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CONTENTS

S. No.	TITLE	Page No.
DRDO News		1-14
DRDO Technology News		1-13
1.	Our anti-drone technology can stave off threats: DRDO Chief	1
2.	India works on counter-drone strategy to avoid Jammu-like attacks; DRDO says it's tech can fend off threats	2
3.	किसी भी ड्रोन के खतरे को बेअसर कर सकता है DRDO का एंटी ड्रोन सिस्टम, पढ़ें इसके बारे में सब कुछ	4
4.	आसमान में मंडराते आतंकी खतरे, ड्रोन को आखिर कैसे कर सकते हैं तबाह	5
5.	PM holds meet on future challenges	7
6.	DRDO's 'Chess' anti-drone tech - How it works	8
7.	Explained: Can a drone attack be prevented?	9
8.	Agni P (Prime): India's ASBM in the Making and its Impact on Naval Warfare	11
9.	Israel unveils Sea Breaker, the long-range missile system it could offer for Make in India	12
10.	LAWDA installs DRDO bio-digesters in Telbal	13
COVID 19: DRDO's Contribution		14-14
11.	मेरठ कैंट अस्पताल में डीआरडीओ के सहयोग से बनेगा आक्सीजन प्लांट, 168 करोड़ का बजट पास	14
Defence News		15-20
Defence Strategic: National/International		15-20
12.	Chief of Defence Staff visits forward areas in central sector and HQ Western Command of Indian Army	15
13.	चीफ ऑफ डिफेंस स्टाफ ने सेंट्रल सेक्टर के अग्रिम क्षेत्रों और भारतीय सेना के पश्चिमी कमान के मुख्यालय का दौरा किया	16
14.	CAS visit to Bangladesh	17
15.	वायुसेना प्रमुख की बांग्लादेश यात्रा	18
16.	MOU between Indian Navy and M/s BEL for Technology Incubation Forum (TIF)	19
17.	भारतीय नौसेना और मेसर्स बीईएल के बीच टेक्नोलॉजी इनक्यूबेशन फोरम (टीआईएफ) हेतु एमओयू	19
18.	INS Tabar visits Alexandria, Egypt	20
19.	आईएनएस तबर का अलेक्जेंड्रिया, मिस्र का दौरा	20
Science & Technology News		21-26
20.	A new type of quasiparticle	21
21.	Identifying a topological fingerprint	22
22.	A new piece of the quantum computing puzzle	24
COVID-19 Research News		26-26
23.	Covid-19: Genome research identifies more dangerous variants - study	26

Our anti-drone technology can stave off threats: DRDO Chief

DRDO's counter-drone technology uses a variety of methods to neutralise the danger from such aerial attacks, officials familiar with it said on condition of anonymity

By Rahul Singh

New Delhi: Defence Research and Development Organisation (DRDO) Chief G Satheesh Reddy on Tuesday said that the counter-drone technology developed by his organisation could provide the armed forces with the capability to swiftly detect, intercept and destroy small drones that pose a security threat.

He said DRDO's anti-drone system would give the military both "soft kill" and "hard kill" options to tackle the new and fast-emerging aerial threat. The first refers to jamming the hostile drone, while the second involves a laser-based kill system.

Reddy's comments came two days after small drones were used to target the Jammu air force station. The June 27 attack was the first-ever offensive use of drones to target an Indian military facility.

DRDO's counter-drone technology uses a variety of methods to neutralise the danger from such aerial attacks, officials familiar with it said on condition of anonymity.

The officials explained how the system works. The solution consists of a radar system that offers 360-degree coverage with detection of micro drones when they are 4km away, electro-optical/infrared (EO/IR) sensors for detection of micro drones up to 2 km and a radio frequency (RF) detector to detect RF communication up to 3 km

"The RF/Global Navigation Satellite System (GNSS) jammer can detect the frequency being used by the controller and jam signals from a distance of 3 km. The laser-based hard kill system can neutralise micro drones at distances between 150 m to 1 km. The system is integrated through a command post," said one of the officials cited above.

DRDO demonstrated its counter-drone technology to different security agencies at the Hindon air force station in January 2020 and at the National Security Guard (NSG) campus in Manesar in August 2020 and January 2021.

"The radar detects micro drones and hands over the track for soft kill and hard kill after due verification by a sensor. Once confirmed by RF detection and verified by EO/IR sensor, the system is ready to jam RF/GNSS signals or use laser weapon as per standard operating procedures," said a second official.



Reddy's comments came two days after small drones were used to target the Jammu air force station.(HT file)

The system was deployed for VVIP protection duties during Republic Day 2020, the visit of US President Donald Trump to Motera stadium in Ahmedabad, Independence Day 2020 and Republic Day 2021.

“Prototypes for one vehicle-based and one ground-based set up have been prepared and evaluated by DRDO,” the second official added.

DRDO has transferred the technology for the production of the anti-drone system to Bharat Electronics Limited (BEL), and also written letters to the three services informing them about the system’s capabilities, as reported by Hindustan Times on Tuesday.

DRDO is also ready to transfer technology to private companies to produce the anti-drone system.

The Jammu drone attack is a watershed in asymmetric warfare and underlines the need for the armed forces to build capabilities to counter the aerial threat, experts previously said.

Chief of defence staff General Bipin Rawat on Monday said that India has to start preparing for future generation warfare. He said the three services, DRDO, academia and other stakeholders were working together to develop technology to counter the threat from drones at the earliest.

<https://www.hindustantimes.com/india-news/our-anti-drone-technology-can-stave-off-threats-drdo-chief-101624993037673.html>



Wed, 30 June 2021

India works on counter-drone strategy to avoid Jammu-like attacks; DRDO says it's tech can fend off threats

Rogue drones have been spotted for the fourth consecutive day in Jammu, pushing defence forces to quickly work on a counter-drone strategy to avert attacks like the one witnessed on June 27

India is working on a comprehensive counter-drone strategy to avert attacks like the one that happened at the Jammu airbase on June 27.

Measures and strategies to counter “weaponised drones used for terror purposes against strategic and commercial assets” were discussed in a high-level meeting chaired by Prime Minister Narendra Modi on June 29, NDTV reported. The meeting was also attended by Defence Minister Rajnath Singh, Union Home Minister Amit Shah and National Security Advisor (NSA) Ajit Doval, among others.

Our tech can fend off threats, says DRDO Chief

G Satheesh Reddy, the chief of the Defence Research and Development Organisation (DRDO), suggested on June 29 that counter-drone technology developed by his organisation could provide India’s armed forces with the capability to quickly detect and destroy small drones posing a security threat.

Reddy told the Hindustan Times that DRDO’s anti-drone system can provide both “soft kill” and “hard kill” options to the military to tackle fast-emerging aerial threat. ‘Soft kill’ refers to mere jamming of hostile drones and ‘hard kill’ involves a laser-based destruction method.



A general view of a camera-mounted drone (Image: Stan Szeto-USA TODAY Sports via Reuters)

The solution developed by the DRDO reportedly comprises a radar system that offers 360-degree coverage with detection of micro drones when they are 4 kilometres away. Electro-optical/infrared (EO/IR) sensors can detect drones up to 2 km away. A radio frequency (RF) detector can detect RF communications up to 3 km away.

DRDO's RF/Global Navigation Satellite System (GNSS) jammer detects the frequency being used by the controller and jam the signals. The 'hard kill' system can also neutralise small drones at distances between 150 m and 1 km, the news report cited an unnamed official as saying.

The military's research and development agency has reportedly demonstrated these counter-drone technologies to various security agencies in the past. The system was also deployed for VVIP protection during Republic Day 2020, during the bilateral visit of then United States president Donald Trump, Independence Day 2020 and this year's Republic Day parade.

The technology has been transferred to Bharat Electronics Limited (BEL) for the production of the anti-drone system, the Hindustan Times report added.

The NDTV report suggested that the Indian Air Force (IAF) will act as the nodal authority for such technology. The air force is also expected to coordinate efforts on countering weaponised drones in the future.

India currently doesn't have a universal policy to deal with rogue drones. The Civil Aviation and Home ministries will be reviewing the country's existing regulations related to unmanned aircraft systems.

The Centre, on June 29, handed over the probe into the Jammu airport drone attack to the National Investigation Agency (NIA). On June 27, two bombs were dropped at the IAF airbase, injuring two personnel. The first explosion happened at around 1.40 am followed by another six minutes later.

Officials said that the first blast had ripped through the roof of a single-story building at the high-security technical area of the airport. The second blast happened in an open area.

Security personnel spotted drones at three locations in Jammu, including near defence installations, for the fourth consecutive day on June 30. The latest incident took place before dawn, India Today reported.

The dual-use airport belongs to the IAF but is also used for commercial flight operations. It is located on the outskirts of Jammu city.

Earlier news reports suggested that investigative agencies are probing Pakistan's possible involvement in the incidents.

