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समाचार पत्रों से चयित अंश
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BW BUSINESSWORLD

Wed, 24 Nov 2021

DRDO's Turbo Fan Engine for UAVs will make India self-reliant in this complex and critical technology: G. Satheesh Reddy, Secretary DDR&D & Chairman DRDO

DRDO has been building upon the success of Medium Range Surface to Air Missiles Systems for IAF. Now the task upon DRDO is to achieve such breakthroughs in developing indigenous aero- engine and marine engine. That includes Small Turbo Fan Engine for unmanned system that is put to test by DRDO. On the foundation of Kaveri Engine, DRDO has already developed a 12 MW Kaveri Marine Gas Turbine (KMGT) engine as derivative of Kaveri Aero Engine. G. Satheesh Reddy, Secretary DDR&D & Chairman DRDO, talks about such innovation with Manish Kumar Jha of BW Businessworld. He also spoke on the critical Air Independent Propulsion (AIP) Technology for the Indian navy's Project 75 and P-75I. The Project P-75I is unfolding under the first ever Strategic Partnership. The key is the technology here

By Manish Kumar Jha

DRDO has been building upon the success based on its breakthrough in missile technologies. It is much evident with the handover of Medium Range Surface to Air Missiles Systems to IAF. Now the task upon DRDO is to achieve such breakthroughs in developing indigenous aero-engine and marine engine. That includes Small Turbo Fan Engine for unmanned system where DRDO has completed design validation tests on ground and presently undergoing experimental flight trials. It is the most complex work of modern science and engineering which is achieved by very few. Though not from scratch, DRDO has laid the foundation way back with Kaveri Engine. Furthermore, DRDO has already developed a 12 MW Kaveri Marine Gas Turbine (KMGT) engine as derivative of Kaveri Aero Engine. G. Satheesh Reddy, Secretary DDR&D & Chairman DRDO, talks about such innovation with Manish Kumar Jha of BW Businessworld. He also spoke on the critical (Air Independent Propulsion (AIP) Technology for the Indian navy's Project 75 and P75I. The Project 75 India is unfolding under first ever strategic partnership. The key is the technology here.

G. Satheesh Reddy-DRDO

Manish K. Jha: Could you tell us about the proposed Combat Air Teaming System (CATS)? What are types of systems and subsystem are being planned? What is the proposed time line?

G. Satheesh Reddy: CATS is not a DRDO project.

Manish K. Jha: DRDO's Medium Range Surface-to Air Missile (MRSAM) System was recently handed over to Indian Air Force (IAF) at Air Force which in collaboration with IAI. Could it be potentially available for export?

G. Satheesh Reddy: The MRSAM (IAF) has been handed over the Indian Air Force, which will be a game changer in the air-defence-system. The is an advanced network centric combat Air Defence System developed jointly by DRDO and Israel Aerospace Industries (IAI) in collaboration with the Indian industry comprising of private and public sectors including MSMEs.

BW Businessworld's Manish Kumar Jha with G. Satheesh Reddy, Secretary DDR&D & Chairman DRDO

It is a giant leap towards achieving 'Aatmanirbhar Bharat'. The system is having great potential for export.

Manish K. Jha: Could you share the latest update on Small Turbo Fan Engine aimed for unmanned aerial vehicle applications?

G. Satheesh Reddy: We have designed, developed and manufactured a small turbo fan engine for unmanned aerial vehicle applications with the support of Indian Industry. The engine has completed design validation tests on ground and presently undergoing experimental flight trials.

DRDO and Israel on Dual Technology

On successful completion of flight trials, derivatives of these engines will be manufactured for a variety of unmanned aerial vehicle applications, making the country 'Atmanirbhar' in this complex and critical technology.

Manish K. Jha: Aero engine is a critical area of aerospace engineering. India is struggling hard to achieve high thrust turbofan engine for multirole fighter jets. Could you tell us the progress in the core areas of aero engine like: advance material, forging, turbine, fan blade technology, combustor among others?

G. Satheesh Reddy: Military gas turbine engines form an integral part of aircraft system. India being an aspiring nation took a bold stride in developing an indigenous military gas turbine very early with challenging requirements through the ambitious Kaveri engine development for LCA Tejas. Kaveri Engine, a 4th generation military engine, is the first indigenous aero gas turbine engine designed and built in the country. Through this indigenous DRDO project on military gas turbines, sufficient Technology Readiness Level (TRL) in the field of aero engines for fighter aircraft has been attained in the country.

This capability is aiding the nation in producing crucial propulsion systems for unmanned aerial vehicles & weapon platforms along with long range weapon delivery systems, like cruise missile systems. As you are aware, these engines are denied by global OEM's for strategic applications.

Knowledge, skill set, experience and expertise gained through this engine development programme is invaluable for the country and future engine programmes. Almost, a non-existent ecosystem has been built in the country through the Kaveri project for 4th generation class of engine technology. With the technologies developed through the Kaveri project, today India is in a position to indigenously develop a power plant for the strategic application of Unmanned Combat Air Vehicle (UCAV).

More than 3200 hours of engine testing has been completed which includes Simulated Altitude Test and Flying Test Bed (FTB) trials. Twelve types of Materials (Titanium, Steel and Super alloys) have been indigenously developed and type certified for aerospace standard.

These alloys have been used in many aerospace and other programmes in the country. Majority of the Titanium forgings have been developed indigenously and certified for gas turbine applications. Directionally Solidified (DS) investment casting technology has been developed successfully for high temperature turbine blade.

Manish K. Jha: Could you share the update on marine engine technology being developed by DRDO? What is the next generation marine engine that is being deliberated for Indian warships?

G. Satheesh Reddy: DRDO's Gas Turbine Research Establishment (GTRE) has developed a 12 MW Kaveri Marine Gas Turbine (KMGT) engine as derivative of Kaveri Aero Engine. KMGT demonstrated it's performance in Test bed at Naval Dockyard, Vizag.

Next generation engine requirement from Indian Navy will be Gas Turbine with more power output, depending on the identified naval platform.

Manish K. Jha: When do we see the AIP system ready for P75I?

G. Satheesh Reddy: DRDO is developing AIP for P75 submarines, which are already with the Navy. The first AIP is expected to be installed in next submarine when it comes for refit.

Subsequently, every two years thereafter, AIP will be installed in other submarines during their planned refits.

http://www.businessworld.in/article/DRDO-s-Turbo-Fan-Engine-for-UAVs-Will-Make-India-Self-Reliant-In-This-Complex-And-Critical-Technology-G-Satheesh-Reddy-Secretary-DDR-D-Chairman-DRDO-/23-11-2021-412706/

अमृत विचार
एक सम्पूर्ण अखबार

Mon, 22 Nov 2021

देश पर संभावित जैविक या रासायनिक हमलों को रोकने में सक्षम डीआरडीओ: डॉ मेघवंशी

झांसी। देश की रक्षा अनुसंधान कार्य से जुड़ी संस्था रक्षा अनुसंधान एवं विकास संगठन (डीआरडीओ) की ग्वालियर स्थित प्रयोगशाला रक्षा अनुसंधान एवं विकास स्थापना (डीआरडीई) का काम देश पर किसी संभावित रासायनिक या जैविक हमले से सुरक्षा प्रदान करना है। हाल ही में यहां हाथी ग्राउंड में आयोजित रक्षा प्रदर्शनी में डीआरडीओ की अन्य प्रयोगशालाओं के उत्पादों के साथ रक्षा अनुसंधान और विकास स्थापना (डीआरडीई) ग्वालियर की कैम-बायोडिफेंस तकनीकों का भी प्रदर्शन किया गया।

