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Press Information Bureau
Government of India

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Wed, 03 Nov 2021 5:54PM

DRDO & Indian Air Force carry out successful flight tests of indigenously-developed smart anti-airfield weapon

Key highlights:

- ***Two different configurations on satellite navigation & electro optical sensors tested successfully***
- ***First Electro optical seeker based flight test of this class of bomb in the country***
- ***Equipped with Imaging Infra-Red Seeker technology to enhance precision strike capability of the weapon***
- ***Maximum range of 100 kms***

Two flight tests of indigenously-developed smart anti-airfield weapon have been carried out jointly by Defence Research & Development Organisation (DRDO) and Indian Air Force (IAF). The two different configurations based on satellite navigation and electro optical sensors have been successfully tested. Electro optical seeker based flight test of this class of bomb has been conducted for the first time in the country. The electro optic sensor has been developed indigenously. The weapon was launched by an IAF aircraft from Chandan ranges at Jaisalmer, Rajasthan on October 28, 2021 and November 03, 2021.

Electro optical configuration of the system is equipped with Imaging Infra-Red (IIR) Seeker technology enhancing the precision strike capability of the weapon. In both the tests, the intended target was hit with high accuracy. The system is designed for a maximum range 100 kilometres. The newly adapted launcher ensured smooth release and ejection of the weapon. Advanced guidance and navigation algorithms, software performed as per the mission requirements. The telemetry and tracking systems captured all mission events throughout the flight. All the mission objectives were achieved.

Smart anti airfield weapon has been designed and developed by Research Centre Imarat (RCI) in coordination with other DRDO Laboratories and extensive support from IAF. Quality and design certification agencies have contributed significantly in its development and Hindustan Aeronautics Limited (HAL), Bengaluru has carried out weapon integration with the aircraft.

Raksha Mantri Shri Rajnath Singh has complimented the synergistic efforts of DRDO, IAF and the teams associated with the mission. Congratulating the teams, Secretary, Department of Defence R&D and Chairman DRDO Dr G Satheesh Reddy said the performance and reliability of the weapon has been proved.

https://pib.gov.in/PressReleasePage.aspx?PRID=1769241

पत्र सूचना कार्यालय
भारत सरकार

रक्षा मंत्रालय

Wed, 03 Nov 2021 5:54PM

डीआरडीओ और भारतीय वायु सेना ने स्वदेश में विकसित स्मार्ट एंटी-एयरफील्ड हथियार का सफल उड़ान परीक्षण किया

प्रमुख बिंदु:

- ***सैटेलाइट नेविगेशन और इलेक्ट्रो ऑप्टिकल सेंसर पर दो अलग विन्यासों का सफल परीक्षण किया गया***
- ***देश में बम के इस वर्ग का पहला इलेक्ट्रो ऑप्टिकल सीकर आधारित उड़ान परीक्षण***
- ***हथियार की सटीक स्ट्राइक क्षमता बढ़ाने के लिए इमेजिंग इन्फ्रा-रेड सीकर तकनीक से लैस***
- ***100 किलोमीटर की अधिकतम सीमा***

रक्षा अनुसंधान एवं विकास संगठन (डीआरडीओ) और भारतीय वायु सेना द्वारा संयुक्त रूप से स्वदेशी तरीक़े से विकसित स्मार्ट एंटी-एयरफील्ड हथियार के दो उड़ान परीक्षण किए गए हैं। सैटेलाइट नेविगेशन और इलेक्ट्रो ऑप्टिकल सेंसर पर आधारित दो अलग-अलग विन्यासों का सफलतापूर्वक परीक्षण किया गया है। बम के इस वर्ग का इलेक्ट्रो ऑप्टिकल सीकर आधारित उड़ान परीक्षण देश में पहली बार किया गया है। इलेक्ट्रो ऑप्टिक सेंसर को स्वदेशी रूप से विकसित किया गया है। हथियार को दिनांक 28 अक्टूबर, 2021 और 03 नवंबर, 2021 को राजस्थान के जैसलमेर में चंदन पर्वतमाला से भारतीय वायुसेना के विमान द्वारा लॉन्च किया गया था।

सिस्टम का इलेक्ट्रो ऑप्टिकल कॉन्फिगरेशन इमेजिंग इंफ्रा-रेड (आईआईआर) सीकर तकनीक से लैस है जो हथियार की सटीक स्ट्राइक क्षमता को बढ़ाता है। दोनों परीक्षणों में लक्षित किए गए लक्ष्य को उच्च सटीकता के साथ निशाना बनाया गया था। सिस्टम को अधिकतम 100 किलोमीटर की दूरी के लिए डिज़ाइन किया गया है। नए अनुकूलित लांचर ने हथियार की सुचारू रिलीज़ और निष्कासन सुनिश्चित किया। उन्नत मार्गदर्शन और नेविगेशन एल्गोरिदम मिशन आवश्यकताओं के अनुसार सॉफ्टवेयर का प्रदर्शन किया। टेलीमेट्री और ट्रैकिंग सिस्टम ने पूरी उड़ान के दौरान सभी मिशन कार्यक्रमों को कैप्चर किया। मिशन के सभी उद्देश्यों को प्राप्त किया गया ।

स्मार्ट एंटी एयरफील्ड हथियार को रिसर्च सेंटर इमारत (आरसीआई) द्वारा अन्य डीआरडीओ प्रयोगशालाओं के समन्वय और भारतीय वायुसेना के व्यापक रूप से प्रदान समर्थन से डिजाइन और विकसित किया गया है। गुणवत्ता और डिजाइन प्रमाणन एजेंसियों ने इसके विकास में महत्वपूर्ण योगदान दिया है और हिंदुस्तान एयरोनॉटिक्स लिमिटेड (एचएएल), बेंगलुरु ने विमान के साथ हथियार का एकीकरण किया है ।

रक्षा मंत्री श्री राजनाथ सिंह ने रक्षा अनुसंधान एवं विकास संगठन (डीआरडीओ) और भारतीय वायु सेना तथा मिशन से जुड़ी टीमों के साझा एवं सामंजस्यपूर्ण प्रयासों की सराहना की है। रक्षा अनुसंधान एवं विकास विभाग के सचिव और रक्षा अनुसंधान एवं विकास संगठन (डीआरडीओ) के अध्यक्ष डॉ. जी सतीश रेड्डी ने टीमों को बधाई देते हुए कहा कि हथियार का प्रदर्शन और विश्वसनीयता साबित हो गई है।

https://pib.gov.in/PressReleasePage.aspx?PRID=1769303

FRONTLINE
INDIA'S NATIONAL MAGAZINE

Thu, 04 Nov 2021

Smart anti-airfield weapon successfully tested by DRDO and IAF

By Ravi Sharma

The Defence Research and Development Organisation (DRDO) and the Indian Air Force (IAF) have successfully conducted an electro-optical seeker based flight test of the indigenously developed smart anti-airfield weapon (SAAW). A precision-guided bomb, the SAAW is designed to destroy enemy runways, bunkers, aircraft hangers, radars and other reinforced structures at a maximum range of 100 kilometres. The tests were conducted twice, both occasions being a success.