<https://www.moneycontrol.com/news/india/india-works-on-counter-drone-strategy-to-avoid-jammu-like-attacks-drdo-says-its-tech-can-fend-off-threats-7105571.html>

किसी भी ड्रोन के खतरे को बेअसर कर सकता है DRDO का एंटी ड्रोन सिस्टम, पढ़ें इसके बारे में सब कुछ

राष्ट्रपति डोनाल्ड ट्रंप के अहमदाबाद के मोटेरा स्टेडियम के दौरे, स्वतंत्रता दिवस 2020 और गणतंत्र दिवस 2021 के दौरान वीवीआईपी सुरक्षा के लिए इस सिस्टम को तैनात किया गया था।

Edited By: हर्षित गौतम

रक्षा अनुसंधान और विकास संगठन (DRDO) के प्रमुख जी सतीश रेड्डी ने मंगलवार को कहा कि उनके संगठन द्वारा विकसित काउंटर-ड्रोन टेक्नोलॉजी सशस्त्र बलों को सुरक्षा के लिए खतरा पैदा करने वाले छोटे ड्रोनो का तेजी से पता लगाने, उन्हें रोकने और खत्म करने की ताकत दे सकती है। उन्होंने कहा कि डीआरडीओ का एंटी ड्रोन सिस्टम नए और तेजी से उभरते हुए हवाई खतरे से निपटने के लिए सेना को "सॉफ्ट किल" और "हार्ड किल" दोनों ऑप्शन देगा। इसमें पहला सिस्टम ड्रोन को जाम करता है, जबकि दूसरा लेजर-बेस्ड किल सिस्टम उन्हें खत्म कर सकता है। रेड्डी की टिप्पणी जम्मू एयरफोर्स स्टेशन को निशाना बनाने के लिए छोटे ड्रोनो के इस्तेमाल के दो दिन बाद आई। 27 जून को एयरफोर्स स्टेशन पर किसी भारतीय मिलिट्री बेस को निशाना बनाने के लिए ड्रोन का ये पहले आक्रामक इस्तेमाल का मामला है।



किसी भी ड्रोन हमले को बेअसर कर सकता है DRDO का एंटी ड्रोन सिस्टम

डीआरडीओ की काउंटर-ड्रोन टेक्नोलॉजी ऐसे हवाई हमलों के खतरे को बेअसर करने के लिए कई तरह के तरीकों का इस्तेमाल करती है। अधिकारियों ने बताया कि सिस्टम कैसे काम करता है। इस सिस्टम में एक रडार है जो 4 किमी दूर तक माइक्रो ड्रोन का पता लगाने के साथ 360-डिग्री कवरेज देता है। 2 किमी तक के माइक्रो ड्रोन का इलेक्ट्रो-ऑप्टिकल / इन्फ्रारेड (EO/IR) सेंसर पता लगा सकते हैं। रेडियो फ्रीक्वेंसी (RF) डिटेक्टर 3 किमी तक इस तरह के किसी भी कम्यूनिकेशन का पता लगा सकती है।

3 किमी तक ड्रोन का पता लगा सकता है

आरएफ/ग्लोबल नेविगेशन सैटेलाइट सिस्टम (GNSS) जैमर 3 किमी की दूरी से कंट्रोल किए जा रहे ड्रोन का पता लगा सकता है। लेजर आधारित हार्ड किल सिस्टम 150 मीटर से 1 किमी के बीच की दूरी पर माइक्रो ड्रोन को बेअसर कर सकता है। DRDO ने जनवरी 2020 में हिंडन एयरफोर्स स्टेशन पर और अगस्त 2020 और जनवरी 2021 में मानेसर में राष्ट्रीय सुरक्षा गार्ड (NSG) परिसर में विभिन्न सुरक्षा एजेंसियों के लिए अपनी काउंटर-ड्रोन टेक्नोलॉजी का प्रदर्शन किया था।

ऐसे ड्रोन ध्वस्त कर सकता है

रडार माइक्रो ड्रोन का पता लगाता है और सेंसर के वेरिफिकेशन के बाद सॉफ्ट किल और हार्ड किल के लिए आगे बढ़ा देता है। एक बार आरएफ डिटेक्शन द्वारा पुष्टि हो जाती है तो सिस्टम आरएफ / GNSS सिग्नल को जाम करने या लेजर हथियारों के जरिए उस पर अटैक करने के लिए तैयार होता है।

वीवीआईपी सुरक्षा में हो चुका है इस्तेमाल

गणतंत्र दिवस 2020, अमेरिकी राष्ट्रपति डोनाल्ड ट्रंप के अहमदाबाद के मोटेरा स्टेडियम के दौरे, स्वतंत्रता दिवस 2020 और गणतंत्र दिवस 2021 के दौरान वीवीआईपी सुरक्षा के लिए इस सिस्टम को तैनात किया गया था। डीआरडीओ ने भारत इलेक्ट्रॉनिक्स लिमिटेड (BEL) को एंटी-ड्रोन सिस्टम के प्रोडक्शन के लिए टेक्नोलॉजी दे दी है। तीनों सेवाओं को पत्र लिखकर सिस्टम की क्षमताओं के बारे में जानकारी दी गई है। DRDO एंटी ड्रोन सिस्टम के प्रोडक्शन के लिए निजी कंपनियों को भी टेक्नोलॉजी देने को तैयार है।

<https://www.tv9hindi.com/india/drdo-anti-drone-technology-can-stave-off-threats-716733.html>

TIMES NOW हिंदी

Wed, 30 June 2021

आसमान में मंडराते आतंकी खतरे, ड्रोन को आखिर कैसे कर सकते हैं तबाह

*जम्मू में एयफोर्स स्टेशन पर हुए ड्रोन अटैक ने सुरक्षा को लेकर कई सवाल पैदा किए हैं।
सवाल यह है कि आसमान में मंडराते खतरे को आखिर किस तरह नष्ट
किया जा सकता है? जानिये क्या कहते हैं रक्षा विशेषज्ञ:*

नई दिल्ली: जम्मू में वायुसेना के ठिकाने पर हुए हमले और इलाके में कई अन्य ड्रोन देखे जाने के बाद देश में हर किसी का ध्यान सुरक्षा चुनौतियों की ओर गया है। यह मसला अंतरराष्ट्रीय सुर्खियों में भी है। आतंकी इरादों के लिए ड्रोन के इस्तेमाल का मुद्दा भारत ने संयुक्त राष्ट्र महासभा में भी उठाया और कहा कि यह गंभीर खतरे के रूप में उभरा है। ड्रोन को लेकर इन सुरक्षा चुनौतियों के बीच लोगों के जेहन में यह सवाल आ रहा है कि आखिर इसका खतरा कितना बड़ा है और दुश्मन के इरादों को कैसे आसमान में ही नष्ट किया जा सकता है।



रिटायर्ड एयर वाइस मार्शल मनमोहन बहादुर ने 'टाइम्स ऑफ इंडिया' में एक लेख के जरिये इसे समझाया है। उन्होंने यह भी बताया कि ड्रोन को ट्रैक करना मुश्किल क्यों होता है और आसमान में मंडराते खतरे को किस तरह तबाह किया जा सकता है। अपने आर्टिकल में उन्होंने सबसे पहले यह बताया है कि आखिर ड्रोन इतने खतरनाक क्यों होते हैं?

ड्रोन इतने खतरनाक क्यों होते हैं?

ड्रोन खतरनाक क्यों होते हैं, इसकी पांच वजहें उन्होंने बताई हैं।

1. एयर वाइस मार्शल (सेवा.) मनमोहन बहादुर के अनुसार, सबसे पहले तो यह समझ लेने की जरूरत है कि ड्रोन बहुत किफायती होते हैं और कोई भी इन्हें ऑनलाइन खरीद सकता है। कोई शख्स किस उद्देश्य से ड्रोन खरीद रहा है, वर्चुअल तरीके से इसका पता लगा पाना इस समय बेहद मुश्किल है।
2. दूसरे, ड्रोन के अनियंत्रित प्रसार के कारण इसे खरीदने और इसका इस्तेमाल करने वाले शख्स की पहचान छिपी रहती है।

3. तीसरी महत्वपूर्ण बात ये है कि ड्रोन को चलाने के लिए बहुत तकनीकी जानकारी की आवश्यकता नहीं है। जीपीएस का इस्तेमाल करते हुए इसे कहीं भी आसानी से भेजा जा सकता है। इससे अगर पिज्जा और दवाओं की डिलीवरी हो सकती है तो बम भी ले जाए जा सकते हैं।
4. चौथी बात, आतंकियों के द्वारा ड्रोन के इस्तेमाल का लोगों और सुरक्षाबलों पर भी मनोवैज्ञानिक असर होता है।
5. पांचवीं महत्वपूर्ण बात ये है कि आतंकी ड्रोन केवल सुरक्षा व सैन्य संस्थानों में ही नहीं, बल्कि पूरे देश में कहीं भी तैनात किए जा सकते हैं। इनसे निपटने में उच्च स्तरीय वेपन सिस्टम या फौज की तैनाती बहुत कारगर नहीं है।

ड्रोन को पकड़ने में क्या हैं मुश्किलें?