डीआरडीई के वैज्ञानिक डॉ एम के मेघवंशी ने मंगलवार को बताया कि डीआरडीओ की 50 से अधिक प्रयोगशालाओं में एक प्रयोगशाला समूह ऐसा भी है जिसे लाइफ साइंसेज क्लस्टर के नाम से जाना जाता है। इसी क्लस्टर में आने वाली एक अत्यन्त महत्वपूर्ण प्रयोगशाला है" डीआरडीई"। यूं तो डीआरडीओ सैनिकों के लिए आधुनिक हथियारों और युद्ध में काम आने वाले दूसरे साजोसामान से जुड़ी विकसित करने का काम मुख्य रूप से करता ही है और डीआरडीई का मुख्य काम जैविक एवं रासायनिक हथियारों की पहचान, उनसे बचाव एवं वातावरण शुद्धिकरण जैसे क्षेत्र से संबंधित तकनीक विकसित करना है।

साथ ही इसका कार्य देश पर होने वाले संभावित जैविक एवं रासायनिक हमलों से सुरक्षित रखना है। इसके अलावा सैनिकों की मानवीय जरूरतों को पूरा करने वाले सामान की तकनीक भी विकसित करता है। हाल ही में 17 से 19 तक आयोजित हाथी ग्राउण्ड प्रदर्शनी में डीआरडीई की ही अन्य महत्वपूर्ण टैक्नोलॉजी का भी प्रदर्शन किया गया। जिसे बायोडायजस्टर के नाम से जाना जाता है। डॉ मेघवंशी ने बताया कि यह मानव अपशिष्ट के उपचार हेतु प्रयोग में लाई जाती है।

अत्यधिक ऊंचाई वाले पर्वतीय क्षेत्रों जैसे-लेह, लद्दाख व सियाचिन जैसे स्थानों पर तैनात सैन्य बलों के उपयोग के लिए विकसित इस तकनीक को आज भारतीय रेलवे में भी मानव अपशिष्ट के ऑन बोर्ड ट्रीटमेंट

के प्रयोग में लाया जा रहा है। डीआरडीओ की इस तकनीक पर आधारित बायोटॉयलेट के उपयोग से रेल परिवहन तंत्र को स्वच्छ बनाकर केंद्र सरकार के स्वच्छ भारत अभियान में मदद मिली है। वर्तमान में डीआरडीई इस तकनीक के अधिक बेहतर रूप के अनुसंधान एवं विकास में लगी हुई है।

https://amritvichar.com/drde-capable-of-preventing-possible-biological-or-chemical-attacks-on-the-country-dr-meghavans/

BBC NEWS | हिन्दी

Wed, 24 Nov 2021

ड्रोन की जंग के लिए भारत की तैयारी शुरू

By गुरप्रीत सैनी

पड़ोसी चीन और पाकिस्तान के साथ जारी तनाव के बीच भारत घरेलू इनोवेशन और विदेशी खरीद के ज़रिए उन्नत ड्रोन तकनीक हासिल कर अपनी सैन्य क्षमता बढ़ाने की कोशिशें कर रहा है।

इस क्षेत्र में तकनीक के ताज़ा प्रदर्शन में भारत के रक्षा अनुसंधान एवं विकास संस्थान (डीआरडीओ) ने 17 नवंबर को 'ड्रोन स्वार्म' का प्रदर्शन किया। इस झुंड में 25 ड्रोन थे जो एक साथ उड़ रहे थे।

इस ड्रोन स्वार्म ने कई परिस्थितियों का प्रदर्शन किया। जैसे- किसी टार्गेट को घेरना, सुनियोजित हमला करना आदि।

https://www.bbc.com/hindi/media-59385538

BBC NEWS | हिन्दी

Mon, 22 Nov 2021

भविष्य की जंग में ड्रोन्स की भूमिका के लिए कितना तैयार है भारत?

By सचिन गोगोई

पड़ोसी चीन और पाकिस्तान के साथ जारी तनाव के बीच भारत घरेलू इनोवेशन और विदेशी खरीद के ज़रिए उन्नत ड्रोन तकनीक हासिल कर अपनी सैन्य क्षमता बढ़ाने की कोशिशें कर रहा है।

पड़ोसी चीन और पाकिस्तान के साथ जारी तनाव के बीच भारत घरेलू इनोवेशन और विदेशी खरीद के ज़रिए उन्नत ड्रोन तकनीक हासिल कर अपनी सैन्य क्षमता बढ़ाने की कोशिशें कर रहा है।

भारत सरकार अमेरिका से नए ड्रोन ख़रीद सकती है

इस क्षेत्र में तकनीक के ताज़ा प्रदर्शन में भारत के रक्षा अनुसंधान एवं विकास संस्थान (डीआरडीओ) ने 17 नवंबर को 'ड्रोन स्वार्म' का प्रदर्शन किया। इस झुंड में 25 ड्रोन थे जो एक साथ उड़ रहे थे।

इस ड्रोन स्वार्म ने कई परिस्थितियों का प्रदर्शन किया। जैसे- किसी टार्गेट को घेरना, सुनियोजित हमला करना आदि।

हिंदुस्तान टाइम्स अख़बार के मुताबिक भारत में ड्रोन का ऐसा पहला प्रदर्शन इस साल जनवरी में भारतीय सेना ने किया था। तब 75 स्वदेशी ड्रोन को एक साथ उड़ाया गया था। इन ड्रोन ने भी कई तरह के मिशन का प्रदर्शन किया था जिनमें आक्रामक मिशन भी शामिल थे।

17 नवंबर के प्रदर्शन के बाद ट्विटर पर जारी एक बयान में डीआरडीओ ने कहा कि "डीआरडीओ यंग साइंटिस्ट लैब फॉर असिमैट्रिक टेक्नोलॉजी (डीवाईएसएलसीटी) स्वार्म टेक्नोलॉजी पर काम कर रहा है जिससे असिमैट्रिक युद्ध क्षमताओं को बढ़ाया जाएगा।'

भारत आक्रामक क्षमता बढ़ाने के लिए ड्रोन हासिल करने की कोशिशें कर रहा है। भारतीय सेना जासूसी ड्रोन का इस्तेमाल कई सालों से कर रही है। भारत की ड्रोन सेना में अधिकतर ड्रोन इसराइल निर्मित हैं।

हालांकि हाल के सालों में भारत ने इसराइल और अमेरिका जैसे देशों के साथ जो गठजोड़ किए हैं उनसे संकेत मिलते हैं कि भारत मानवरहित विमानों के ज़रिए दुश्मन के ठिकानों को नेस्तनाबूद करने की क्षमता हासिल करने पर ज़ोर दे रहा है।

हाल के सालों में क्षेत्र में जो सुरक्षा हालात बने हैं उनके मद्देनज़र ये भारत की ज़रूरत भी बन गया है।

ड्रोन विमानों की ज़रूरत पर ज़ोर देते हुए डीआरडीओ ने एक लेख में कहा था कि भारत ने फरवरी 2019 में पाकिस्तान में की गई भारतीय वायुसेना की एयर स्ट्राइक अधिक प्रभावशाली होती यदि इसमें ड्रोन का भी इस्तेमाल किया गया होता।

अज़रबैजान-अर्मेनिया युद्ध से सबक

भारत लंबे समय से ड्रोन का इस्तेमाल जासूसी से आगे बढ़ाकर हमलावर मिशन के लिए करना चाह रहा था। इसी बीच बीते साल अज़रबैजान-अर्मेनिया के बीच हुए युद्ध से मिले सबक ने भी भारत की ज़रूरत को और अधिक रेखांकित किया है।