Said an official from the DRDO: "Though the SAAW has been tested around a dozen times so far, this is the first time in the country that we have undertaken an electro-optical seeker based flight test of this class of precision-guided bomb." The electro-optical sensor has also been developed indigenously. The weapon's precision striking capability has also been enhanced by equipping the electro-optical configuration of the system with imaging infra-red (IIR) seeker technology.

The weapon's initial launch was by an IAF aircraft from the Chandan ranges at Jaisalmer in Rajasthan on October 28. The second SAAW launch, again by an IAF aircraft and at the same ranges, was on November 3. Officials disclosed that in both the launches, the intended target was "hit with a very high degree of accuracy". Explained an official: "Two different configurations based on satellite navigation and electro-optical sensors were successfully tested." He said that the advanced guidance and navigational algorithms and inbuilt software performed as per the mission's requirements. "The telemetry and tracking systems captured all mission events throughout the flight. The performance and reliability of the weapon has been proved. All the mission objectives were achieved," the official said.

Designed and developed by the DRDO's Research Centre Imarat (RCI) in coordination with other DRDO laboratories and with extensive support from the IAF, SAAW's development has also been significantly assisted by the quality and design certification agencies like CEMILAC. Hindustan Aeronautics Limited has carried out the smart anti-airfield weapon's integration on aircraft such as the Jaguar fighters and Hawk advanced jet trainers.

Defence Minister Rajnath Singh and Dr G. Satheesh Reddy, Secretary, Department of Defence R&D, and Chairman, DRDO, complimented the synergistic efforts of DRDO, IAF and the teams associated with the SAAW mission.

https://frontline.thehindu.com/dispatches/smart-anti-airfield-weapon-successfully-tested-by-drdo-and-iaf/article37327015.ece

THE HINDU

Thu, 04 Nov 2021

DRDO, IAF jointly test smart anti-airfield weapon

System designed for a maximum range of 100 kilometres

New Delhi: The Defence Research and Development Organisation (DRDO) and Indian Air Force (IAF) have jointly carried out two flight tests of the indigenously-developed smart anti-airfield weapon.

The weapon was launched by an IAF aircraft from Chandan ranges at Jaisalmer, Rajasthan on October 28 and November 3, a Defence Ministry statement said. “In both the tests, the intended target was hit with high accuracy. The system is designed for a maximum range of 100 kilometres.”

Stating that two different configurations based on satellite navigation and electro-optical sensors have been successfully tested, the Ministry said that electro-optical seeker based flight test of this class of bomb has been conducted for the first time in the country. The electro-optic sensor has been developed indigenously.

Electro optical configuration of the system is equipped with Imaging Infra-Red (IIR) Seeker technology enhancing the precision strike capability of the weapon, the Ministry explained.

The newly adapted launcher ensured smooth release and ejection of the weapon while advanced guidance and navigation algorithms, software performed as per the mission requirements, the statement said. “The telemetry and tracking systems captured all mission events throughout the flight. All the mission objectives were achieved,” it added.

The smart anti-airfield weapon has been designed and developed by Research Centre Imarat (RCI) in coordination with other DRDO Laboratories and support from IAF. Hindustan Aeronautics Limited (HAL), Bengaluru has carried out weapon integration with the aircraft.

Speaking after the test flight, Secretary, Department of Defence R&D and Chairman DRDO Dr G Satheesh Reddy said the performance and reliability of the weapon has been proven.

https://www.thehindu.com/news/national/drdo-iaf-conduct-successful-flight-tests-of-anti-airfield-weapon/article37324494.ece

Hindustan Times

Thu, 04 Nov 2021

India conducts key flight test of anti-airfield weapon

This was the second successful test firing of the smart anti-airfield weapon (SAAW) from the Jaguar fighter plane in a week -- it was earlier fired on October 28. The weapon has a range of 100 km.

By Rahul Singh

New Delhi: On Diwali eve, the Indian Air Force (IAF) and the Defence Research and Development Organisation (DRDO) successfully tested an indigenous smart weapon that can target enemy airfield assets such as radars, bunkers, taxiways and runways, at a firing range in Rajasthan, officials familiar with the development said on Wednesday.

SAAW has been designed and developed by DRDO's Research Centre Imarat with support from IAF.(Twitter)

This was the second successful test firing of the smart anti-airfield weapon (SAAW) from the Jaguar fighter plane in a week -- it was earlier fired on October 28. The weapon has a range of 100 km.

The November 3 test is significant as it involved the imaging infrared seeker technology that exponentially enhances the terminal accuracy of the weapon, said one of the officials cited above. The weapons earlier tested -- SAAW has been test fired around 10 times -- were equipped with GPS-based navigation and terminal guidance systems.

"The two different configurations based on satellite navigation and electro optical (EO) sensors have been successfully tested. EO seeker-based flight test of this class of bomb was conducted for the first time in the country. EO configuration of the system is equipped with imaging infrared seeker technology that enhancing the precision strike capability of the weapon," the defence ministry said in a statement.

In both tests, the newly adapted launcher ensured smooth release of the weapon and intended targets were hit with high accuracy, it added.

"SAAW is an important tactical weapon whose equivalent glide bombs have thus far been imported. Once inducted, SAAW will fill a critical indigenous capability gap," said Air Marshal Anil Chopra (retd), director general, Centre for Air Power Studies.