सबसे बड़ा सवाल यह है कि ड्रोन को पकड़ने में आखिर क्या मुश्किलें हैं। इसकी दो प्रमुख वजह उन्होंने बताई है।

1. पहली बात तो यह कि ड्रोन बैटरी से संचालित होते हैं और इसलिए ये ज्यादा शोर नहीं करते। इसे मैनुअली ऑपरेट व कंट्रोल किया जा सकता है या फिर नीचे उड़ने के लिए इसमें प्रोग्रामिंग की जा सकती है।
2. दूसरी अहम बात यह है कि छोटे आकार की वजह से ये सामान्य सिविल और मिलिट्री रडार्स की पकड़ में नहीं आते।

कैसे पता लगाएं ड्रोन का?

तो अब सवाल उठता है कि आखिर ड्रोन का पता कैसे लगाएं। इस बारे में एयर वाइस मार्शल (सेवा.) मनमोहन बहादुर ने अपने लेख में बताया है कि विशेष स्पेशल मिलीमीट्रिक वेव रडार्स, अकाउस्टिक, इलेक्ट्रो-ऑप्टिक और इन्फ्रारेड सेंसर्स के कॉम्बिनेशन का इस्तेमाल ड्रोन का पता लगाने में किया जा सकता है।

ड्रोन को कैसे खत्म करें?

आसमान में मंडराने वाले ड्रोन रूपी खतरों को नष्ट करने के लिए बंदूकों या खास तरह के जाल का इस्तेमाल किया जाता है। इसके अतिरिक्त इलेक्ट्रॉनिक तरीके और हाई पावर लेजर के जरिये भी ड्रोन नष्ट किए जा सकते हैं।

ड्रोन को नष्ट करना मुश्किल क्यों?

ड्रोन को नष्ट करने में आखिर क्या मुश्किलें आती हैं, इस साल के जवाब में एयर वाइस मार्शल (सेवा.) मनमोहन बहादुर ने बताया है कि जब ड्रोन रात के समय उड़ान भरते हैं या झुंड में आते हैं तो तत्काल जवाबी कार्रवाई मुश्किल हो सकती है। जैसा कि जम्मू में देखा गया है।

तो सरकार को क्या करना चाहिए?

ड्रोन को पकड़ने और उसे नष्ट करने में पेश आने वाली इन तमाम मुश्किलों के बीच एयर वाइस मार्शल (सेवा.) मनमोहन बहादुर ने बताया है कि सरकार को आखिर क्या करने चाहिए? उन्होंने इसके लिए पांच एक्शन सुझाए हैं:

1. सबसे पहली बात, चूंकि हर अहम जगह की निगरानी संभव नहीं, इसलिए उन स्थानों को लेकर प्राथमिकता के आधार पर लिस्ट बनाने की जरूरत है, जिनकी सुरक्षा बेहद महत्वपूर्ण है। दुर्भाग्य से इसमें शख्सियतों को भी शामिल करना होगा, क्योंकि विदेशों में ड्रोन सहित मानवरहित सिस्टम्स के जरिये हत्या की कोशिशें हो चुकी हैं।

2. दूसरी अहम बात, चूंकि देश में इस वक्त एंटी-ड्रोन सिस्टम का रिसर्च एंड डिवेलपमेंट और उत्पादन शुरुआती चरण में है, इसलिए कुछ खास जगहों के लिए इन्हें विदेशों से आयात किया जा सकता है।
3. तीसरी महत्वपूर्ण बात, डीआरडीओ ने जो एंटी-ड्रोन सिस्टम बनाए हैं, वे राष्ट्रीय दिवसों पर VIPs की सुरक्षा सुनिश्चित करते हैं। अब समय आ गया है कि DRDO जैसे अग्रणी संस्थान को 'जम्मू' चुनौती को ध्यान में रखते हुए ऐसे सिस्टम्स के लिए R&D तेज करना चाहिए।
4. चौथी बात, DRDO के रिकॉर्ड को देखते हुए इसमें प्राइवेट इंडस्ट्री को भी शामिल किया जाना चाहिए। किसी एक ही कंपनी से पूरे सिस्टम के उत्पादन की उम्मीद अगर की जाती है, इसमें बस देरी होगी।
5. पांचवीं और सबसे अहम बात यह है कि ड्रोन की खरीद पर निगरानी के लिए सिस्टम बनाने की जरूरत है। इस तरह की नीति बनाने की जरूरत है कि इसमें लीगल प्लेयर्स ही आएँ और टेक्नोलॉजी को गलत हाथों में जाने से बचाया जा सके।

<https://www.timesnowhindi.com/india/article/jammu-air-force-station-drone-attack-how-to-catch-and-destroy-terror-drone/352520>



Wed, 30 June 2021

PM holds meet on future challenges

New Delhi: As the country faces new terror threat from drones with three incidents in Jammu in the last three days, Prime Minister Narendra Modi on Tuesday held a meeting with Defence Minister Rajnath, Home Minister Amit Shah and National Security Adviser (NSA) Ajit Doval.

The high-level meeting lasting more than an hour discussed future challenges in the defence sector and the need to equip the security forces with modern weapon systems.

Earlier in the day, the three Services Chiefs and Chief of Defence Staff General Bipin Rawat briefed Rajnath about the current situation in Jammu.

Rajnath reviewed the issue soon after returning from a three-day visit to Ladakh to take stock of operational readiness of the armed forces and inaugurated 63 bridges.

Similarly, IAF chief RKS Bhadauria also returned from an official visit to Bangladesh. Rajnath and Bhadauria, however, were in regular touch with the IAF teams in New Delhi and Jammu since the drone attack on the airbase there on Sunday.

Jammu airbase houses strategic assets of the IAF including MI-17 helicopters and unmanned aerial vehicles (UAV). They play an important and vital role in anti-terrorist operations in Jammu and Kashmir.

Initial probe suggests the drone attack was aimed at the helicopters and the UAVs. However, the crude bombs launched by the drones fell short of these crucial assets, sources said. Fighter jets are not based at this airfield.

It was the first ever attack using drones and General Rawat said on Monday the security agencies will have to start preparing for future generation warfare. Drones and such elements will change the nature of warfare, he added. Incidentally, this is the second terrorist attack on an airbase. The first one was at the Pathankot airbase in 2016.

In an interview to a television channel, the CDS also said the three Services and the Defence Research and Development Organisation (DRDO) are working to develop anti-drone technology.

In fact, the DRDO has developed the technology to detect and shoot down the hostile drone, he said. The DRDO system can bring down the drone at a range of two to three kms.

Moreover, the DRDO has transferred the anti-drone technology to the public sector Bharat Electronics Limited (BEL) and is willing to share the know how with private sector players also, sources said.

<https://www.dailypioneer.com/2021/page1/pm-holds-meet-on-future-challenges.html>



Wed, 30 June 2021

DRDO's 'Chess' anti-drone tech - How it works

Defence Research and Development Organisation (DRDO) has developed a comprehensive solution to tackle the problem that drones may pose to national security agencies

By Manish Prasad

Visuals of DRDO-developed technology which can bring down micro drones through either jamming of command and control links or by damaging electronics of drones through Laser based Directed Energy Weapon, reports Manish Prasad.

The system can detect and jam micro drones up to 3 kms and lase a target up to 1-2.5 km depending on the wattage of laser weapon.

The solution can be a effective counter to increased drone based activity in western and Northern sectors.



Image Source : India TV



Image Source : India TV



<https://www.indiatvnews.com/photos/india-drdo-chess-anti-drone-technique-national-security-agencies-latest-pics-715560>

Explained: Can a drone attack be prevented?

While the Jammu attack was the first such instance in India where a drone was weaponised, the most high-profile incident in recent times involving a drone, perhaps, was the targeted bombing of two key oil facilities inside Saudi Arabia by Yemen's Houthi rebels in 2019

By Leela Prasad

New Delhi: The need for an anti-drone system shielding critical installations in the country came under sharp focus after Sunday's drone attack on an IAF base in Jammu, 14 km from the international border.

A security officer told *The Indian Express*: "At present, the only option is to shoot down the drones, but it is easier said than done as that would require sniper fire and the drone to be within range. Also, sighting drones, especially during night, is not easy."

While the Jammu attack was the first such instance in India where a drone was weaponised, the most high-profile incident in recent times involving a drone, perhaps, was the targeted bombing of two key oil facilities inside Saudi Arabia by Yemen's Houthi rebels in 2019.



Rafael, the defence company behind Israel's famed Iron Dome missile system, has also developed something called the Drone Dome. (Source: rafael.co.il)

Drones have also been increasingly used in the Middle East, particularly in Iraq and Syria, by the US to carry out targeted assassinations. In 2020, Iranian general Qasem Soleimani, the most powerful figure in Iran after its supreme leader, was killed in a US drone strike in Iraq. In 2018, Venezuelan President Nicolas Maduro also claimed he survived an assassination attempt involving drones rigged with explosives.

How to counter the drone threat

Several private defence contractors, over the years, have begun to offer off-the-shelf anti-drone tech to counter hostile Unmanned Aerial Vehicles (UAVs), popularly known as drones.

Companies, predominantly based out of Israel, US, and even China, have developed anti-drone systems using existing technologies such as radars, frequency jammers, optic and thermal sensors etc.

But how do these systems stand apart?

It comes down to the range and the manner in which the threat is assessed and neutralised. Some systems simply monitor and alert the presence of a drone, while others are equipped with ballistics and even lasers.