दुनियाभर के सैन्य और रक्षा विशेषज्ञ ये मानते हैं कि इस युद्ध में अज़रबैजान की निर्णायक जीत में ड्रोन ने अहम भूमिका निभाई है।

भारतीय मीडिया ने इस युद्ध पर रिपोर्टिंग की थी और देश का सैन्य नेतृत्व युद्ध में ड्रोन के इस्तेमाल पर नज़र रख रहा था। ख़ासकर अज़रबैजान ने बड़े पैमाने पर ड्रोन विमानों का इस्तेमाल किया था।

अज़रबैजान के ड्रोन बेड़े में अधिकतर विमान इसराइल और तुर्की में बने हुए हैं। भारत पहले से ही अपने जासूसी अभियानों में इसराइल के ड्रोन का इस्तेमाल कर रहा है। पत्रकार और रक्षा विश्लेषक शेखर गुप्ता ने अपने एक लेख में चेताया है कि भारत का चिर-प्रतिद्वंदी पड़ोसी पाकिस्तान तुर्की से ड्रोन हासिल कर सकता है क्योंकि दोनों देशों के राजनीतिक नेतृत्व के बीच नज़दीकिया हैं।

रिपोर्टों के मुताबिक इस साल अगस्त में भारत की कंपनी डीसीएम श्रीराम इंडस्ट्रीज़ ने तुर्की के ड्रोन निर्माता ज़ाइरोन डॉयनैमिक्स में 30 फ़ीसदी की हिस्सेदारी ख़रीदी है। माना जा रहा है कि इन दो निजी कंपनियों के बीच हुई साझेदारी को भारत सरकार ने बढ़ावा दिया है और इस्तांबुल में जब सौदे पर हस्ताक्षर हुए तो भारतीय राजदूत संजय पांडा वहां मौजूद रहे।

मीडिया रिपोर्टों में ये भी कहा गया है कि डीसीएम श्रीराम इंडसट्रीज़ और एक और कंपनी ज़ेन टेक्नोलॉजी भारत सरकार की नई ड्रोन नीति का फ़ायदा उठा सकती हैं। नई ड्रोन नीति का उद्देश्य साल 2030 तक भारत को ड्रोन उत्पादन का हब बनाना है। इस नीति के तहत निजी कंपनियों को ड्रोन तकनीक के विकास और रिसर्च के लिए फायदेमंद माहौल दिया जाएगा।

हमलावर ड्रोन पर ध्यान

हाल के सालों में भारत सरकार ने अमेरिका के प्रीडेटर और रीपर ड्रोन की तर्ज पर आक्रामक हमलावर ड्रोन की फौज तैयार करने की कोशिशें तेज़ की हैं।

इसी के तहत भारत अमेरिका से एमक्यू-9 रीपर ड्रोन के 20 स्काई गार्डियन और 10 सी गार्डियन वर्ज़न हासिल कर सकता है। माना जा रहा है कि अमेरिका तीन अरब डॉलर की अनुमानित कीमत पर ये ड्रोन भारत को उपलब्ध कराएगा।

दैनिक जागरण की एक रिपोर्ट के अनुसार भारत ड्रोन का ये ऑर्डर इस साल दिसंबर तक भी दे सकता है।

वहीं इंडिया टुडे की एक रिपोर्ट के मुताबिक भारत इसराइल निर्मित जासूसी ड्रोन हेरोन पर भी हथियार तैनात करने की प्रक्रिया शुरू कर रहा है। लगभग 40 करोड़ डॉलर के प्रोजेक्ट के तहत भारत के साथ साझा प्रोजेक्ट में इसराइल इन ड्रोन पर लेज़र गाइडेड बम बम और हवा से ज़मीन पर मार करने वाली मिसाइलें तैनात करेगा। इनके अलावा टैंकरोधी गाइडेड मिसाइल भी लगाई जाएंगी।

स्थानीय स्तर पर इनोवेशन और उत्पादन पर फोकस

17 नवंबर को झांसी में डीआरडीओ के ड्रोन स्वार्म का प्रदर्शन भारत की आज़ादी के 75 साल पूरे होने पर मनाए जा रहे आज़ादी का अमृत महोत्सव कार्यक्रम के तहत हुआ। भारत सरकार देश की उपलब्धियों का जश्न मना रही है और आत्मनिर्भरता को बढ़ावा दे रही है।

भारत सरकार का फोकस इस समय अगली पीढ़ि की युद्धक क्षमता को देश में स्थानीय स्तर पर विकसित करने पर है। इसके लिए स्थानीय स्तर पर इनोवेशन और उत्पादन को बढ़ावा दिया जा रहा है। भारत सरकार की नई ड्रोन नीति ने मानवरहित विमानों के लिए उत्साहवर्धक और खुला माहौल तैयार किया है। प्रधानमंत्री नरेंद्र मोदी ने ट्वीट किया, "नए ड्रोन नियम इस क्षेत्र में काम कर रहे स्टार्ट अप और युवाओं की मदद करेंगे और नवाचार, तकनीक और इंजीनियरिंग में भारत की ताक़त को मज़बूत करके भारत को ड्रोन हब बनाएंगे।"

भारत में स्थानीय स्तर पर निर्मित कई ड्रोन प्लेटफार्म हैं जो विकास और ऑपरेशन की अलग-अलग स्टेज में हैं। इंडिया टुडे की एक रिपोर्ट के मुताबिक इनमें से भविष्य का सबसे उत्कृष्ट ड्रोन एक बमवर्षक विमान होगा जिसे 'घातक' भी कहा जा रहा है।

रिपोर्ट के मुताबिक भविष्य की ड्रोन फोर्स का आधार बनने जा रहे इस ड्रोन के टैक्सी ट्रायल शुरू हो चुके हैं। अभी ये प्रोजैक्ट अपने शुरुआती चरण में ही है लेकिन यदि कामयाब हुआ तो घातक एक लड़ाकू विमान के क़द का ड्रोन होगा जो बमों के अलावा गाइडेड मिसाइल लांच करने में भी सक्षम होगा। ये उन्नत हथियारों से लैस होगा।

https://www.bbc.com/hindi/international-59340326

अमर उजाला

Tue, 23 Nov 2021

एअर मार्शल (सेवानिवृत्त) कुलदीप को मिला राष्ट्रपति पदक

काशीपुर: सुल्तानपुर पट्टी के ग्राम पिपलिया निवासी एयर मार्शल (सेवानिवृत्त) कुलदीप शर्मा को परम विशिष्ट सेवा पदक (पीवीएसएम) से नवाजा गया है। सोमवार को राष्ट्रपति भवन में उन्हें यह सम्मान दिया गया।

दिल्ली में महामहिम राष्ट्रपति के हाथों सम्मान प्राप्त करते एअर मार्शल (सेवानिवृत्त) कुलदीप शर्म - फोटो : KASHIPUR

पिपलिया निवासी कुलदीप शर्मा ने 38 वर्षों तक वायुसेना के विभिन्न पदों पर कार्य किया। वायुसेना से सेवानिवृत्त होने के बाद वर्तमान में वह भारत सरकार के रक्षा उपक्रम (डीआरडीओ) में अपनी सेवाएं दे रहे हैं।

सेवारत रहते हुए उनकी ओर से किए गए उत्कृष्ट कार्यों के लिए उनको दो बार वायु सेना प्रमुख और एक बार कमांडिंग ऑफ चीफ ने प्रोत्साहन पदक से सम्मानित किया। शर्मा को विशिष्ट सेवा पदक, अतिविशिष्ट सेवा पदक भी मिल चुके हैं।