The November 3 test came a week after India carried out the latest test of the 5,000 km range Agni-V missile from the APJ Abdul Kalam Island off the Odisha coast, a significant step towards boosting the nuclear deterrence against China.

In January 2021, Hindustan Aeronautics Limited (HAL) announced that a Hawk-i aircraft successfully fired SAAW for the first time off the coast of Odisha. It was seen as a significant boost to an upgrade programme for the Hawk advanced jet trainer operated by IAF and navy.

https://www.hindustantimes.com/india-news/india-conducts-key-flight-test-of-anti-airfield-weapon-101635984577194.html

Thu, 04 Nov 2021

DRDO, IAF ने रचा इतिहास, एक हफ्ते के भीतर स्मार्ट एंटी-एयरफील्ड वेपन का दूसरा टेस्ट भी सफल

नई दिल्ली: रक्षा अनुसंधान एवं विकास संगठन (DRDO) और भारतीय वायु सेना (IAF) ने एक हफ्ते के अंदर ही स्वदेशी रूप से विकसित स्मार्ट एंटी-एयरफील्ड वेपन (SAAW) के दूसरा सफल उड़ान परीक्षण किया है। यह सेटेलाइट नेविगेशन और इलेक्ट्रो-ऑप्टिकल सेंसर के आधार पर अलग-अलग विन्यास के साथ दो फ्लाइट टेस्ट किए गए। पहला परीक्षण पिछले गुरुवार को किया गया था, जबकि दूसरा परीक्षण बुधवार को किया गया। इसे जैसलमेर में चंदन रेंज से भारतीय वायुसेना के एक विमान द्वारा शुरू किया गया था। रक्षा मंत्रालय के एक बयान में कहा गया है कि भारत में पहली बार इस वर्ग के बम का इलेक्ट्रो-ऑप्टिकल सीकर आधारित उड़ान परीक्षण किया गया।

SAAW 100 किलोमीटर की दूरी तक जमीनी लक्ष्यों को भेदने में सक्षम है.

मंत्रालय ने कहा कि इस सिस्टम का इलेक्ट्रो-ऑप्टिकल कॉन्फ़िगरेशन इमेजिंग इंफ्रा-रेड (IIR) सीकर तकनीक से लैस है, जो हथियार की सटीक स्ट्राइक क्षमता को बढ़ाता है। इसमें कहा गया है कि SAAW 100 किमी की सीमा तक जमीनी लक्ष्यों को मारने में सक्षम है। एयरफील्ड रनवे को निष्क्रिय कर सकता है। वहीं यह 125 किग्रा तक का वारहेड ले जा सकता है। परीक्षण के संबंध में रक्षा मंत्रालय ने कहा है कि हथियारों को एक नए अनुकूलित लॉन्चर द्वारा आसानी से छोड़ा और निकाला गया। इसके द्वारा लक्षित टारगेट को उच्च सटीकता के साथ मारा गया। साथ ही टेलीमेट्री और ट्रैकिंग सिस्टम ने पूरे उड़ान के दौरान सभी मिशन कार्यक्रमों को कैप्चर किया।

रक्षा मंत्री राजनाथ सिंह ने DRDO, IAF और मिशन से जुड़ी टीमों के 'सहयोगी प्रयासों' की प्रशंसा की है। वहीं मंत्रालय ने बताया कि मिशन की जरूरतों के मुताबिक एडवांस गाइडेंस और नेविगेशन एल्गोरिदम, सॉफ्टवेयर प्रदर्शन के साथ दोनों ही फ्लाइट टेस्ट्स के सभी मिशन ऑब्जेक्टिव्स को सफलता से प्राप्त किया गया। रक्षा अनुसंधान एवं विकास विभाग के सचिव और डीआरडीओ के अध्यक्ष डॉ जी सतीश रेड्डी ने टीम को बधाई दी और कहा कि इससे हथियार का प्रदर्शन और विश्वसनीयता साबित हो गई है। इससे पहले DRDO ने जनवरी में एंटी-एयरफील्ड हथियार का परीक्षण किया था।

स्मार्ट एंटी एयरफील्ड हथियार (SAAW) भारत के रक्षा अनुसंधान और विकास संगठन (DRDO) द्वारा विकसित एक लंबी दूरी की सटीक-निर्देशित एंटी-एयरफील्ड हथियार है। इसे 100 किलोमीटर (62 मील) की सीमा तक सटीक मारक क्षमता के साथ जमीनी लक्ष्यों को भेदने में सक्षम बनाया गया है। सितंबर 2020 में, SAAW को नौसेना और वायु सेना के लिए भारत सरकार द्वारा खरीद के लिए मंजूर किया गया था। हथियार का पहला सफल परीक्षण मई 2016 में किया गया था। इसका एक और सफल परीक्षण नवंबर 2017 में किया गया था। इसके बाद दिसंबर 2017 में तीन और सफल परीक्षणों की एक सीरीज हुई। 16 और 18 अगस्त 2018 के बीच, तीन सफल परीक्षण किए गए, जिससे कुल परीक्षणों की संख्या आठ हो गई। जनवरी 2021 में डीआरडीओ ने इसका 9वां सफल परीक्षण किया था।

https://hindi.news18.com/news/nation/drdo-iaf-create-history-within-a-week-the-second-test-of-smart-anti-airfield-weapon-also-successful-3832538.html

अमर उजाला

Thu, 04 Nov 2021

बढ़ेगी ताकत: स्मार्ट एंटी-एयरफील्ड हथियारों का सफल परीक्षण, डीआरडीओ और वायुसेना ने दिया अंजाम

सार

भारतीय वायु सेना और डीआरडीओ ने स्मार्ट एंटी एयरफील्ड हथियारों के दो उड़ान परीक्षण किए हैं। रक्षा मंत्रालय ने बताया कि ये परीक्षण पूरी तरह सफल रहे।

विस्तार

रक्षा अनुसंधान एवं विकास संगठन (डीआरडीओ) और भारतीय वायु सेना ने संयुक्त रूप से स्वदेश में विकसित स्मार्ट एंटी-एयरफील्ड हथियारों के सफलतापूर्वक दो उड़ान परीक्षण किए हैं। यह जानकारी बुधवार को रक्षा मंत्रालय ने एक बयान में साझा की। मंत्रालय ने बताया कि ये परीक्षण राजस्थान के जैसलमेर में किए गए।