What are the existing anti-drone systems?

Rafael, the defence company behind Israel's famed Iron Dome missile system, has also developed something called the Drone Dome. Like the Iron Dome, which identifies and intercepts incoming missiles, the Drone Dome detects and intercepts drones.

Besides the collection of static radars, radio frequency sensors, and cameras it uses to offer "a 360-degree coverage", the Drone Dome is also capable of jamming the commands being sent to a hostile drone and blocking visuals, if any, that are being transmitted back to the drone operator. Its highlight, however, is the precision with which it can shoot high-powered laser beams to bring down targets.

One of the company's promotional videos claims that it is safe for deployment in civilian areas as "the laser beam is never released unless it is 100 per cent locked onto the target". Rafael, like most other companies, says its technology works under all-weather conditions and at night time.

US-based Fortem Technologies also operates in a similar fashion but uses an interceptor drone — aptly called the 'DroneHunter' — to pursue and capture hostile drones. The DroneHunter fires from its 'NetGun' a spider web-shaped net to capture targets midair and tow them.

Besides the regular detection and surveillance, DroneShield, an Australian publicly listed company, also offers a portable solution in the form of a drone gun that can be used to point and 'shoot'. The company's DroneGun Tactical and DroneGun MKIII engage in radio frequency disruption that will disrupt the hostile drone's video feed and force it to land on the spot or return to the operator.

How much do they cost?

Most of the leading players in the drone detection industry have not listed the prices of their products on their websites. Considering that most orders are customised based on client requirements and how many strategic sites need protecting, costs vary from hundreds of thousands of dollars to even millions.

However, a 2020 press release by China-based DJI attacking one of its corporate rivals offers an insight into how much they may cost. The company said its rival offered "a \$340,000 drone detection system with a \$44,000 annual maintenance fee".

Is there an indigenous solution for India?

Yes, there is. The Defence Research and Development Organisation (DRDO) has developed an 'Anti Drone System' and it will be deployed this year, according to a March press release by the Ministry of Defence.

While details about the system's capabilities remain threadbare, it has been deployed during then US President Donald Trump's visit to India in 2020. According to news agency PTI, the system was part of the security arrangements made for the 22km-long roadshow in Ahmedabad.

The same year it was again used near the Red Fort on the occasion of Prime Minister Narendra Modi's Independence Day address. According to news agency ANI, the anti-drone system can detect and jam drones up to 3km and uses a laser weapon to fire at targets that are 1 to 2.5km away.

In March, CNBC-TV18 also reported that Adani Defence Systems and Technologies Ltd has demonstrated an anti-drone system to government agencies.

<https://indianexpress.com/article/explained/explained-can-drone-attack-be-prevented-7379857/>

Agni P (Prime): India's ASBM in the Making and its Impact on Naval Warfare

A few years ago China using a ballistic missile shot down a satellite in low-Earth, DRDO officials in India had only four words " we can do that " and in a matter of few years, DRDO using PDV Mk-II anti-ballistic missile showcased exactly what the Chinese had demonstrated a few years earlier, but by that time Chinese already tested DF-21D, the world's first anti-ship ballistic missile, and yesterday, India just again demonstrated why it's not far away from developing its own Anti-Ship Ballistic Missile (ASBM) system after it tested all new Agni-P (Prime) that is not just near successor to the older Agni-I SRBM but much more than advertised.



The Two-Stage solid fueled Agni P (Prime) uses an all-composite structure that includes the casing that not only reduces its weight considerably by also improves its range. Agni-P (Prime) in side by side comparison looks like a mini-variant of the bigger Agni-V and actually, it does incorporate many of the technologies that were exclusively developed for the Agni-V program that includes, first for India of integrating hermetically sealed tandem twin canister made of composite materials that allow easier storage of missiles and quicker salvo launches but also makes it a tad difficult for the satellite to pick them up when on the move. Agni-P (Prime) also features a ring laser gyro-based inertial navigation system (INS) and a modern micro-navigation system (MINS) borrowed from Agni-V.

More than What Meets the Eye

DRDO in its Press Release said that the missile is a next-generation Agni MRBM (Medium Range Ballistic Missile) that has a range of 1000 to 2000km that could vary as per payload and it is estimated that it will be able to carry 1.5 tons payload to its max range of 2000km and even more with lighter payload. A notable feature of the Agni-P (Prime) is four delta fins for terminal maneuver indicating maneuvering warheads that can defeat not only ballistic missile defense system but also be used as an Anti-Ship Ballistic Missile (ASBM) when a new variant is developed based on the Agni-P (Prime).

Not many Indian defense pundits are buying it as just a next-generation Agni MRBM that will replace older Agni-1 generation missiles but also will be developed as an Anti-Ship Ballistic Missile (ASBM) system that adds another dimension to the threat to Chinese carrier battle groups, so Agni-P (Prime) development alone can be seen as India sending a clear message of China's increasing military confidence in the region.

Impact on Indian Ocean Region (IOR)

ASBMs effectiveness in practice hinges on a comprehensive reconnaissance and targeting architecture that includes seaward-looking ISR with an array of air, land, sea, and space-based collection assets that can guild a missile in its terminal phase even against an aircraft carrier that is moving or makes aggressive maneuvers to avoid being hit. India is piecing together the missing pieces in India's defense jigsaw puzzle that includes the ability to track Ballistic Missile launches using space and ground-based long-range sensors and India is also putting together systems that can effectively demonstrate deployment of the ASBMs when required. . A conventionally armed ASBM is designed to take advantage of its ballistic trajectory through the upper atmosphere to

propel its warhead to hypersonic speeds so that they can penetrate any shipboard anti-ballistic missile (ABM) system that its targets have fielded.

Indian Navy sure requires its land based ASBMs that once fired in salvos could give the Indian Navy not only the ability to deny access to the sea but also act as deterrence to any Chinese confidence in taking out Indian carrier battle groups. ASBMs are technically not designed to sink aircraft carriers or their Armitage but it's used for "mission kill" and the warheads atop them are only part of a larger kill chain that will make a carrier unable to conduct flight operations, that's the main objective.

<https://www.eletimes.com/agni-p-prime-indias-asbm-in-the-making-and-its-impact-on-naval-warfare>

ThePrint

Wed, 30 June 2021

Israel unveils Sea Breaker, the long-range missile system it could offer for Make in India

Sea Breaker, the 5th generation long range, autonomous, precision-guided missile system, is meant to hit high-value maritime and land targets

By Snehesh Alex Philip, Edited by Poulomi Banerjee

New Delhi: Israeli defence major Rafael Advanced Defense Systems Wednesday unveiled Sea Breaker, a 5th generation long range, autonomous, precision-guided missile system meant to hit high-value maritime and land targets.

Described by the firm as a naval and artillery unit force-multiplier, Sea Breaker, which has stand-off ranges of up to 300 km, can be fired both from land and surface ships.

Though company sources said they would be offering the system to India in future with a possible Make in India initiative, the country already has a similar product, BrahMos, an Indo-Russia missile system.

The Israeli company has an existing joint venture with Indian private firm Kalyani and is called the Kalyani Rafael Advanced Systems (KRAS).

The joint venture had this March rolled out its first batch of Medium Range Surface to Air Missile (MRSAM) kits for the Indian Army and the Indian Air Force.

These missile sections will be sent to the state-run Bharat Dynamics Limited (BDL) for further and future integration.

Sources said the same facility can be used for future Make in India initiative.

Sea Breaker vs BrahMos

The Sea Breaker can be launched from naval platforms, varying in size, from fast attack missile boats, to corvettes and frigates. The land version is based on Rafael's SPYDER air defence launchers, in service with the Indian Air Force.

The battery architecture supports standalone launchers, or operation as an integrated solution, with a command and control Unit (CCU) and various sensors, based on customer requirements.

While the Sea Breaker flies at "high subsonic speeds", the Brahmos is a supersonic cruise missile and would be seen as a direct competition to the Israeli system.

Adding extra weight in favour of BrahMos is that the missile can be fired from ships, land and air. Work is also on for a submarine launched BrahMos variant.

While both missiles have a similar range, enhanced range versions of the BarhMos are already being rolled out.

However, Rafael sources said the missile can be modified for air operation as well if a customer so needs and the speed can be made to supersonic too in future.

Rafael said Sea Breaker performs deep-learning and big data-based scene-matching, a feature that is available on the Spice 2000 that was used during the Balakot strike. The Spice 2000 is also manufactured by Rafael. The Spice 2000 uses a Digital Scene Matching Area Correlator (DSMAC) technology which automatically matches the target, as it zooms in, with the image that has been pre-fed, besides the GPS coordinates.

The Sea Breaker has full operational capability in Global Navigation Satellite System (GNSS)-denied arenas, in all weather conditions. The missile is electronic countermeasures immune and jam-resilient.

The company said Sea Breaker's mission profile enables sea-skimming and terrain-following low-level flight above ground. It also added that the missile's datalink supports real-time man-in-the-loop decision making and tactical updates. It also features a mid-flight abort capability and Battle Damage Assessment (BDA).

