**

3. The theme of the webinar is 'AI for Data Driven Navy'. Papers are invited from academia, officers (both serving & retired) and industry experts on the following sub themes (write-up on the subthemes attached at enclosures):-

- (a) **Sub-theme 1.** Machine Learning for Future Warfare (Enclosure 1 refers).
- (b) **Sub-theme 2.** Use Cases for AI in Maritime Domain (Enclosure 2 refers).
- (c) **Sub-theme 3.** Explainable AI (XAI) for Naval Applications (Enclosure 3 refers).

4. **Selection of Papers.** The Papers would be examined by an expert panel and best papers in each theme category would be presented by the authors during the Webinar. Further, selected papers would be published in the biennial Journal, JEEE. Authors of selected papers will be intimated post scrutiny of papers.

5. **Instructions for Authors.** Papers (3000 - 5000 words) along with author's bio-data and passport size photo and author's certificate as per the submission guidelines placed at Enclosure 4 are to be forwarded by post and e-mail at [ocits.valsura@navy.gov.in](mailto:ocits.valsura@navy.gov.in) by 10 Sep 20.

6. **Contact Details.**

The Commanding Officer  
(for O i/C ITS)  
INS Valsura  
Jamnagar  
Gujrat 361150

Telephone/ Fax: 0288-252-7277  
E-mail: [ocits.valsura@navy.gov.in](mailto:ocits.valsura@navy.gov.in)

**SUB THEME 1: MACHINE LEARNING FOR FUTURE WARFARE**

1. Artificial Intelligence (AI) is viewed as the most disruptive technology of the current era. Substantial research and commercial investment has been observed in the past decade. Recent developments in AI suggest that AI will have a deterministic and potentially transformative influence on military power. It has already started reshaping the functioning of militaries in many ways and is deemed to transform future warfare and military operations.
2. Major military powers like the United States (US), the European Union (EU) and China have already come out with policy documents and roadmaps on development, adoption and promotion of AI in various fields. India has also come out with a roadmap in 2018 for making India a significant power in AI in defence specifically in the area of aviation, naval, land systems, cyber, nuclear and biological warfare.
3. The probable applications of AI and ML for future warfare are as follow:-
  - (a) Military robots and drones integrated with artificial intelligence capable of undertaking tasks and missions autonomously.
  - (b) Advent of constellations or swarms of smart robotic devices. For example, large numbers of smart sea mines could pose enormous threats to shipping. The devices might in effect be miniature submarines, with sensors and explosives as payload.
  - (c) The AI driven systems can ease the tasks for identifying ships and high valued targets using satellite images.
  - (d) AI Weaponisation for navigating and utilising unmanned naval, aerial and terrain vehicles, producing collateral damage estimations and deploying 'fire and forget' missile systems.
  - (e) AI in decision making. Transformation from domain awareness to domain understanding.
4. AI is a potent enabler and has endless possibilities in the military sphere. We would like our participants to highlight the applications of AI on future warfare and military operations.

**SUB THEME 2: USE CASES FOR AI IN MARITIME DOMAIN**

1. AI-based technologies can be employed in the military domain to execute complex missions, especially in environments that are hostile and unpredictable; the maritime battle-space perfectly fits this frame. Oceanic environments are often unmapped and difficult to navigate, and the use of AI-based systems to track, calculate, detect, chart and execute the best actions for a vessel.
2. Artificial Intelligence (AI) coupled with Internet of Things (IOT) and big data can profoundly change the management of the maritime domain such as Naval combat, search and rescue operation, patrolling, humanitarian assistance and disaster relief, combating illegal trafficking , unregulated and unreported (IUU) fishing, counter piracy, environment protection, patrolling and illegal migration, security and surveillance, Electronic Warfare, Inventory Management, Naval training and Predictive Maintenance.
3. A robust AI based maritime domain awareness (MDA) can potentially contribute to transparency across the seas and oceans by integrating multi-source data, analytics and advanced networking services making data accessible much more easily. It is possible to track vessels, determine the type of cargo and even the business behavior of shipping companies.
4. An AI-based MDA architecture could be built around numerous diversified technical devices and systems such as radar (ships, aircraft, shore), vessel monitoring systems (VMS), satellite supported systems (AIS), UAVs, drones, imagery, open source intelligence (OSINT), etc. to generate data. Thereafter, advanced algorithms fuse data from different sources provide automated threat evaluation or early warning on anomalous activities at sea, understand and quantify risks, and provide timely alerts of possible threats or suspicious ships before reaching their destinations. In essence, this helps to minimise information gap, thus limiting the number of vessels that require investigation.
5. As far as search and rescue at sea is concerned, navies and coast guards are often pressed into operations to rescue fishermen during cyclones and hurricanes. It will be possible in the future for ships to launch autonomous vehicles to respond to emergencies to help locate and rescue victims that have been left stranded, immobile or are sinking.
6. We request participants to delve into the various facets of Maritime Domain that can be augmented by application of Artificial Intelligence, and submit papers on application of AI on any of the use cases, brought out at para 2.