रक्षा मंत्रालय - फोटो : फाइल

देश में पहली बार हुआ इस तकनीक का इस्तेमाल

रक्षा मंत्रालय ने बताया कि उपग्रह नेविगेशन और इलेक्ट्रो ऑप्टिकल सेंसर पर आधारित दो अलग-अलग उपकरणों का सफल परीक्षण किया गया है। इस तरह के बम का इलेक्ट्रो ऑप्टिकल सेंसर आधारित उड़ान परीक्षण देश में पहली बार किया गया है। इस इलेक्ट्रो ऑप्टिक सेंसर को भी स्वदेश में ही विकसित किया गया है।

उच्च सटीकता के साथ लगाया टारगेट पर निशाना

मंत्रालय ने बताया कि वायु सेना ने जैसलमेर की चंदन रेंज से एक हथियार 28 अक्तूबर और दूसरा तीन नवंबर को लॉन्च किया था। दोनों परीक्षणों में हथियार ने अपने टारगेट पर उच्च सटीकता के साथ निशाना लगाया। इस हथियार की मारक क्षमता अधिकतम 100 किलोमीटर है। यह इमेजिंग इन्फ्रारेड सीकर तकनीकी से लैस है।

https://www.amarujala.com/india-news/drdo-and-airforce-conducted-two-flight-tests-of-indigenously-developed-smart-anti-airfield-weapon

The Indian EXPRESS

Thu, 04 Nov 2021

Karnataka: HAL Tumkuru facility to be operational by March 2022

The Ministry of Defence approved the procurement of 12 LUH from the HAL on November 2.

By Aksheev Thakur

Bengaluru: The new helicopter-making facility of the Hindustan Aeronautics Limited (HAL) at Tumkuru will start operations by March 2022. The unit will manufacture the Light Utility Helicopter (LUH).

Notably, the Ministry of Defence approved the procurement of 12 LUH from the HAL on November 2.

Top officials from the HAL told indianexpress.com that the new facility will have the capacity to produce 30 helicopters annually.

The LUH attained Operational Clearance on February 7, 2020. (File)

The 12 LUH (six for the Indian Army and six for the Indian Air Force) come under a limited series production (LSP). The LUH has finished trials in high-altitude areas like Siachen and Ladakh.

The HAL has also requested the ministry to issue 'Acceptance of Necessity' (AON) for 175 more LUHs at the earliest.

"Non-placement of sufficient order in time would lead to idling of capacities and also delay in production due to non-availability of critical items in time," the source added.

The LUH attained Operational Clearance on February 7, 2020. The initial operational clearance for LUH Indian Army Version was accorded by the Centre for Military Airworthiness and Certification (CEMILAC) at the Aero India 2021 in Bengaluru. The LUH is a three-ton class new generation single-engine helicopter indigenously designed and developed by the Rotary Wing Research and Design Centre of HAL with features suitable for operations in the diverse operating conditions unique to India. The LUH will replace the ageing fleet of Cheetah/Chetak helicopters operated by the Services.

It is powered by a single-turbo shaft engine Ardiden 1U from M/s Safran Helicopter Engine (SHE), France with adequate power margins to accomplish high-altitude missions in the Himalayas with ease. The chopper is equipped with a glass cockpit and state-of-the-art HUMS (Health & Usage Monitoring System).

The initial operational clearance for LUH IAF version was accorded by CEMILAC on February 7, 2020 during Defexpo 2020 at Lucknow.

https://indianexpress.com/article/cities/bangalore/karnataka-hal-tumkuru-facility-to-be-operational-by-march-2022-7606178/

DRDO on Twitter

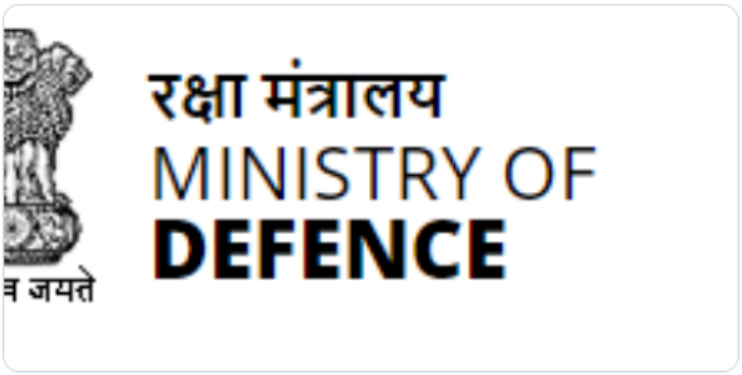
A. Bharat Bhushan Babu @SpokespersonMoD · 14h

.@DRDO_India & @IAF_MCC carried out successful flight tests of indigenously-developed smart anti-airfield weapon. Two different configurations on satellite navigation & electro optical sensors tested successfully. More Details 👉pib.gov.in/PressReleseDet...

#AatmanirbharBharat

ANI @ANI

Two flight tests of indigenously-developed smart anti-airfield weapon have been carried out jointly by Defence Research & Development Organisation (DRDO) & Indian Air Force (IAF): Ministry of Defence



6:09 PM · Nov 3, 2021

रक्षा मंत्री कार्यालय/ RMO India Retweeted

DRDO @DRDO_India · 14h

DRDO & Indian Air Force carry out successful flight tests of indigenously-developed smart anti-airfield weapon.

pib.gov.in/PressReleseDet...

Thu, 04 Nov 2021

Army Chief General MM Naravane visits forward areas in Jammu, reviews security situation

Army Chief General MM Naravane was briefed by the commanders on ground on the prevailing security situation along the Line of Control (LoC)

Indian Army chief General MM Naravane carried out aerial reconnaissance of forward areas in the Jammu region on Wednesday.

The army chief was briefed by the commanders on the ground on the prevailing security situation along the Line of Control (LoC).

Army chief General MM Naravane is on a two-day visit to Jammu where he will review the security situation and operational preparedness, officials said.

Indian Army Chief General MM Naravane. Image Source : ANI

This is his second visit to Jammu in the past over two weeks amid an ongoing operation against terrorists in a forest belt in twin districts of Poonch and Rajouri, which is the longest in the recent past that has entered 24th day on Wednesday.