<https://theprint.in/defence/israel-unveils-sea-breaker-the-long-range-missile-system-it-could-offer-for-make-in-india/686993/>

KASHMIR READER

Wed, 30 June 2021

LAWDA installs DRDO bio-digesters in Telbal

Srinagar: J&K LAWDA installs DRDO invariant land based bio-digesters in Telbal area on Tuesday.

The initiative was kick started by Vice-Chairman LAWDA, Bashir Ahmad Bhat (IRS) and SE LAWDA, Vineet Kumar besides several officers from the engineering wing were present at the occasion.

In various meetings held by the Committee of Experts appointed by the Hon'ble High Court J&K it was decided as pilot project the J&K Lakes and Waterways Development Authority, Srinagar shall take up providing 100 number Bio-Digesters free of cost to the individual household in Telbal area which are not connected with the existing STPs.



In this regard, the experts from DRDO were invited to formulate a programme wherein they shall provide design of Bio-Digesters. After proper e-tendering the work has been allotted to one of the TOTs of DRDO.

All the 100 Bio-digesters have been delivered by the concerned agency and installation of these Bio-digesters has been started today on 29.06.2021.

The main purpose of these bio-digesters was to scientifically take care of the sewage generated from the households which otherwise was directly going into one of the main inflow channels of the Dal lake.

<https://kashmirreader.com/2021/06/30/lawda-installs-drdo-bio-digesters-in-telbal/>



Wed, 30 June 2021

मेरठ कैंट अस्पताल में डीआरडीओ के सहयोग से बनेगा आक्सीजन प्लांट, 168 करोड़ का बजट पास

मेरठ कैंट अस्पताल में 250 किलोलीटर क्षमता का आक्सीजन प्लांट बनेगा। डीआरडीओ के सहयोग से इसका निर्माण किया जाएगा। इसके साथ ही प्रदेश सरकार के सहयोग से कम्युनिटी अस्पताल बनाने की दिशा में भी कार्य किया जा रहा है। कैंट बोर्ड में 168 का बजट पास।

By Taruna Tayal

मेरठ: सफेद हाथी कहे जाने वाले कैंट अस्पताल का दिन सुधरने वाला है। इसमें कैंट अस्पताल में 250 किलोलीटर क्षमता का आक्सीजन प्लांट बनेगा। डीआरडीओ के सहयोग से इसका निर्माण किया जाएगा। इसके साथ ही प्रदेश सरकार के सहयोग से कम्युनिटी अस्पताल बनाने की दिशा में भी कार्य किया जा रहा है। मंगलवार को कैंटबोर्ड की मीटिंग में सीईओ ने यह जानकारी दी।

उन्होंने कहा कि कैंट बोर्ड इसके लिए जच्चा बच्चा वार्ड में इसके लिए व्यवस्था की जाएगी। इससे पहले कोविड अस्पताल के लिए 10 करोड़ की मांग की गई है। जिसका प्रस्ताव भेजा गया था।



कैंट बोर्ड की विशेष बैठक में 168 करोड़ का बजट पास किया गया है। वर्ष 2021-22 के इस बजट करीब 168 करोड़ का व्यय भी दिखाया गया है। बोर्ड बैठक में सीईओ ने बताया कि कैंटबोर्ड पर करीब 54 करोड़ की देनदारी है। सरकार से ग्रांट मिलने पर इसे पूरा कर लिया जाएगा। फिलहाल बोर्ड अपने आय से इसे पूरा करने को कहा। बोर्ड मीटिंग में बोर्ड अध्यक्ष अर्जुन सिंह ने कैंट में सफाई की व्यवस्था पर सफाई अनुभाग को सराहा। कैंट उपाध्यक्ष सहित सदस्यों ने अभिनन्दन पत्र पढ़ा।

एक और बोर्ड बैठक होगी

12 जुलाई को बोर्ड भंग हो जाएगा। इससे पहले एक और बोर्ड बैठक होगी। कैंट बोर्ड बैठक में सदस्यों की ओर से मांग की गई। जिस पर सीईओ ने कहा कि एक बोर्ड मीटिंग 9 या 10 जुलाई को हो सकती है। बोर्ड मीटिंग में सीईओ ने सदस्यों के मानदेय की बढ़ी हुई राशि देने के लिए कहा। जिसका चेक दिया जाएगा।

<https://www.jagran.com/uttar-pradesh/meerut-city-oxygen-plant-will-be-built-in-meerut-cantt-hospital-in-collaboration-with-drdo-budget-of-168-crores-passed-in-cantt-board-21783614.html>

Defence Strategic: National/International



Press Information Bureau
Government of India

Ministry of Defence

Tue, 29 June 2021 6:26PM

Chief of Defence Staff visits forward areas in central sector and HQ Western Command of Indian Army

The Chief of Defence Staff (CDS), General Bipin Rawat visited forward areas along the Line of Actual Control in the Central Sector in Himachal Pradesh along with GOC, Uttar Bharat Area today. On arrival at the forward most post in Sumdoh Sub-Sector, the CDS was briefed on the operational preparedness of own forces towards safeguarding the territorial integrity of the nation. The CDS interacted extensively with the Indian Army, ITBP and GREF personnel deployed in the remote areas and appreciated their state of high morale. He encouraged all ranks to keep up the high state of alertness and professionalism displayed by them.



Later in the day, General Bipin Rawat visited the Headquarters of Western Command of Indian Army at Chandimandir where he reviewed the operational situation along the Western borders. The CDS commended the formation for their efforts to ensure force preservation and at the same time stepping forward to provide support in terms of establishing COVID hospitals at Chandigarh, Patiala, Faridabad, providing paramedical staff in aid of civil hospitals, assistance in vaccination of common citizens and revitalizing oxygen plants at various places in the nation's fight against the pandemic. He stressed upon the need to focus on training hard and remain vigilant to thwart the nefarious designs of our adversaries. He emphasized that all ranks must keep themselves abreast with latest trends in information technology, emerging cyber threats and counter measures.

<https://pib.gov.in/PressReleasePage.aspx?PRID=1731203>



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भारत सरकार

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Tue, 29 June 2021 6:26PM

चीफ ऑफ डिफेंस स्टाफ ने सेंट्रल सेक्टर के अग्रिम क्षेत्रों और भारतीय सेना के पश्चिमी कमान के मुख्यालय का दौरा किया

चीफ ऑफ डिफेंस स्टाफ (सीडीएस) जनरल बिपिन रावत ने आज उत्तर भारत एरिया के जीओसी के साथ हिमाचल प्रदेश में सेंट्रल सेक्टर में वास्तविक नियंत्रण रेखा के साथ सटे अग्रिम क्षेत्रों का दौरा किया। सुमदोह सब सेक्टर में फॉरवर्ड पोस्ट पर सीडीएस को देश की क्षेत्रीय अखंडता की रक्षा में तैनात सैन्य बलों की अभियानगत तैयारियों की जानकारी दी गई। सीडीएस ने दूरदराज के इलाकों में तैनात भारतीय सेना, आईटीबीपी और जीआरईएफ कर्मियों के साथ व्यापक बातचीत की और उनके उच्च मनोबल की सराहना की। उन्होंने सभी रैंकों को उनके द्वारा प्रदर्शित सतर्कता और व्यावसायिकता के उच्च मानकों को बनाए रखने के लिए प्रोत्साहित किया।



इसके बाद जनरल बिपिन रावत ने चंडीमंदिर में भारतीय सेना की पश्चिमी कमान के मुख्यालय का दौरा किया जहां उन्होंने पश्चिमी सीमा की स्थिति की समीक्षा की। सीडीएस ने सैन्य बलों का बुद्धिमतापूर्ण इस्तेमाल सुनिश्चित करते हुए इस कार्य के साथ साथ उन्हें चंडीगढ़, पटियाला, फरीदाबाद में कोविड अस्पतालों की स्थापना, सिविल अस्पतालों की सहायता में पैरामेडिकल स्टाफ उपलब्ध कराने, आम नागरिकों के टीकाकरण में सहायता करने और महामारी के खिलाफ देश की लड़ाई में विभिन्न स्थानों पर ऑक्सीजन संयंत्रों के संदर्भ में सहायता प्रदान करने के लिए उनकी सराहना की। उन्होंने विरोधियों के नापाक मंसूबों को नाकाम करने के लिए कड़ी ट्रेनिंग पर ध्यान देने और सतर्क रहने पर जोर दिया। उन्होंने जोर देकर कहा कि सभी रैंकों को सूचना प्रौद्योगिकी के नवीनतम रुझानों, उभरते साइबर खतरों और जवाबी उपायों के साथ स्वयं को तैयार रखना चाहिए।

<https://pib.gov.in/PressReleasePage.aspx?PRID=1731279>



Press Information Bureau
Government of India

Ministry of Defence

Tue, 29 June 2021 5:00PM

CAS visit to Bangladesh

Air Chief Marshal RKS Bhadauria PVSM AVSM VM ADC, Chief of the Air Staff was invited by his counterpart Air Marshal Shaikh Abdul Hannan BUP, nswc, fawc, psc, GD (P), Chief of Air Staff, Bangladesh Air Force to review the Passing Out Parade and Commissioning Ceremony at Bangladesh Air Force Academy (BAFA) in Jashore on 28 June 2021, on the occasion of 'President Parade 2021'.