सोमवार को राष्ट्रपति रामनाथ कोविंद ने उन्हें पदक प्रदान किया। इस मौके पर राष्ट्रपति भवन में शर्मा के बड़े भाई यूपीएसटीसी सिडकुल में चीफ इंजीनियर रहे सुरेश शर्मा भी मौजूद रहे। उन्होंने वहीं से दूरभाष पर इस बारे में जानकारी दी।

कुलदीप के बड़े भाई स्व. धर्मवीर शर्मा उत्तराखंड हाईकोर्ट के जस्टिस रह चुके हैं। एक भाई अशोक शर्मा अधिवक्ता हैं। लायंस क्लब काशीपुर सिटी के अध्यक्ष सुरेश शर्मा व अधिवक्ता मनोज जोशी ने शर्मा को राष्ट्रपति पदक मिलने पर खुशी जाहिर की है।

https://www.amarujala.com/uttarakhand/udham-singh-nagar/kuldeep-hounerd-by-pvsm-kashipur-news-hld4453769112

THE TIMES OF INDIA

Wed, 24 Nov 2021

Disaster mitigation in focus at IIT event

By Shinjini Ghosh

New Delhi: The fifth World Congress on Disaster Management is set to begin from Wednesday at Indian Institute of Technology (IIT) – Delhi. Union defence minister Rajnath Singh is scheduled to inaugurate the event that is based on the theme of "Technology, finance and capacity building resilience to disasters in the contexts of Covid-19."

The four-day event is scheduled to have seven plenary sessions addressed by experts around the world, 36 technical sessions where 230 technical papers contributed by researchers and policy makers will be presented and three feature events with MPs, city mayors and the media.

"Climate change is compounding the risks through its impact on increasing frequency and intensity of disasters. Now, the deadly pandemic of Covid-19, which is affecting communities and countries across regions, killing people and disrupting society and economy, has added another dimension to the complex risks of disasters," read the concept note on WCDM-2021.

According to officials, the global database of disasters estimates around 12,732 disasters in the last two decades where over 1.4 million people lost their lives and 3.9 billion people were affected adversely.

Dr S Ananda Babu, convenor of the event, said, "Technology can certainly be a game changer in building resilience. This will require transfer and dissemination of proven technologies from the lab to land and from the developed to the developing countries.During the past five years, several initiatives have been taken for technology development and transfer for building resilience to disasters, but the impacts of the initiatives are yet to be seen in large parts of the globe."

Stating that finance is the second most critical issue for building resilience to disasters, Babu added, "The need for significant mobilisation of resources from a variety of sources and the effective use of financing for building resilience to disasters have been highlighted very prominently in the global development agendas."

The event, which is scheduled to be held from November 24 to November 27, will have sessions on socio and psycho-social issues for long term recovery from pandemics, overcoming economic slowdown and financial stress for building resilience and the emerging technologies and innovations for reducing risks of disasters.

The event will be held in collaboration with the Delhi government, National Disaster Management Authority, National Institute of Disaster Management, Defence Research Development Organisation and Indian Council of Medical Research, among others.

https://timesofindia.indiatimes.com/city/delhi/disaster-mitigation-in-focus-at-iit-event/articleshow/87877226.cms

Outlook

Wed, 24 Nov 2021

Naren Lokwani, Founder, Frshr Technologies, makes bold predictions on the future of blockchain, NFT and AI Technologies

Naren Lokwani receives DRDO's Dare to Dream Award from Honourable Defence Minister Shri Rajnath Singh in DRDO Bhawan, New Delhi

What was your moment of epiphany to start this venture?

Frshr Technologies (https://www.frshr.tech) is a startup for startups! We are a unique software startup as we work with other startups and enterprises and help them build software products of their dreams.

We have built a portfolio of very interesting software products for a variety of enterprises around the world. Some of our exciting and recent projects are Social Media App built on Hedera blockchain for our UK client, an Identity management AI platform for our US client, Code sharing web app for our India client and a Travel booking engine for our UK client.

My moment of epiphany to start Frshr Tech came when one of my Silicon Valley-based friends called me up and mentioned that he had a startup idea but no tech team to build the product. We realized a big latent need in the market to help non-technical founders with their dream software product. Hence, Frshr Tech was born as a Product Engineering venture. We are experiencing continued growth and momentum right from our inception days.

How are Frshr technologies taking care of the modern-day requirements of the advancing world of Artificial intelligence & tech?

Interestingly, my career journey during the last 20 years, where I was building cutting-edge software products for MNCs and global clients, helped me launch Frshr Tech. AI and Machine Learning are critical use-cases for our clients today, and this is exactly where Frshr Tech is working hard to stay ahead of the curve.

If you look around yourself, you are unknowingly interacting with AI algorithms all the time. Whether browsing books on Amazon, ordering food from Swiggy, driving your smart SUV or instructing Alexa to play your favourite song, you are interacting with AI software without even being aware! Humans and AI will continue to integrate to transform the way we live. Our global clients understand the ubiquitous nature of AI and Machine Learning applications and utilize our tech capabilities to build cutting edge AI applications in healthcare, finance, Security, Identity Management and social media. Coupled with our unique product development methodology of "Idea to MVP in 12 weeks", we provide a transformational journey for our global customers.

What is your firm's USP, and how you are doing something different from other players in the new technology areas such as Cryptocurrency and Blockchain?

Frshr Tech USP is to stay ahead of the curve for technology applications in business verticals. We want to help our enterprise customers take maximum advantage of the latest technologies and deliver amazing RoI for their tech investments.

Cryptocurrency and Blockchain are seeing surreal growth and have fundamentally altered the technology sector. Some enthusiasts define Blockchain as the new Internet, and this may even be true! A few years back, Cryptocurrency was the only major use case for Blockchain applications.

Still, now we are seeing Blockchain applications in a variety of domains such as Finance, Lending, Investments, Security, Logistics, and even Social Media and Travel.

Companies are seeing major applications of Tokenization in their day-to-day business. All consumer-focused global enterprises want to mint their own Crypto Tokens to define a very customized end-user experience and roll out a unique customer journey. Almost all our international customers today want their own Branded Crypto Tokens to reward customers, motivate and guide user journey, and provide a memorable experience to users visiting their app or desktop applications.

The Crypto and Blockchain journey into the technology sector is just getting started, and this will fundamentally transform how we live, spend, save and entertain going forward!

What success mantra has led you to bring new services such as NFT to the table effectively?

Frshr Tech believes in innovation and having a strong value system based on entrepreneurship. We want to continue to delight our customers and end-users by building global scale tech products.

NFT or Non-fungible tokens is another Blockchain application that is fundamentally altering the way we live and transact. We have successfully integrated NFT in mobile applications to help users create their digital art, list it at the right price and monetize their creativity. I will paint a picture of the future where NFT is going to become an everyday business. Today, if you buy or sell real estate, you are always worried about the authenticity of the property documentation. There are cases where people forge documents, and hence it becomes difficult to trust paper-based documentation for high-value products.

With NFTs, in the not-too-distant future, you will see all documentation getting transformed into digital NFTs. Users will verify the real-estate documentation over Blockchain without getting into the hassle of time-taking legal verification of the property documentation. This will transform, automate and enable real-time property transactions. We predict that you will be able to buy and sell real estate in minutes using NFT and Blockchain in the next few years!

What are your plans to expand and grow your network and take Frshr technologies to new heights?