"General MM Naravane #COAS (Chief of Army Staff) is on a visit to Jammu region wherein he will be given an update on security situation & operational preparedness. #COAS will visit forward areas & interact with troops and commanders on ground," the Additional Directorate General of Public Information (ADGPI) of the Indian Army tweeted.

Earlier, the Army chief conducted a two-day tour of the Jammu region on October 18 and 19 and reviewed the ground situation and the ongoing counter-infiltration operations.

He had also visited the border districts of Rajouri and Poonch, where a massive operation to track down terrorists hiding in the forest areas of Mendhar, Surankote and Thanamandi has been going on since October 11.

The operation started in Surankote forest on October 11, following the killing of five soldiers, including a Junior Commissioned Officer (JCO) and was subsequently extended to Mendhar to neutralise the fleeing terrorists where another encounter took place on October 14, leaving four soldiers, including another JCO, killed.

Pakistani terrorist Zia Mustafa, who was shifted from Kot Bhalwal Central Jail Jammu to Mendhar on police remand for questioning in connection with the operation, was killed when the security forces accompanying him to identify a hideout came under fire from hiding terrorists on October 24.

Police have arrested a terrorist associate allegedly having links with Mustafa and the terrorist handlers across the border, while over a dozen others are also being questioned in connection with providing logistic support to the terrorists in the forest belt.

Rajouri and Poonch in the Jammu region have witnessed a rise in infiltration attempts since June this year, resulting in the killing of nine terrorists in separate encounters.

https://www.indiatvnews.com/news/india/army-chief-general-naravane-in-jammu-reviews-security-743565

Hindustan Times

Thu, 04 Nov 2021

Pentagon report details how China beefed up border infra in standoff with India

The Pentagon report also said that China is indulging in aggressive and coercive behaviour with its neighbours, India in particular. It has continued "taking incremental and tactical actions" to press its claims at the LAC.

A report by Pentagon has said that China installed a fibre optic network in remote areas of the western Himalayas region during the height of the border standoff with India in 2020. It also said that the border row along the Line of Actual Control (LAC) resulted in significant force buildup by China's military and establishment or enforcement of forward positions.

"At the height of the border standoff between the PRC and India in 2020, the People's Liberation Army (PLA) installed a fibre optic network in remote areas of the western Himalayas to provide faster communications and increased protection from foreign interception," the report titled "Military and Security Developments Involving the People's Republic of China 2021" said.

Indian army trucks drive near Pangong Tso lake in Ladakh.(AP File Photo)

This set up gave them access to near-real-time ISR (intelligence, surveillance, and reconnaissance) and situational data for streamlining decision-making processes and shortening response timelines, the report released on Wednesday further said.

The Pentagon regularly reports to the US Congress about various issues, including the India-China border standoff in eastern Ladakh, which began with a skirmish between the two militaries in June last year. Both sides suffered casualties in that incident and have held several rounds of talks to resolve issues but no significant breakthrough has been achieved.

The Pentagon report, meanwhile, noted that despite the coronavirus disease pandemic, border clashes with India, and other significant events, the Chinese army in 2020 accelerated its training and fielding of equipment from the already fast pace of recent years.

The Pentagon said despite the ongoing diplomatic and military dialogues to reduce border tensions, China has continued "taking incremental and tactical actions" to press its claims at the LAC.

It also said that China is indulging in aggressive and coercive behaviour with its neighbours, India in particular.

Talking about the build-up of nuclear force, the Pentagon said in its report that China is doing that much faster than US officials predicted just a year ago, which could enable Beijing to match or surpass US global power by mid-century.

https://www.hindustantimes.com/india-news/pentagon-report-details-how-china-beefed-up-border-infra-in-standoff-with-india-101635985796594.html

PHYS.ORG

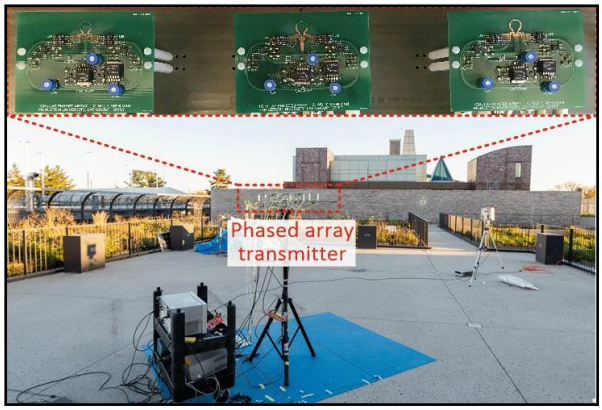
Thu, 04 Nov 2021

Thin-film, high-frequency antenna array offers new flexibility for wireless communications

By Molly Sharlach

Princeton researchers have taken a step toward developing a type of antenna array that could coat an airplane's wings, function as a skin patch transmitting signals to medical implants, or cover a room as wallpaper that communicates with internet of things (IoT) devices.

The technology, which could enable many uses of emerging 5G and 6G wireless networks, is based on large-area electronics, a way of fabricating electronic circuits on thin, flexible materials. The researchers described its development in a paper published Oct. 7 in *Nature Electronics*.



Princeton researchers have developed a new type of phased array antenna based on large-area electronics technowireless networks. The researchers tested the system on the roof of Princeton's Andlinger Center for Energy and the Environment. Credit: Can Wulogy, which could enable many uses of emerging 5G and 6G

The approach overcomes limitations of conventional silicon semiconductors, which can operate at the high radio frequencies needed for 5G applications, but can only be made up to a few centimeters wide, and are difficult to assemble into the large arrays required for enhanced communication with low-power devices.

"To achieve these large dimensions, people have tried discrete integration of hundreds of little microchips. But that's not practical—it's not low-cost, it's not reliable, it's not scalable on a wireless systems level," said senior study author Naveen Verma, a professor of electrical and computer engineering and director of Princeton's Keller Center for Innovation in Engineering Education.

"What you want is a technology that can natively scale to these big dimensions. Well, we have a technology like that—it's the one that we use for our displays" such as computer monitors and liquid-crystal display (LCD) televisions, said Verma. These use thin-film transistor technology, which Verma and colleagues adapted for use in wireless signaling.