The two day visit was highly significant in view of the Golden Jubilee of the historic victory in 1971 War for Liberation of Bangladesh. This occasion also marks the first instance when any foreign Chief was invited to review the Parade as the Chief Guest – a re-affirmation of the strong bonds of friendship and trust between India and Bangladesh and their Armed Forces.

While addressing the graduating trainees on parade, CAS complimented them for an excellent parade and noted the rapid progress being made in all aspects of military level interactions, with bilateral defence cooperation having become an important pillar in the deep historical and fraternal ties between India and Bangladesh. The CAS described this event as a reflection of the excellent state of professional relationship between the two Air Forces based on mutual trust and understanding. He expressed confidence that his presence in BAFA during this historic 50th year of Liberation War would reinforce the already strong and multi-dimensional partnership between the two Nations.

During his stay in Bangladesh, The CAS held discussions with his host, the Chief of Air Staff Bangladesh Air Force as well as the Chief of Army Staff and Principal Staff Officer, Armed Forces Division; wherein matters of mutual interest and avenues to further strengthen the all-encompassing defence cooperation were discussed. He also interacted with the High Commissioner of India, HE Vikram K. Doraiswami during his stay in Dhaka.

<https://pib.gov.in/PressReleasePage.aspx?PRID=1731169>





पत्र सूचना कार्यालय
भारत सरकार

रक्षा मंत्रालय

Tue, 29 June 2021 5:00PM

वायुसेना प्रमुख की बांग्लादेश यात्रा

वायुसेना प्रमुख आर के एस भदौरिया, पीवीएसएम, एवीएसएम, वीएम, एडीसी को उनके समकक्ष एयर मार्शल शेख अब्दुल हन्नान, बीयूपी एनएसडब्ल्यूसी एफएडब्ल्यूसी पीएससी, जीडी (पी), बांग्लादेश वायुसेना प्रमुख द्वारा 28 जून 2021 को जाशोर में बांग्लादेश वायु सेना अकादमी (बीएएफए) में 'प्रेसिडेंट परेड 2021' के अवसर पर पासिंग आउट परेड और कमीशनिंग समारोह की समीक्षा करने के लिए आमंत्रित किया गया था।



बांग्लादेश की मुक्ति के लिए 1971 के युद्ध में ऐतिहासिक जीत की स्वर्ण जयंती को देखते हुए यह दो दिवसीय यात्रा बेहद महत्वपूर्ण रही। यह अवसर पहला उदाहरण भी है जब किसी विदेशी प्रमुख को मुख्य अतिथि

के रूप में परेड की समीक्षा करने के लिए आमंत्रित किया गया था- यह आमंत्रण भारत एवं बांग्लादेश और उनके सशस्त्र बलों के बीच मित्रता और विश्वास के मजबूत संबंधों की पुनः पुष्टि करता है।

परेड के दौरान स्नातक प्रशिक्षुओं को संबोधित करते हुए वायुसेना प्रमुख ने उत्कृष्ट परेड के लिए उनकी सराहना की और सैन्य स्तर पर बातचीत के सभी पहलुओं में तेजी से हो रही प्रगति का उल्लेख किया जिसमें भारत और बांग्लादेश के बीच द्विपक्षीय रक्षा सहयोग गहरे ऐतिहासिक और भाईचारे वाले संबंधों में एक महत्वपूर्ण स्तंभ बन गया है। वायुसेना प्रमुख ने इस घटना को आपसी विश्वास और समझ के आधार पर दोनों वायु सेनाओं के बीच पेशेवर संबंधों की उत्कृष्ट स्थिति का परिचायक बताया। उन्होंने विश्वास व्यक्त किया कि मुक्ति संग्राम के इस ऐतिहासिक 50वें वर्ष के दौरान बीएएफए में उनकी उपस्थिति दोनों राष्ट्रों के बीच पहले से मजबूत और बहुआयामी साझेदारी को मजबूत करेगी।

बांग्लादेश में अपने प्रवास के दौरान वायुसेना प्रमुख ने अपने मेजबान बांग्लादेश वायुसेना के प्रमुख के साथ-साथ सेना प्रमुख और सशस्त्र बल प्रभाग के प्रिंसिपल स्टाफ ऑफिसर के साथ विचार-विमर्श किया, जिसमें आपसी हित के मसलों तथा सभी प्रकार के रक्षा सहयोग को और मजबूत करने के तौर तरीकों पर चर्चा की गई। उन्होंने ढाका प्रवास के दौरान भारत के उच्चायुक्त विक्रम के दोराईस्वामी से भी बातचीत की।

<https://pib.gov.in/PressReleasePage.aspx?PRID=1731236>



Press Information Bureau
Government of India

Ministry of Defence

Tue, 29 June 2021 5:59PM

MOU between Indian Navy and M/s BEL for Technology Incubation Forum (TIF)

A Memorandum of Understanding (MoU) was signed between the Indian Navy and M/s Bharat Electronics Limited, Bangalore on 29 June 21 at Integrated Headquarters, Ministry of Defence (Navy), New Delhi for creation of a joint Technology Incubation Forum (TIF).

The Technology Incubation Forum reflects the joint vision of Indian Navy and Bharat Electronics Limited towards innovative and creative thinking and fostering development of Emerging Technologies. The broad charter of the TIF includes technology development in the domain of Weapons & Sensors, Information Technology and Emerging Technologies such as Artificial Intelligence & Machine Learning, Quantum Computing, Autonomous Platforms/ Robotics, Image Processing and Cognitive Radio. The TIF will spearhead mission mode development of deployable products under the Government's 'Atmanirbhar Bharat' initiative with involvement of Industry, Academia and Start-Ups.

<https://pib.gov.in/PressReleasePage.aspx?PRID=1731189>



पत्र सूचना कार्यालय
भारत सरकार

रक्षा मंत्रालय

Tue, 29 June 2021 5:59PM

भारतीय नौसेना और मेसर्स बीईएल के बीच टेक्नोलॉजी इनक्यूबेशन फोरम (टीआईएफ) हेतु एमओयू

भारतीय नौसेना और मेसर्स भारत इलेक्ट्रॉनिक्स लिमिटेड, बेंगलूर के बीच 29 जून 2021 को एकीकृत मुख्यालय, रक्षा मंत्रालय (नौसेना), नई दिल्ली में एक संयुक्त प्रौद्योगिकी इनक्यूबेशन फोरम (टीआईएफ) के निर्माण के लिए एक समझौता ज्ञापन (एमओयू) पर हस्ताक्षर किए गए।

प्रौद्योगिकी इनक्यूबेशन फोरम अभिनव और रचनात्मक सोच और उभरती प्रौद्योगिकियों के विकास को बढ़ावा देने की दिशा में भारतीय नौसेना और भारत इलेक्ट्रॉनिक्स लिमिटेड के संयुक्त दृष्टिकोण को दर्शाता है। टीआईएफ के व्यापक चार्टर में हथियार और संसर, सूचना प्रौद्योगिकी और उभरती प्रौद्योगिकियों जैसे आर्टिफिशियल इंटेलिजेंस एंड मशीन लर्निंग, क्वांटम कंप्यूटिंग, स्वायत्त प्लेटफार्मों/ रोबोटिक्स, इमेज प्रोसेसिंग और संज्ञानात्मक रेडियो के क्षेत्र में प्रौद्योगिकी विकास शामिल है। टीआईएफ उद्योग, शिक्षा और स्टार्ट-अप की भागीदारी के साथ सरकार की 'आत्मनिर्भर भारत' पहल के तहत उत्पादों के मिशन मोड पर विकास के कामकाज का नेतृत्व करेगा।

<https://pib.gov.in/PressReleasePage.aspx?PRID=1731296>



Press Information Bureau
Government of India

Ministry of Defence

Tue, 29 June 2021 3:16PM

INS Tabar visits Alexandria, Egypt

Indian Navy's frontline frigate, INS Tabar arrived at Alexandria on 27 Jun 21 for two days as part of a goodwill visit. India and Egypt share warm bilateral relations and ships of the Indian Navy have frequently visited Alexandria port.

Commanding Officer INS Tabar, Captain M Mahesh and his ships crew laid wreath at Alexandria Naval Unknown Soldier Memorial. The Commanding Officer also called upon Rear Admiral Ayman al-Daly, Commander of Alexandria Naval Base.

On departure from port, INS Tabar undertook a maritime partnership exercise at sea with the Egyptian Navy Ship Touthka. The exercise included helo deck landing ops and underway replenishment drills. These evolutions at sea exemplified naval cooperation and interoperability between the IN and EN. The goodwill visit by INS Tabar aims to strengthen strong relations between the two sides and also explore newer avenues of bolstering the relationship.