Frshr Technologies has a life and journey of its own! This company is a team of more than 50 associates. Today, who live, breathe, dream and develop technology every day. We are planning and working towards Frshr Tech becoming a team of 1000 plus associates in the next five years and will work towards a future IPO to enable people to become a part of our success journey.

What is Naren Lokwani as a person. How do you like to spend your free time?

Naren Lokwani is a hustler and a fighter. I perform best in adverse situations and always strive to give my 110% to any situation. It is this fighting spirit that I wish to assign to every associate of ours.

I like to spend my free time hitting the gym, and there is nothing better than lifting heavy metal after a tough day at work, transforming the way humankind lives and dreams.

https://www.outlookindia.com/website/story/outlook-spotlight-naren-lokwani-founder-frshr-technologies-makes-bold-predictions-on-the-future-of-blockchain-nft-and-ai-technolog/402183

Defence News

Defence Strategic: National/International

Press Information Bureau
Government of India

Ministry of Defence

Tue, 23 Nov 2021 6:39PM

Defence Acquisition Council headed by Raksha Mantri Shri Rajnath Singh approves proposal of value Rs. 2,236 Cr.

Key highlights:

- ***Indian Air Force to procure GSAT-7C Satellite and Ground Hubs for real-time connectivity of Software Defined Radios***
- ***Complete design, development and launching of satellite to be in India***
- ***It will enhance the ability of our Armed Forces to communicate beyond the Line of Sight***

The Defence Acquisition Council (DAC) in its meeting of 23 November 2021 held under the Chairmanship of Raksha Mantri Shri Rajnath Singh accorded Acceptance of Necessity (AoN) for one Capital Acquisition proposal of Indian Air Force for its modernization and operational needs amounting to Rs. 2,236 Cr. under the category of 'Make in India'. The procurement proposal of Air Force was for GSAT-7C Satellite and Ground Hubs for real-time connectivity of Software Defined Radios (SDRs). The project envisages complete design, development and launching of satellite in India.

Induction of GSAT-7C Satellite and Ground Hubs for Software Defined Radios (SDRs) will enhance the ability of our Armed Forces to communicate beyond Line of Sight (LoS) among one another in all circumstances in a secure mode.

https://pib.gov.in/PressReleasePage.aspx?PRID=1774313

Press Information Bureau
Government of India

Ministry of Defence

Tue, 23 Nov 2021 7:18PM

37th Edition of India - Indonesia Coordinated Patrol

Indian Naval Ship (INS) *Khanjar*, an indigenously built Missile Corvette along with Dornier Maritime Patrol Aircraft is undertaking coordinated patrol (CORPAT) with Indonesian Naval Ship KRI *Sultan Thaha Syaifuddin*, (376), a Kapitan Patimura-Class Corvette, from 23 to 24 Nov 21. The 37th edition of CORPAT between India and Indonesia will also witness participation of Maritime Patrol Aircraft from both Nations. The exercise, is being conducted as a 'non-contact, "at sea only" exercise in view of COVID-19 pandemic and highlights the mutual trust, synergy and cooperation between the two friendly Navies.

India and Indonesia have been carrying out Coordinated Patrols (CORPAT) along the International Maritime Boundary Line (IMBL) twice in a year since 2002, with an aim of keeping this vital part of the Indian Ocean Region safe and secure for commercial shipping, international trade and conduct of legitimate maritime activities. CORPATs help build understanding and interoperability between navies, and facilitate institution of measures to prevent and suppress Illegal Unreported Unregulated (IUU) fishing, drug trafficking, maritime terrorism, armed robbery and piracy.

As part of Government of India's vision of SAGAR (Security And Growth for All in the Region), Indian Navy has been proactively engaging with the countries in the Indian Ocean Region. India and Indonesia have traditionally enjoyed a close and friendly relationship covering a wide spectrum of activities and interactions, which have strengthened and institutionalised over the years. The Maritime interactions have been growing steadily between the two navies with frequent port visits, bilateral exercises and training exchanges.

The 37th edition of IND-INDO CORPAT seeks to bolster the maritime cooperation between the two navies and forge strong bonds of friendship across the Indo Pacific.

https://pib.gov.in/PressReleasePage.aspx?PRID=1774332

The EurAsian Times

Wed, 24 Nov 2021

Indian Military inducts Light Combat Helicopter (LCH) – 'World's only attack chopper' that can operate from 15K feet

By Aritra Banerjee

The Indian Air Force (IAF) received the indigenous Light Combat Helicopter (LCH) under the 'Make in India' initiative. Indian PM Narendra Modi symbolically handed over the LCH to IAF Chief Air Chief Marshal VR Chaudhari recently.

In the aftermath of the 1999 Kargil war, IAF had felt the need for a potent helicopter capable of delivering precision strikes at high altitudes. This laid the foundation for the research and development of the LCH, which received the government of India's sanction in October 2006.

Following the IAF, the Army Aviation Corps (AAC) too joined the program in December The IAF and AAC's combined LCH requirements reached 160.

Indian Air Force's LCH operates in the high-altitude Ladakh sector. (HAL image)

Why LCH Is A Potent Platform

Developed by the state-owned Hindustan Aeronautics Limited (HAL), the LCH is a twin-engine helicopter weighing between five to eight tonnes. It is touted to be the world's only attack helicopter capable of taking off and landing at altitudes as high as 5,000-metres (16,400-feet) whilst boasting a significant payload. The LCH becomes an excellent platform for supporting troops deployed in high-altitude areas (HAA). It can operate in various temperatures, ranging from 50 degrees Celsius on snow peaks to 50 degrees Celsius in the desert. This makes it a highly flexible platform that caters to the diverse deployment patterns of Indian military personnel.

As a light attack helicopter, the indigenous chopper packs a lethal punch with air-to-air and air-to-ground missiles. It is armed with a 20 mm gun and can carry 70 mm rockets. The LCH can acquire and neutralize both air and ground targets with the aid of advanced avionics and arms.

The chopper is manually operated during operations and can be erected at 180 degrees and even reversed. The LCH can even revolve at 360 degrees; what this entails is that the attack chopper can be rotated rapidly in the air itself.

A Dedicated Combat Helicopter

Hindustan Aeronautics Limited (HAL) claimed in its press release that the LCH is a dedicated combat helicopter designed and developed indigenously for the first time in India.

LCH is the only attack helicopter in the world, which can land and take-off at an altitude of 5000 m (16400 ft) with a considerable load of weapons and fuel meeting the specific requirements of the Indian armed forces.

HAL has proactively initiated advance action towards launching the production activities of 15 LCH LSPs with internal funding. Material procurement for all 15 helicopters has been completed. Three helicopters are ready for delivery to users and the balance helicopters are in advanced stages of production. HAL has initiated various planning activities and has drawn a detailed master plan for achieving the peak rate production capacity of 30 helicopters per annum in order to cater to the production of balance 145 LCHs.

Improved Electronics Warfare (EW) Suite, Directional Infra-Red Countermeasure (DIRCM), air-to-ground missiles, data-link, anti-radiation missile (ARM), bombs, Nuclear, Biological and Chemical (NBC) protection and wire-cutter are being incorporated in the LCH.

Being a unique helicopter in this weight category and with this kind of capabilities, LCH is also expected to have good export potential.

Will LCH Be A Game Changer For IAF?

Former IAF Vice Chief, Air Marshal Bhushan Gokhale (Retd) told the EurAsian Times, "*It is a* good induction especially for the use in mountainous terrain. It was long-awaited. I do hope that India, be it the Defence Research and Development Organisation (DRDO), Hindustan Aeronautics Limited (HAL) or private industry are able to develop the engine technology which will make many major weapon systems truly Made in India."