The researchers used zinc-oxide thin-film transistors to create a 1-foot-long (30-centimeter) row of three antennas, in a setup known as a phased array. Phased antenna arrays can transmit narrow-beam signals that can be digitally programmed to achieve desired frequencies and directions. Each antenna in the array emits a signal with a specified time delay from its neighbors, and the constructive and destructive interference between these signals add up to a focused electromagnetic beam—akin to the interference between ripples created by water droplets in a pond.

A single antenna broadcasts a fixed signal in all directions, "but a phased array can electrically scan the beam to different directions, so you can do point-to-point wireless communication," said lead study author Can Wu, a postdoctoral researcher at Stanford University who completed a Ph.D. in electrical and computer engineering at Princeton earlier this year.

Phased array antennas have been used for decades in long-distance communication systems such as radar systems, satellites, and cellular networks, but the technology developed by the Princeton

team could bring new flexibility to phased arrays and enable them to operate at a different range of radio frequencies than previous systems.

"Large-area electronics is a thin film technology, so we can build circuits on a flexible substrate over a span of meters, and we can monolithically integrate all the components into a sheet that has the form factor of a piece of paper," said Wu.

In the study, the team fabricated the transistors and other components on a glass substrate, but a similar process could be used to create circuits on flexible plastic, said Wu.

This type of antenna system could be installed almost anywhere. When used like wallpaper in a room, it could enable quick, secure and energy-efficient communication with a distributed network of IoT devices such as temperature or motion sensors.

Having an antenna that's a flexible surface could also be beneficial for satellites, which are launched in a compact format and unfold as they reach orbit, and a large area could be advantageous for long-distance communication with aircraft.

"With an airplane, because its distance is so far, you lose a lot of the signal power, and you want to be able to communicate with high sensitivity. The wings are a fairly large area, so if you have a single point receiver on that wing it doesn't help too much, but if you can expand the amount of area that's capturing the signal by a factor of a hundred or a thousand, you can reduce your signal power and increase the sensitivity of your radio," said Verma.

In addition to Wu and Verma, the paper's coauthors, all from the Department of Electrical and Computer Engineering, were Ph.D. graduates Yoni Mehlman (2020) and Tiffany Moy (2017); graduate students Prakhar Kumar and Yue Ma; postdoctoral research associate Hongyang Jia; professor emeritus and senior scholar Sigurd Wagner; and James Sturm, the Stephen R. Forrest Professor in Electrical Engineering.

More information: Can Wu et al, A phased array based on large-area electronics that operates at gigahertz frequency, *Nature Electronics* (2021). DOI: 10.1038/s41928-021-00648-z

Journal information: *Nature Electronics*

https://phys.org/news/2021-11-thin-film-high-frequency-antenna-array-flexibility.html

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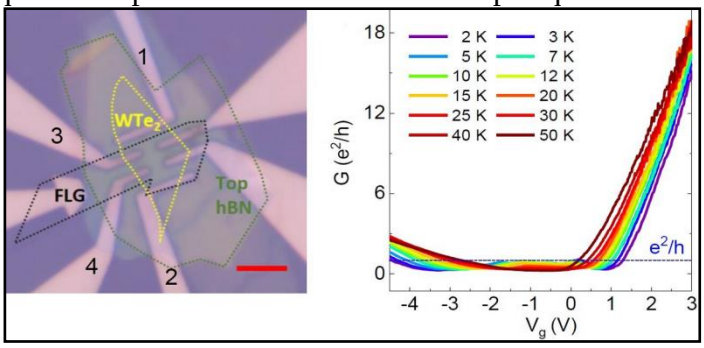
Thu, 04 Nov 2021

Quantifying spin in WTe2 for future spintronics

A RMIT-led, international collaboration published this week has observed large in-plane anisotropic magnetoresistance (AMR) in a quantum spin Hall insulator and the spin quantization axis of the edge states can be well-defined.



Left: monolayer WTe2 device (scale bar = 5um). Right: Gate-dependent conductance at varying temperatures. Credit: Nano Letters

quantum spin Hall insulator (QSHIs) is a two-dimensional state of matter with an insulating bulk and non-dissipative helical edge states that display spin-momentum locking, which are promising options for developing future low-energy nano-electronic and spintronic devices.

The FLEET collaboration of researchers at RMIT, UNSW and South China Normal University (China) confirm for the first time the existence of large in-plane AMR in monolayer WTe_2 which is a novel QSHI with higher critical temperatures.

By allowing electrical conduction without wasted dissipation of energy, such materials could form the basis of a new future generation of ultra-low energy electronics.

Fabricating monolayer WTe_2 devices

The rise of topological insulators has offered significant hope for researchers seeking non-dissipative transport, and thus a solution to the already observed plateauing of Moore's law.

Unlike previously-reported quantum-well systems, which could only exhibit quantized edge transport at low temperatures, the recent observation of quantized edge transport at 100 K in a predicted large band-gap QSHI, monolayer WTe_2, has shed more light on the applications of QSHI.

"Although we had gained much experience in stacking van der Waals (vdW) heterostructures, fabricating monolayer vdW devices was still challenging for us," the study's first author Dr. Cheng Tan says.

"Because monolayer WTe_2 nanoflakes are difficult to obtain, we firstly focused on a more mature material, graphene, to develop the best way for fabricating monolayer WTe_2 vdW devices" says Cheng, who is a FLEET Research Fellow at RMIT University in Melbourne.

As the monolayer WTe_2 nanoflakes are also very sensitive to the air, protective 'suits of amours' made of inert hBN nanoflakes should be utilized to encapsulate them. Additional, the assembly was carried out in an oxygen- and water-free glove box before series of tests outside. After some effort, the team then successfully fabricated the monolayer WTe_2 devices with gate electrodes and observed typical transport behaviors of gated monolayer WTe_2.

"For materials to be used in future spintronic devices, we need a method to determine spin characteristics, in particular the direction of spin," says Dr. Guolin Zheng (also at RMIT).

"However, in monolayer WTe_2, spin-momentum locking (an essential property of QSHI) and whether spin quantization axis in its helical edge states could be determined had yet to be experimentally demonstrated."

Anisotropic magnetoresistance (AMR) is an effective transport measurement method to reveal the relationship between the electrons' spin and momentum when the current is spin-polarized.