<https://pib.gov.in/PressReleasePage.aspx?PRID=1731131>



पत्र सूचना कार्यालय
भारत सरकार

रक्षा मंत्रालय

Tue, 29 June 2021 3:16PM

आईएनएस तबर का अलेक्जेंड्रिया, मिस्र का दौरा

नौसेना का प्रमुख विध्वंसक आईएनएस तबर 27 जून 2021 को दो दिनों के लिए मिस्र के अलेक्जेंड्रिया पहुंचा। भारत और मिस्र के बीच मैत्रीपूर्ण द्विपक्षीय संबंध हैं और भारतीय नौसेना के जहाज अक्सर अलेक्जेंड्रिया बंदरगाह का दौरा करते हैं।

कमांडिंग ऑफिसर आईएनएस तबर, कैप्टन एम महेश और जहाज के चालक दल ने 'अलेक्जेंड्रिया नेवल अननोन सोल्जर मेमोरियल' पर माल्यार्पण किया। कमांडिंग ऑफिसर ने अलेक्जेंड्रिया नेवल बेस के कमांडर रियर एडमिरल अयमान अल-डेली से भी मुलाकात की।

बंदरगाह से प्रस्थान करने पर, आईएनएस तबर ने मिस्र के नौसेना पोत तौशका के साथ समुद्र में 'पार्टनरशिप एक्सरसाइज' की। अभ्यास में डेक लैंडिंग ऑपरेशन और अंडरवाटर रिचार्ज ड्रिल शामिल थे। समुद्र में इस अभ्यास के दौरान भारतीय नौसेना और मिस्र की नौसेना के बीच सहयोग और समन्वय प्रशंसनीय था। आईएनएस तबर की सद्भावना यात्रा का उद्देश्य दोनों देशों के बीच संबंधों को मजबूत करने के साथ-साथ संबंधों को बढ़ाने के नए तरीके खोजना था।

<https://pib.gov.in/PressReleasePage.aspx?PRID=1731224>





Wed, 30 June 2021

A new type of quasiparticle

Russian scientists have experimentally proved the existence of a new type of quasiparticle—previously unknown excitations of coupled pairs of photons in qubit chains. This discovery could be a step towards disorder-robust quantum metamaterials. The study was published in *Physical Review B*.

Superconducting qubits are a leading qubit modality today that is currently being pursued by industry and academia for quantum computing applications. However, the performance of quantum computers is largely affected by decoherence that contributes to a qubit's extremely short lifespan and causes computational errors. Another major challenge is low controllability of large qubit arrays.

Metamaterial quantum simulators provide an alternative approach to quantum computing, as they do not require a large amount of control electronics. The idea behind this approach is to create artificial matter out of qubits, the physics of which will obey the same equations as for some real matter. Conversely, you can program the simulator in such a way as to embody matter with properties that have not yet been discovered in nature.

Arrays of superconducting qubits are generally described by the Bose-Hubbard model. An interesting feature of the Bose-Hubbard model is the emergence of bound boson pairs (doublons) caused by the strong quantum nonlinearity. The topological physics of doublons has been extensively explored in a series of recent theoretical works. However, the experimental investigation of topological properties of bound photon pairs is still lacking.

A group of scientists from NUST MISIS, Russian Quantum Center, ITMO University, Bauman Moscow State Technical University, Dukhov Automatics Research Institute (VNIIA) and Ioffe Institute used an array of superconducting qubits to engineer a quantum simulator. Quantum utilize entanglement and many-particle behaviors to explore and solve hard scientific, engineering, and computational problems.

"By registering the properties of qubits, we can draw conclusions about a broader class of physical systems described by the same equations. And if we can change the parameters of these equations in a controlled way, then such a device can be considered a "specialized simulator." Of course, its programmability is not the same as that of a quantum computer, but its scaling requires significantly fewer resources," explains the main author of the study Ilya Besedin, junior researcher at the NUST MISIS Laboratory of Superconducting Metamaterials.

The scientists engineered an array of superconducting transmon qubits with alternating coupling. Due to the alternation of strong and weak bonds, two zones and an edge state appear in this system. This state is classified as topological. Moreover, the experiment shows that doublons also form an edge state.



The main author of the study Ilya Besedin, junior researcher at the NUST MISIS Laboratory of Superconducting Metamaterials. Credit: Sergey Gnuskov/NUST MISIS

"We were able to see how doublons form these zones, and we even managed to detect how an edge doublon state appeared at the upper edge of the doublon zone as we increased the length of the array," notes Ilya Besedin.

Thus, the scientists were able to demonstrate for the first time that a new type of quasiparticles—doublon topological excitations—can arise in qubit chains.

"Research on superconducting qubits and quantum circuits is currently underway in many countries around the world, and competition in this area is growing. This study on 11 qubits shows that Russia has attained high level of scientific development in the field of superconducting quantum computing," notes Prof. Alexey Ustinov, Head of the Laboratory for Superconducting Metamaterials at NUST MISIS and Group Head at Russian Quantum Center, who co-authored the study.

More information: Ilya S. Besedin et al, Topological excitations and bound photon pairs in a superconducting quantum metamaterial, *Physical Review B* (2021). DOI: [10.1103/PhysRevB.103.224520](https://doi.org/10.1103/PhysRevB.103.224520)

Journal information: [Physical Review B](https://phys.org/news/2021-06-quasiparticle.html)
<https://phys.org/news/2021-06-quasiparticle.html>



Wed, 30 June 2021

Identifying a topological fingerprint

A FLEET theoretical study out this week has found a 'smoking gun' in the long search for the topological magnetic monopole referred to as the Berry curvature.

This discovery is a breakthrough in the search for topological effects in non-equilibrium systems.

The group, led by Dimi Culcer at UNSW, identified an unconventional Hall effect driven by an in-plane magnetic field in semiconductor hole systems, which is traced exclusively to the Berry curvature.

(Conversely, the ordinary Hall effect and anomalous Hall effect both require a magnetic field/magnetisation that is perpendicular to the surface.)

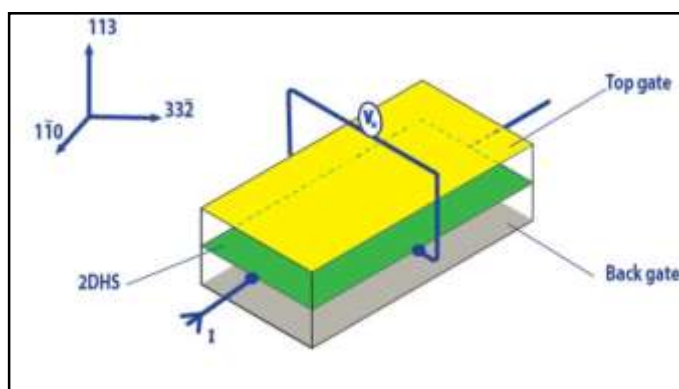
Enhanced topological effects would permit low-energy topological electronics viable for large-scale, room-temperature operation, and were recently included in the IEEE roadmap towards future electronics.

Isolating response a breakthrough moment

"Isolating topological responses in 'regular conductors' has been a historically difficult task," says research team leader A/Prof Dimi Culcer (UNSW). "Even though these topological responses are believed to be ubiquitous in solids."

Quantized responses, such as the quantum Hall and quantum spin-Hall effects provide a clear fingerprint of topology, yet these have only been observed in one-dimensional (1D) systems and are intimately connected with the existence of edge states.

In 'regular' conductors, meaning 2D and 3D systems, plenty of theoretical literature exists predicting topological contributions to e.g. the anomalous Hall effect, but these have never been observed unambiguously in a transport measurement.



An experimental set-up for measuring conventional Hall effect with magnetic field perpendicular to the surface. Credit: FLEET

There are two main reasons for this: (i) spin-up and spin-down electrons usually make opposite contributions, and these nearly cancel out; (ii) whatever is left is overwhelmed by disorder.

The new FLEET paper remedies this long-standing shortcoming by identifying a two-dimensional system in which the Berry curvature, and only the Berry curvature, is responsible for the Hall signal linear in the applied in-plane magnetic field.

"Remarkably, all disorder contributions vanish: we are not aware of any other multi-dimensional system in which this is true," says lead author, UNSW Ph.D. student James Cullen. "Its experimental measurement is accessible to any state-of-the-art laboratory worldwide, hence we expect strong interest from experimentalists."

Berry curvature, the anomalous Hall effect and topological materials

The research team sought the tell-tale mathematical trace called "Berry curvature," which can be understood if we think of the concept of parallel transport that appears routinely in geometry and general relativity.

"Think of a vector as an arrow that we place somewhere on the surface of a solid object," explains Dimi. "Now we move the arrow around, making sure it always points at the same angle to the surface—this is in fact like a human being walking along the surface of the Earth. We eventually bring the arrow back to the starting point after it has circled around, and we find that, in general, it points in a different direction—it has magically rotated through some angle. The size of this angle is determined by the curvature of the surface. "

In quantum mechanics, instead of vectors we have wave functions, but we can describe the dynamics using the same picture, and the curvature is called the Berry curvature.

The angle of rotation is replaced by the famous Berry phase, named after the mathematical physicist Prof Sir Michael Berry, who formulated the problem in the 1980s. Later on, building on work by Nobel laureate David Thouless, Qian Niu of UT Austin showed that the Berry curvature behaves like the coveted magnetic monopole—but not in real space, rather in momentum space, which is the space most condensed-matter physicists think in.