Author and analyst, Group Captain TP Srivastava (Retd) said, "the Induction of LCH in IAF is a great indigenous achievement. But only if it will perform better than Dhruv."

Gp Capt. Jhonson Chacko (Retd) opined, "A major portion of our land borders are in the mountains. [LCH is] the best platform to launch air-to-ground weapons from is a slow-moving aircraft as it provides the pilot ample time. It is unfortunate that it took us a war (Kargil) to realize this even though everyone knew of the existence of the Himalayas and the 62 war. The launch of the LCH is long overdue.

"It can blunt the attack capabilities of the enemy and disrupt his logistics. Tension with China should not be a trigger for us to react. We need to build the capability to fight in the mountains. Standoff weapons will boost the survivability of the LCH."

When asked if this development is likely to boost India's indigenization goals, the veteran fighter pilot said, "Boost to indigenization depends on the increase in the percentage of totally indigenous parts in the helicopter with ALH as a base."

Military author, columnist, and analyst Joseph P Chacko said, "The LCH gives the Indian Army an advantage at high altitude warfare which no other country possesses. In the lower altitudes, it is better than the neighborhood fields. Being an Indian-origin Chopper, India has control over the serviceability too. Anti Unmanned Aerial Vehicles (UAV), air-to-air and night and day capabilities of LCH have been proven in the trials.

With respect to the Chinese assertion along the eastern sector of the LAC, the analyst said, "It [the LCH] is already operating at LAC. It is good to destroy Chinese armor, convoys, and bunkers. The LCH was meant to take out hard-to-reach targets in mountains like the ones in the Kargil war."

Group Captain Badal Debnath (Retd) said, "Attack helicopters are going to play a very important role in any future war. India needs an armed combat helicopter for effectively attacking enemy tank formations during battle. Introduction of LCH is a great way to make our airborne forces more potent."

Explaining the LCH deployment to at eastern sector of the LAC, the IAF veteran said that LCH will provide Indian forces with a great tactical advantage in the mountains against PLA assets, as we will be able to overcome the limitations of mountainous terrain very easily. "If required, LCH can attack the enemy in depth also," he added.

Emphasizing the indigenization of the defense industry, Gp Capt. Badal said, "Yes, we have been importing our main weapon systems for the last 70 years…it is time that Indian armed forces encourage indigenous weapon platforms. LCH is a great leap forward towards Atma Nirbhar Bharat."

Air Vice-Marshal Manmohan Bahadur (Retd), the former Additional Director General, Centre for Airpower Studies (CAPS), had Tweeted about this development, "There is NO helicopter in the world that can deliver armament at 15k feet. Have been writing since 2012, when I first flew it, that we must go full bore for LCH. Good, it's officially inducted – let's ensure all promised weaponry & avionics come-in."

The induction of LCH complements Indian Defense Minister Rajnath Singh's recent statement that India intends to achieve 90% indigenization in defense equipment.

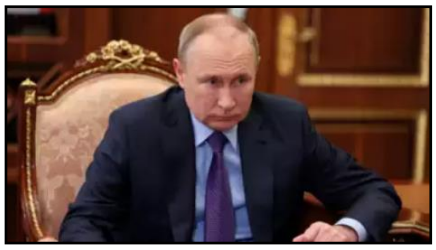
https://eurasiantimes.com/indian-military-light-combat-helicopter-lch-worlds-combat-helicopter/

THE TIMES OF INDIA

Wed, 24 Nov 2021

Ahead of Putin's visit, defence ministry clears Rs 5000 cr AK-203 assault rifle deal with Russia

New Delhi: Defence Ministry on Tuesday gave its final clearance to over Rs 5,000 crore deal with Russia to manufacture 7.5 lakh AK-203 assault rifles in Uttar Pradesh's Amethi.



Russian President Putin is expected to visit India next month (AP)

This comes ahead of Russian President Vladimir Putin's expected visit next month.

The AK-203 assault rifles deal, which may be signed during the visit, was cleared by the defence acquisition council meeting on Tuesday, defence sources told ANI.

The Russian-designed AK-203 will be made in a factory in Amethi.

The deal had been agreed upon between the two sides a few years ago and now the last major issue would be resolving the issues on the transfer of technology, they said.

Of the 7.5 lakh rifles to be acquired by the Indian Army, the first 70,000 will include Russian made components as the transfer of technology happens slowly.

These will be delivered to the Army 32 months after the production process begins.

https://timesofindia.indiatimes.com/india/ahead-of-putins-visit-defence-ministry-clears-rs-5000-cr-ak-203-assault-rifle-deal-with-russia/articleshow/87873237.cms

THE TIMES OF INDIA

Wed, 24 Nov 2021

ISRO working on tech that can beat even Star Trek's

By Chethan Kumar

Bengaluru: Isro is on an interstellar overdrive, working on a bunch of future technologies that could be the stuff of Hollywood sci-fi. Think self-eating rockets and self-vanishing satellites, to name just a few among the 46 slices of mind-bending tech taking shape at its innovation hub.

"All our rockets have metal casings that are dropped into the sea after launch or become (final-stage) space debris. We are working on a technology through which rockets will effectively eat themselves, eliminating waste-dropping into seas and space debris. We are looking at special materials for casings that can burn up along with motors," Isro chairman K Sivan told TOI on Tuesday.

In the same vein, self-vanishing satellite technology would enable spacecraft destruction, once its lifetime is over, through a "kill button" to kickstart a process that will burn it up in-orbit.

"When rockets fly, there are defects sometimes. Self-healing materials can correct some of these defects by themselves," Sivan said.

Make-in-space concepts, quantum communication and advanced radars are the other technologies Isro is focusing on as part of the plan to prepare India for future even as private enterprises manage day-to-day launches.

https://timesofindia.indiatimes.com/india/isro-working-on-tech-that-can-beat-even-star-treks/articleshow/87877923.cms

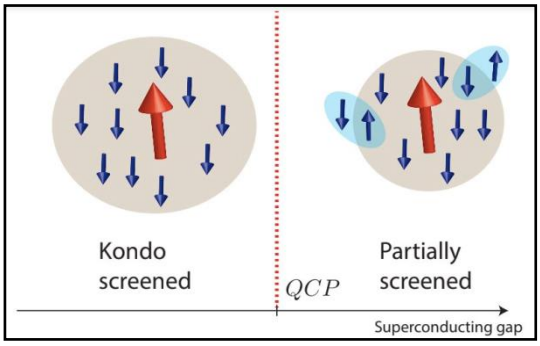
PHYS.ORG

Wed, 24 Nov 2021

Study predicts the behavior of a Kondo cloud in a superconductor

By Ingrid Fadell

In recent years, many physicists worldwide have been investigating the behavior of hybrid nanostructures. These are systems that are typically made up of two or more materials. Special attention in this class of structures is paid to magnetic impurities interacting with superconducting and normal metallic contacts.



Credit: Paşcu Moca.

Past studies have found that when a metal contains magnetic impurities, conduction electrons can form a screening cloud, which essentially screens the impurity's spin. This physical phenomenon is known as the Kondo effect; thus, the resulting cloud is referred to as a Kondo cloud.

While the behavior of the Kondo cloud in normal systems is well-understood, its properties in the presence of superconducting materials have not yet been explored in depth. So far, most physicists have believed that the screening of impurity spins in hybrid nanostructures takes place predominantly in the screened, rather than in the unscreened, quantum phase. Researchers at Budapest University of Technology and Economics in Hungary and Adam Mickiewicz University in Poland, however, have recently showed that while the Kondo state does not form in the unscreened phase, Kondo clouds exist in both screened and unscreened quantum phases.