Considering that the edge states of a QSHI only allow the transport of spin-polarized electrons, the team then used AMR measurements to explore the potential spin-momentum locking in the edge states of monolayer WTe_2.

"Fortunately, we found the proper method to deal with the monolayer WTe_2 nanoflakes," says co-author Dr. Feixiang Xiang (UNSW). "So then we performed angular-dependent transport measurements to explore the potential spin features in the edge states."

Performing anisotropic magnetoresistance and defining the spin quantization axis

However, the topological edge states are not the only possible cause for spin-momentum locking and in-plane AMR effects in a QSHI. Rashba splitting could also generate similar effects, which may make the experimental results unclear.

"Fortunately, topological edge states and Rashba splitting induce very different gate-dependent in-plane AMR behaviors, because the band structure under these two situations are still very different." says co-author Prof Alex Hamilton (also at UNSW).

"Most of the samples show that minimum of in-plane AMR happens when the magnetic field is nearly perpendicular to the edge current direction." says Cheng.

Further theoretical calculations by collaborators at South China Normal University further confirmed that electrons' spins in the edge states of monolayer WTe_2 should be always perpendicular to their propagation directions, so-called 'spin-momentum locking."

"The amplitudes of the in-plane AMR observed in monolayer WTe_2 is very large, up to 22%" says co-author A/Prof Lan Wang (also at RMIT).

"While the previous amplitudes of in-plane AMR in other 3D topological insulators are only around 1%. By AMR measurements, we can also precisely determine the spin quantization axis of the spin polarized electrons in the edge states."

"Again, this work demonstrates the promising potential of QSHI for designing and developing novel spintronic devices and prove AMR as a useful tool for the design and development of QSHI-based spintronic devices, which are one of the promising routes for FLEET to realize low-energy devices in future."

More information: Cheng Tan et al, Spin-Momentum Locking Induced Anisotropic Magnetoresistance in Monolayer WTe2, *Nano Letters* (2021). DOI: 10.1021/acs.nanolett.1c02329

Journal information: *Nano Letters*

https://phys.org/news/2021-11-quantifying-wte2-future-spintronics.html

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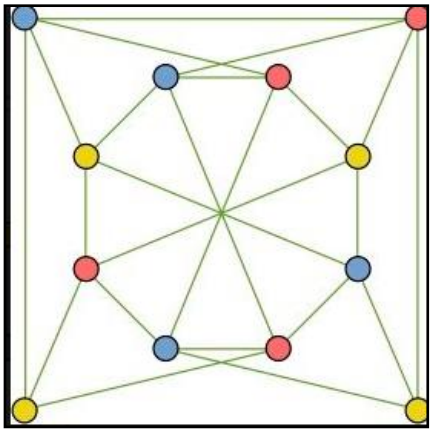
Thu, 04 Nov 2021

Securing data transfers with relativity

The volume of data transferred is constantly increasing, but the absolute security of these exchanges cannot be guaranteed, as shown by cases of hacking frequently reported in the news. To counter hacking, a team from the University of Geneva (UNIGE), Switzerland, has developed a new system based on the concept of zero-knowledge proofs, the security of which is based on the physical principle of relativity: information cannot travel faster than the speed of light. Thus, one of the fundamental principles of modern physics allows for secure data transfer. This system allows users to identify themselves in complete confidentiality without disclosing any personal information, promising applications in the field of cryptocurrencies and blockchain. These results can be read in the journal *Nature*.



A graph with its 3-colouring. For each edge, we check that the two connected vertices are of different colours. Credit: © University of Geneva, All rights reserved

When a person—the so called "prover"—wants to confirm their identity, for example when they want to withdraw money from an ATM, they must provide their personal data to the verifier, in our example the bank, which processes this information (e.g. the identification number and the pin code). As long as only the prover and the verifier know this data, confidentiality is guaranteed. If others get hold of this information, for example by hacking into the bank's server, security is compromised.

Zero-knowledge proof as a solution

To counter this problem, the prover should ideally be able to confirm their identity, without revealing any information at all about their personal data. But is this even possible? Surprisingly the answer is yes, via the concept of a zero-knowledge proof. "Imagine I want to prove a mathematical theorem to a colleague. If I show them the steps of the proof, they will be convinced, but then have access to all the information and could easily reproduce the proof," explains Nicolas Brunner, a professor in the Department of Applied Physics at the UNIGE Faculty of Science. "On the contrary, with a zero-knowledge proof, I will be able to convince them that I know the proof, without giving away any information about it, thus preventing any possible data recovery."

The principle of zero-knowledge proof, invented in the mid-1980s, has been put into practice in recent years, notably for cryptocurrencies. However, these implementations suffer from a weakness, as they are based on a mathematical assumption (that a specific encoding function is difficult to decode). If this assumption is disproved—which cannot be ruled out today—security is compromised because the data would become accessible.

Today, the Geneva team is demonstrating a radically different system in practice: a relativistic zero-knowledge proof. Security is based here on a physics concept, the principle of relativity, rather than on a mathematical hypothesis. The principle of relativity—that information does not travel faster than light—is a pillar of modern physics, unlikely to be ever challenged. The Geneva researchers' protocol therefore offers perfect security and is guaranteed over the long term.

Dual verification based on a three-colorability problem

Implementing a relativistic zero-knowledge proof involves two distant verifier/prover pairs and a challenging mathematical problem. "We use a three-colorability problem. This type of problem consists of a graph made up of a set of nodes connected or not by links," explains Hugo Zbinden, professor in the Department of Applied Physics at the UNIGE. Each node is given one out of three possible colors—green, blue or red—and two nodes that are linked together must be of different

colors. These three-coloring problems, here featuring 5,000 nodes and 10,000 links, are in practice impossible to solve, as all possibilities must be tried. So why do we need two pairs of checker/prover?

"To confirm their identity, the provers will no longer have to provide a code, but demonstrate to the verifier that they know a way to three-color a certain graph," says Nicolas Brunner. To be sure, the verifiers will randomly choose a large number of pairs of nodes on the graph connected by a link, then ask their respective prover what color the node is. Since this verification is done almost simultaneously, the provers cannot communicate with each other during the test, and therefore cannot cheat. Thus, if the two colors announced are always different, the verifiers are convinced of the identity of the provers, because they actually know a three-coloring of this graph.