**SUB THEME 3: EXPLAINABLE AI FOR NAVAL APPLICATIONS**

1. Explainable Artificial Intelligence (XAI) is one of the latest technology trends in the field of Artificial Intelligence. XAI refers to methods and techniques to development of interpretable and inclusive machine learning models. It contrasts with the concept of 'black box' in machine learning, where it is difficult to explain why the AI arrived at a specific decision. XAI creates models wherein the decisions can be understood and appropriately trusted by end user. XAI enables the AI technology to be deployed with confidence.
2. Though, AI technologies can be utilised to augment the decision-making process of the naval commanders through digital assistants for navigation, combat and similar applications, there is often a gap of *trust* in these AI technologies due to the *Black Box* nature of AI Algorithms. If the decision makers do not trust the decisions recommended by AI, the top leadership would be reluctant to adopt the technology. Therefore, it is important to identify and implement XAI solutions in the armed forces in order to achieve successful adoption of AI in armed forces.
3. XAI systems have the ability to explain their rationale, characterise their strength and weakness, and convey an understating of how they will behave in the future. US Department of Defence (DoD) and Defence Advanced Research Projects Agency (DARPA) have already taken measures towards implementation of XAI solutions for Armed Forces.
4. We request authors to delve into these potential application of XAI in Naval applications.

**SUBMISSION GUIDELINES**

Contributors are requested to follow the guidelines given below: -

1. The paper should be composed in 12 point Arial single spaced font for the main body of the text, and 10.5 point Arial single spaced font for footnotes using MS Word 2003 and above. The tentative length of the paper should be 2000 – 5000 words (excluding footnotes, acknowledgements, title and sub title). Use footnotes at the end of each page.
2. An Abstract of about 200-300 words should be included to describe the main argument and the conclusions of the paper. The Abstract should not contain footnote references.
3. The first sheet should carry details of the author's bio data (a brief resume of about 200 words), institutional affiliation, a passport-size photograph and the mailing and email address.
4. All diagrams, charts and graphs should be referred to as Figures and consecutively numbered (Fig.1, Fig.2, and so on). Tables should carry only essential data and should complement the text rather than repeat what has already been said. They should carry a short title, be numbered (Table 1) and carry the source at the bottom.
5. Each table must be referenced in the text. If actual statements or phrases are taken from another paper, the name of the author should be mentioned in the text and the chosen material should be placed within quotation marks with an appropriate reference. Alternatively, if another author's views are to be summarised, use the formulations: 'The views of xyz are summarized'; give a crisp summary. It is a good practice to reference sources of information extensively and effectively.
6. Author's acknowledgments(s) may be included at the end of the paper and before References/ Endnotes begin.
7. The paper should have sub-headings to make it more reader-friendly.
8. References/ Endnotes should be sequentially numbered.
9. The authors are responsible for accuracy of the reference.
10. If the same reference is to be cited after a few other references/ citations, write the name of the author followed by the citation number e.g.: Ram Kumar no.16.
11. Any submission not conforming to the above requirements is incomplete and is liable to be rejected by the Review Board.

12. By submitting the paper, the author agrees that *'INS Valsura reserves the rights to publish, re-publish the paper with due credits to the author(s)'*.

13. A Certificate of Authenticity, countersigned by the author, with the following details should accompany the paper:-

*"The paper is the original effort of (author's name, rank, personal number) and the undersigned hereby attest that all material (tables, figures, diagrams, arguments) from primary and secondary sources has been duly cited. The paper bears no Plagiarism in any form. The paper has not been sent to any other publication and has not appeared in print or electronic medium before. The text of the paper does not contain any material above Unclassified."*