"When one considers a single spin S=1/2 impurity, such as a quantum dot or a molecule, attached to a metallic contact, a correlated Kondo state forms in such systems at sufficiently low temperatures," Ireneusz Weymann, one of the researchers who carried out the study, told Phys.org. "In such a state, the impurity's spin is screened by the conduction electrons and a correlation cloud (so-called Kondo cloud) is formed around the impurity."

While several researchers examined the properties of Kondo clouds, only recently have teams also started probing these systems experimentally. One of the most notable experimental studies was conducted by Ivan V. Borzenets at City University of Hong Kong and his colleagues at other institutes worldwide. The recent paper by Weymann and his colleagues, published in *Physical Review Letters*, builds on this previous work to shed light on the behavior of Kondo clouds in superconductors.

"Understanding the spatial extension of various states is important to understand the fundamental aspects of strong electron correlations, which is relevant for various correlated materials," Weymann explained.

The recent work by Weymann and his colleagues is of a purely theoretical nature, as they employed state-of-the-art numerical and analytical renormalization group methods. These techniques allowed them to accurately predict the behavior of a Kondo cloud inside a superconducting material.

"The system we considered exhibits a quantum phase transition when the ground state changes between the Kondo state and the so-called Shiba state," Weymann said. "Up to now, it was believed that the screening occurs in the Kondo phase. Quite strikingly, we have however, demonstrated that the Kondo cloud exists also in the unscreened phase."

The results of the analyses and calculations carried out by this team of researchers also suggest that the properties of Kondo clouds are universal and exhibit a characteristic jump at the so-called

quantum critical point. In the future, their work could inform a series of experiments directly investigating the properties of Kondo clouds in superconductors.

"We now plan to extend our work to more complex systems, where more exotic ground states could be realized," Weymann added.

More information: Cătălin Paşcu Moca et al, Kondo Cloud in a Superconductor, *Physical Review Letters* (2021). DOI: 10.1103/PhysRevLett.127.186804

Ivan V. Borzenets et al, Observation of the Kondo screening cloud, *Nature* (2020). DOI: 10.1038/s41586-020-2058-6

Journal information: *Nature* , *Physical Review Letters*

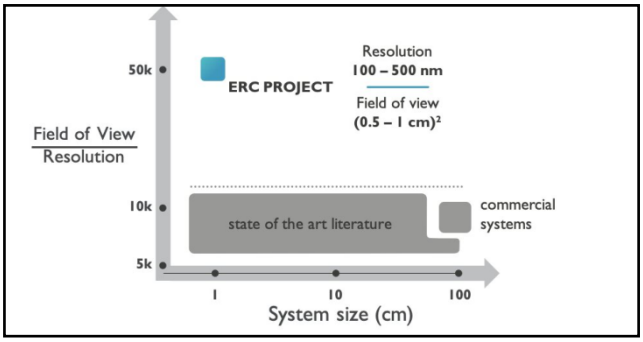
https://phys.org/news/2021-11-behavior-kondo-cloud-superconductor.html

Wed, 24 Nov 2021

A chip-scale microscope for high-throughput fluorescence imaging

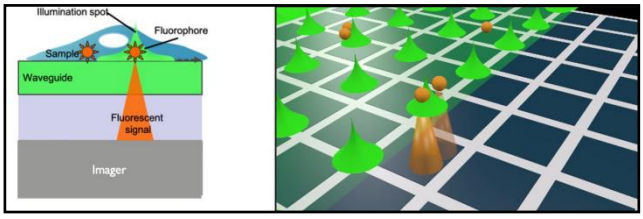
By Niels Verellen

Conventional light microscopy has been instrumental for studying cells and microorganisms; fluorescence microscopy enabled visualization of even smaller cell features by selectively adding fluorescent labels to molecules. These microscopes are often comprise bulky and expensive systems that require regular maintenance to keep the lenses aligned. Additionally, they need to strike a compromise between device size, the size of the field of view, and resolution. For scientists to see more detail, larger optical components are required, but this causes the field of view to decrease.



The fluorescence microscope on-chip is compact with a large field of view and high resolution. Credit: imec

Chip technology presents a whole different view on microscopy. Chips are compact and can integrate multiple functionalities. The scaling possibilities could allow chip-based microscopes to be produced at a fraction of the cost of standard devices. Niels Verellen, principal scientist at imec, has designed a high-resolution, on-chip microscope with a scalable field of view. At the halfway point of the five-year project, he talks about the early successes and challenges ahead.

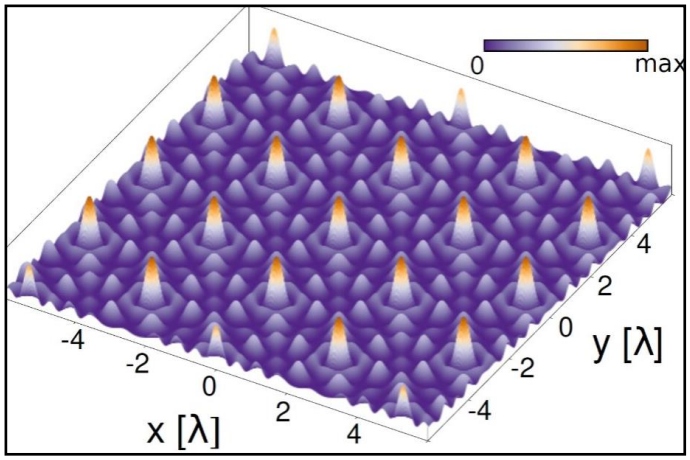


The concept of the fluorescence microscope on chip. Illumination spots are generated in the photonic circuit. The imager picks up a signal where the light excites the fluorophore. Credit: imec

Lens-free fluorescence microscopy

To downsize the microscope, Niels Verellen's team removed the quintessential part of standard optical microscopes: the lens. Lens-free options exist for light microscopy, which directly image scattered light. Imec's lens-free microscope, for example, uses the interference pattern of the excitation light to reconstruct the image holographically. These solutions don't work for fluorescence microscopy because fluorescence light is not coherent, meaning that there is no time-distance relationship between the excitation light and the fluorescence emission.

Niels Verellen says, "The goal of the ERC project is to achieve the same advantages as the existing lens-free optical microscope (small size, scalability, large field of view and high resolution) for fluorescence microscopy. The operating principle of our microscope is similar to that of a traditional confocal laser scanning fluorescence microscope. The lens-free microscope contains an image sensor (a pixel array), topped with an integrated photonic circuit consisting of waveguides and phase modulators that form focused illumination spots. Unlike in a confocal microscope that operates traditionally with one focus point, we can generate and scan many spots simultaneously."



The interference patterns can be precisely controlled to form illumination spots. Credit: imec

"No lenses are needed: the integrated photonics circuit mimics all functions that the objective lens traditionally fulfills in a confocal microscope. The lens focuses laser light into a tiny spot to selectively excite the fluorophore in the sample. In our case, tiny light spots are generated in the integrated photonic circuit. The same lens in a confocal microscope collects the fluorescent light. If you use an objective lens with a higher numerical aperture, you can collect more light. Because the integrated photonic circuit where the spots are generated is very close to the image sensor, the numerical aperture of our microscope is inherently high."