"It's like when the police interrogates two criminals at the same time in separate offices: it's a matter of checking that their answers match, without allowing them to communicate with each other," says Hugo Zbinden. In this case, the questions are almost simultaneous, so the provers cannot communicate with each other, as this information would have to travel faster than light, which is of course impossible. Finally, to prevent the verifiers from reproducing the graph, the two provers constantly change the color code in a correlated manner: what was green becomes blue, blue becomes red, etc. "In this way, the proof is made and verified, without revealing any information about it," says the Geneva-based physicist.

A reliable and ultra-fast system

In practice, this verification is carried out more than three million times, all in less than three seconds. "The idea would be to assign a graph to each person or client," says Nicolas Brunner. In the Geneva researchers' experiment, the two prover/verifier pairs are 60 meters apart, to ensure that they cannot communicate. "But this system can already be used, for example, between two branches of a bank and does not require complex or expensive technology," he says. However, the research team believes that in the very near future this distance can be reduced to one meter. Whenever a data transfer has to be made, this relativistic zero-knowledge proof system would guarantee absolute security of data processing and could not be hacked. "In a few seconds, we would guarantee absolute confidentiality," concludes Hugo Zbinden.

More information: Sébastien Designolle, Experimental relativistic zero-knowledge proofs, *Nature* (2021). DOI: 10.1038/s41586-021-03998-y. www.nature.com/articles/s41586-021-03998-y

Journal information: *Nature*

https://phys.org/news/2021-11-relativity.html

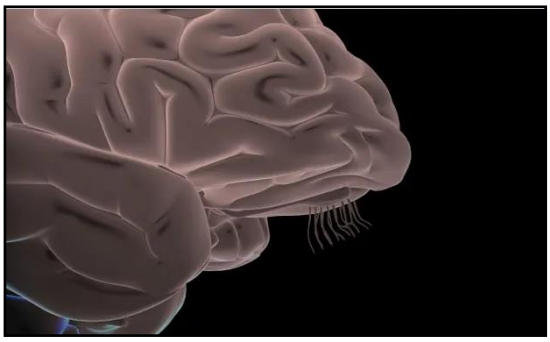
theguardian

Thu, 04 Nov 2021

Covid-19 virus does not infect human brain cells, study suggests

Exclusive: study raises hopes that Covid-related damage to sense of smell may be more superficial than previously feared

The virus that causes Covid-19 does not infect human brain cells, according to a study published in the journal Cell. The findings will raise hopes that the damage caused by Sars-CoV-2 might be more superficial and reversible than previously feared.



A new study suggests Covid-19 does not reach the olfactory bulb, at the front of the brain, where neural input about odours is first processed. Photograph: MedicalRF.com/Alamy

The study contradicts earlier research that suggested the virus infects neurons in the membrane that lines the upper recesses of the nose.

This membrane, called the olfactory mucosa, is where the virus first lands when it is inhaled. Within it are olfactory sensory neurons (OSNs), which are responsible for initiating smell sensations. They are tightly entwined with a kind of support cell called sustentacular cells.

In the new study, Belgian and German researchers claim that the virus infects sustentacular cells but not OSNs. “That is just a critical distinction,” said the senior author Peter Mombaerts, who directs the Max Planck Research Unit for Neurogenetics in Frankfurt, Germany. “Once you believe that olfactory neurons can be infected, there is a quick route into the olfactory bulb and then you’re in the brain already.”

The olfactory bulb, at the front of the brain, is where neural input about odours is first processed. If the virus penetrated this structure it could theoretically spread to deeper brain regions where it could do lasting damage – especially since, unlike OSNs, most neurons are not regenerated once lost.

But if the virus only infects the sustentacular cells, then the damage could be less long-lasting.

Both pathways could explain the olfactory dysfunction that afflicts an estimated half of all Covid-19 patients. In one in 10 of those, the loss or change of smell is long-term, perhaps permanent.

Mombaerts says this could be the result of support for the OSNs breaking down, even if they themselves are not infected. They may function below par, or stop functioning altogether, until the sustentacular cells regenerate.

The group has not looked at other neurological symptoms of Covid-19, such as the fatigue and “brain fog” that accompany long Covid.

Nobody doubts that the central nervous system is affected by the disease; the debate concerns whether these effects are due to the virus infecting neurons or some more indirect mechanism, such as an inflammatory response in the blood irrigating the brain – with different implications for prognosis and treatment.

The findings are likely to prove controversial because of the difficulty of studying molecular events unfolding in the moments after infection. Earlier studies made use of animal models,

clusters of neural stem cells grown in a dish, and postmortem tissue taken from small numbers of Covid-19 patients. The present study is the largest in Covid-19 patients to date, and it deployed a novel technique for capturing those early events.

Laura Van Gerven, a neurosurgeon at the Catholic University of Leuven in Belgium and another of the paper's senior authors, adapted a form of skull base surgery to remove tissue from the olfactory mucosa and bulb of Covid-19 patients within about an hour of their death. In 30 of the patients, the researchers were able to detect that the virus was still replicating – meaning the patients had died in the acute, contagious phase of the disease.

"It is unquestionably the most thoroughly done bit of work on human postmortem olfactory Covid tissue," said Stuart Firestein, a neurobiologist at Columbia University in New York City.

But Firestein said the results did not shed much new light on how Covid-19 causes olfactory dysfunction. "They do not show any OSNs as being damaged or there being fewer of them, or the OSNs near infected sustentacular cells as being different in any way from those not near infected cells," he said.

Debby Van Riel, a virologist at Erasmus University in Rotterdam, the Netherlands, also praised the study's rigour, but said the authors' claim that Sars-CoV-2 does not infect neurons was "pretty bold".

In only six of the 30 patients was the virus detectable in the olfactory mucosa itself. "Overall the numbers are thus really low to make any strong conclusions," she said.

But even if the study isn't the last word on Covid's brain effects, it does indicate that those dire early reports weren't either. If its conclusions are borne out, those experiencing Covid-related anosmia or parosmia can be reassured that the virus has not infected their brains, and that future therapies targeting the understudied sustentacular cells could alleviate or cure their condition.

https://www.theguardian.com/world/2021/nov/03/covid-19-virus-does-not-infect-human-brain-cells-new-study-suggests