The Berry curvature drives topological effects in out-of-equilibrium systems because when an electric field is applied an electron is accelerated, so its momentum changes. When this happens its wave function changes slowly, in the same way that the 'arrow' is rotated in parallel transport, and as a result of this gradual rotation a transverse (Hall) current is generated. The Onsager relations, which are fundamental to non-equilibrium physics, say that the Hall current does not dissipate energy. The extreme case is the quantum anomalous Hall effect (QAHE), a quantum effect key to the function of topological materials, in which edge currents can flow with effectively zero electrical resistance.

('Quantum' describes 'step' transition in the transverse (Hall) resistance—i.e., it varies in discrete steps rather than smoothly—while 'anomalous' refers to the phenomenon's occurrence in the absence of any applied magnetic field.)

Researchers seek to enhance QAHE in order to protect topological behavior at higher temperatures, allowing for topological electronics that would be viable for room-temperature operation.

"The significant reduction in electrical resistance permitted by room temperature QAHE would allow us to significantly reduce the power consumption in electronic devices," says Dimi.

More information: James H. Cullen et al, Generating a Topological Anomalous Hall Effect in a Nonmagnetic Conductor: An In-Plane Magnetic Field as a Direct Probe of the Berry Curvature, *Physical Review Letters* (2021). [DOI: 10.1103/PhysRevLett.126.256601](https://doi.org/10.1103/PhysRevLett.126.256601)

Journal information: [Physical Review Letters](https://phys.org/news/2021-06-topological-fingerprint.html)
<https://phys.org/news/2021-06-topological-fingerprint.html>

A new piece of the quantum computing puzzle

By Brandie Jefferson

Research from the McKelvey School of Engineering at Washington University in St. Louis has found a missing piece in the puzzle of optical quantum computing.

Jung-Tsung Shen, associate professor in the Department of Electrical & Systems Engineering, has developed a deterministic, high-fidelity two-bit quantum logic gate that takes advantage of a new form of light. This new logic gate is orders of magnitude more efficient than the current technology.

"In the ideal case, the fidelity can be as high as 97%," Shen said.

His research was published in May 2021 in the journal *Physical Review A*.

The potential of quantum computers is bound to the unusual properties of superposition—the ability of a quantum system to contain many distinct properties, or states, at the same time—and entanglement—two particles acting as if they are correlated in a non-classical manner, despite being physically removed from each other.

Where voltage determines the value of a bit (a 1 or a 0) in a classical computer, researchers often use individual electrons as "qubits," the quantum equivalent. Electrons have several traits that suit them well to the task: they are easily manipulated by an electric or magnetic field and they interact with each other. Interaction is a benefit when you need two bits to be entangled—letting the wilderness of quantum mechanics manifest.

But their propensity to interact is also a problem. Everything from stray magnetic fields to power lines can influence electrons, making them hard to truly control.

For the past two decades, however, some scientists have been trying to use photons as qubits instead of electrons. "If computers are going to have a true impact, we need to look into creating the platform using light," Shen said.

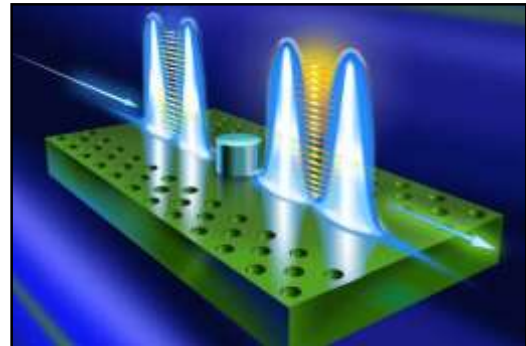
Photons have no charge, which can lead to the opposite problems: they do not interact with the environment like electrons, but they also do not interact with each other. It has also been challenging to engineer and to create ad hoc (effective) inter-photon interactions. Or so traditional thinking went.

Less than a decade ago, scientists working on this problem discovered that, even if they weren't entangled as they entered a logic gate, the act of measuring the two photons when they exited led them to behave as if they had been. The unique features of measurement are another wild manifestation of quantum mechanics.

"Quantum mechanics is not difficult, but it's full of surprises," Shen said.

The measurement discovery was groundbreaking, but not quite game-changing. That's because for every 1,000,000 photons, only one pair became entangled. Researchers have since been more successful, but, Shen said, "It's still not good enough for a computer," which has to carry out millions to billions of operations per second.

Shen was able to build a two-bit quantum logic gate with such efficiency because of the discovery of a new class of quantum photonic states—photonic dimers, photons entangled in both



Jung-Tsung Shen, associate professor in the Department of Electrical & Systems Engineering, has developed a deterministic, high-fidelity, two-bit quantum logic gate that takes advantage of a new form of light. This new logic gate is orders of magnitude more efficient than the current technology. Credit: Jung-Tsung Shen

space and frequency. His prediction of their existence was experimentally validated in 2013, and he has since been finding applications for this new form of light.

When a single photon enters a logic gate, nothing notable happens—it goes in and comes out. But when there are two photons, "That's when we predicted the two can make a new state, photonic dimers. It turns out this new state is crucial."

Mathematically, there are many ways to design a logic gate for two-bit operations. These different designs are called equivalent. The specific logic gate that Shen and his research group designed is the controlled-phase gate (or controlled-Z gate). The principal function of the controlled-phase gate is that the two photons that come out are in the negative state of the two photons that went in.

"In classical circuits, there is no minus sign," Shen said. "But in quantum computing, it turns out the minus sign exists and is crucial."

When two independent photons (representing two optical qubits) enter the logic gate, "The design of the logic gate is such that the two photons can form a photonic dimer," Shen said. "It turns out the new quantum photonic state is crucial as it enables the output state to have the correct sign that is essential to the optical logic operations."

Shen has been working with the University of Michigan to test his design, which is a solid-state logic gate—one that can operate under moderate conditions. So far, he says, results seem positive.

Shen says this result, while baffling to most, is clear as day to those in the know.

"It's like a puzzle," he said. "It may be complicated to do, but once it's done, just by glancing at it, you will know it's correct."

More information: Zihao Chen et al, Two-photon controlled-phase gates enabled by photonic dimers, *Physical Review A* (2021). DOI: [10.1103/PhysRevA.103.052610](https://doi.org/10.1103/PhysRevA.103.052610)

Journal information: [Physical Review A](https://phys.org/news/2021-06-piece-quantum-puzzle.html)
<https://phys.org/news/2021-06-piece-quantum-puzzle.html>

Covid-19: Genome research identifies more dangerous variants - study

The P.1 strain has been identified as more transmissible than the previous COVID-19 strain and is responsible for a surge of COVID-19 deaths in Manaus, Brazil

By Gabrielle Abrams

New COVID-19 mutations have been identified, which could lead to the spread of more dangerous variants, according to a new study in the academic journal *Genetic Epidemiology*.

The study includes an analysis of 7,548 genomes of COVID-19 patients around the world. A total of 29,891 locations in the viral genome were assessed for correlations between variants and mortality.

The analysis identified a locus in viral COVID-19 genomes from Brazil that were associated with higher mortality.

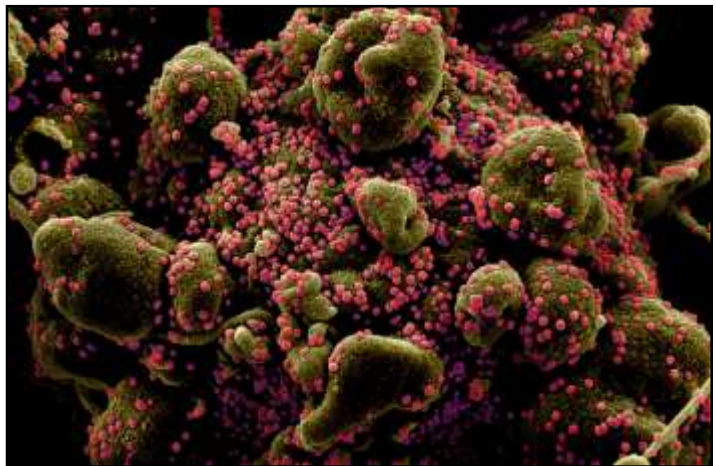
Co-lead author of the study, Georg Hahn of Harvard University, identified this locus as part of the P.1 strain from Brazil.

The P.1 strain has been identified as more transmissible than the previous COVID-19 strain and is responsible for a surge of COVID-19 deaths in Manaus, Brazil.

The methodology used in this study will likely be applicable in disease research beyond COVID-19.

“We expect that this approach would work in similar scenarios involving other diseases, provided the quality of the data collected in public databases is sufficiently high,” said Hahn.

<https://www.jpost.com/health-science/covid-19-genome-research-identifies-more-dangerous-variants-study-672399>



Colorized scanning electron micrograph of an apoptotic cell (greenish brown) heavily infected with SARS-COV-2 virus particles (pink), also known as novel coronavirus, isolated from a patient sample. Image captured and color-enhanced at the NIAID Integrated Research Facility (IRF) in Fort Detrick, Ma. (photo credit: NATIONAL INSTITUTE OF ALLERGY AND INFECTIOUS DISEASES - NIH/HANDOUT VIA REUTERS)