High-throughput microscopy for next-gen sequencing

The chip presents a high-throughput alternative to conventional microscopy, especially for sequencing-related applications. Niels Verellen says, "We can only measure at the surface of a sample, within the evanescent field of total internally reflected light in a waveguide approximately 100nm deep). Aside from imaging membrane proteins, we see DNA sequencing as the most relevant application for our concept. DNA-tagging and optical detection form the backbone of next-generation sequencing, where the whole genome of an organism can be analyzed in one experiment. To sequence a genome, millions to trillions of fluorescently labeled nucleotides (A, G, T, C, the building blocks of DNA) need to be read out in a short time and at a reasonable cost. The on-chip microscope can scan the arrays of nucleotides at the surface and with high throughput. The scalability of the chips allows for massive parallelization of the experiments."

"That's one of the major advantages over confocal microscopy," explains Niels Verellen. "A confocal microscope costs over €100,000 and can scan a well plate with a limited number of DNA fragments or other molecules. Imec's microscope on-chip achieves the same resolution, but you can place ten chips side by side on a table at a fraction of the cost and floor space, and there is no need for expensive alignment maintenance. It removes the bottleneck of throughput."

Generating light spot patterns

"The biggest challenge of this project is to create the high-resolution structured illumination pattern. In other words: how to generate the optimal pattern of light spots over a large field of view within the confines of a two-dimensional chip." The essential components in the photonic chip are waveguides that guide the light in the chip and phase modulators that shape the light for the sample illumination. Interference patterns can be generated using wave characteristics of the laser light. So a spot of light appears in regions where the combined waves reinforce each other (constructive interference) while it remains dark in regions where the waves cancel each other out (destructive interference). "To generate the desired pattern, precise control over the interfering waves is crucial. We successfully built a mathematical model that achieves the pattern with a limited number of components on the photonic chip. The model is based on prime number factorization to design a coherent optical lattice of light spots," explains Niels Verellen.

Optimization of the optical components

One of the main innovations was translating this theoretical model into a chip architecture that allows imaging. For that, the team had to optimize, redesign and de-risk all optical components in the circuit. The initial results on test chips (without imagers) showed that the interference patterns could be nicely controlled and modulated.

Additionally, the team had to develop a custom filter to place between the imager and the photonic circuit. This filter rejects the excitation light so that only the fluorescence emission reaches the imager. A standard fluorescence microscope uses interference filters that selectively reject a narrow range of wavelengths to achieve this. For it to work optimally, the objective lens needs to ensure that the fluorescent light hits the filter straight. "In the absence of a lens to take up the task of bundling the light, we can't use a standard interference filter," explains Niels Verellen. "Therefore, we developed a custom filter that covers a larger angular range."

"Until now, the components were designed and tested separately. However, we're expecting the first photonic circuits on the imagers out of the cleanroom," tells Niels Verellen. "The chips would be the first proof of concept device that can demonstrate the whole imaging concept. In parallel, we're already looking at ways to scale up to larger fields of view in the order of $1cm^2$," says Niels Verellen. "For that goal, we are working on several custom passive and active optical circuit components to shape and modulate the light in an efficient and fast way."

More information: Dmitry Kouznetsov et al, Revival and Expansion of the Theory of Coherent Lattices, *Physical Review Letters* (2020). DOI: 10.1103/PhysRevLett.125.184101

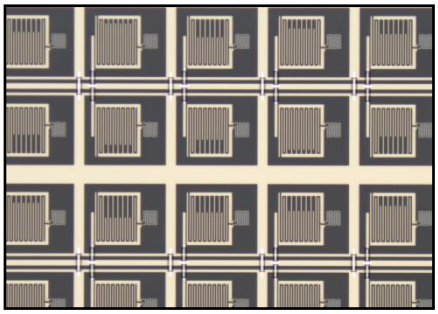
Journal information: *Physical Review Letters*

https://phys.org/news/2021-11-chip-scale-microscope-high-throughput-fluorescence-imaging.html

Wed, 24 Nov 2021

MKID detectors turn out to have 100 times lower noise

Scientists use superconducting detectors (MKIDs) to discern the spectrum of exoplanets from their faint glow. Now, researchers from SRON Netherlands Institute for Space Research and TU Delft have observed 100 times lower noise than expected, providing a new fundamental physics insight: the relationship between the number of quasiparticles and their lifetime vanishes. The study has been published in *Physical Review B*.



Credit: SRON Netherlands Institute for Space Research

Exoplanets are so dim in the night sky that their light reaches Earth-based telescopes in the form of individual photons. To detect these, SRON scientists are developing microwave kinetic inductance detectors, or MKIDs for short. They are cooled to the point that superconductivity occurs; electrons form Cooper pairs and thereby avoid the intrinsic electrical resistance of the material. Incoming photons break the Cooper pairs up into quasiparticles. MKIDs use these to trace back the energy of each photon.

As with any detection technology, noise creates limitations to sensitivity. In the case of MKIDs, noise arises from thermal fluctuations, which cause a continuous breaking up and recombination of quasiparticles. If a weak signal from an exoplanet breaks up only a few Cooper pairs, the signal from the resulting quasiparticles drowns in this quasiparticle noise.

In recently published research, the SRON scientists increased the sensitivity of their MKIDs by a factor of 2.5 by using a membrane to retain leaking energy of incident photons; they initially did not expect to benefit from it because of the noise. But to their surprise, they saw that the noise was a factor of 100 lower than expected. The membrane had increased not only the sensitivity of the detector itself, but also the sensitivity for measuring noise during testing. Moreover, the new design requires a less powerful readout signal, which disturbs the detector less. It means that space telescopes will have 2.5 times higher precision.

It seems that the noise is so low because the correlation between the number of quasiparticles and their lifetime vanishes at the low temperature (-273 degrees C) at which MKIDs operate. Until now, physicists have always observed that the more quasiparticles there are, the faster they find each other and form Cooper pairs again, and thus, the shorter they live. Now that SRON researchers, led by Pieter de Visser (SRON/TU Delft), have accurately mapped out this noise in MKIDs, this law no longer appears to apply.

"That correlation disappears, so quasiparticles live shorter than the measured number of quasiparticles suggests," says first author Steven de Rooij (SRON/TU Delft). "We think that the quasiparticles get stuck and therefore no longer contribute to the noise."

De Visser says, "In addition to making our 2.5 times higher precision relevant , the much lower noise also represents a fundamental discovery in physics. The decoupling of lifetime and number of quasiparticles is a new effect that also other scientists can use to significantly improve their detectors."

More information: Steven A. H. de Rooij et al, Strong reduction of quasiparticle fluctuations in a superconductor due to decoupling of the quasiparticle number and lifetime, *Physical Review B* (2021). DOI: 10.1103/PhysRevB.104.L180506

Journal information: *Physical Review B*

https://phys.org/news/2021-11-mkid-detectors-noise.html

The Indian EXPRESS

Wed, 24 Nov 2021

Explained: How Covid-19 shots for kids help prevent dangerous new variants

Vaccinating kids also means reducing silent spread, since most have no or mild symptoms when they contract the virus

Louisville (Kentucky): Cadell Walker rushed to get her 9-year-old daughter Solome vaccinated against COVID-19 — not just to protect her but to help stop the coronavirus from spreading and spawning even more dangerous variants.

Cadell Walker comforts her daughter Solome, as a nurse administers a Pfizer COVID-19 shot at a vaccination clinic for young students at Ramsey Middle School on Saturday, Nov. 13, 2021 in Louisville (AP)

"Love thy neighbor is something that we really do believe, and we want to be good community members and want to model that thinking for our daughter," said the 40-year-old Louisville mom, who recently took Solome to a local middle school for her shot. "The only way to really beat COVID is for all of us collectively to work together for the greater good."

Scientists agree. Each infection — whether in an adult in Yemen or a kid in Kentucky — gives the virus another opportunity to mutate. Protecting a new, large chunk of the population anywhere in the world limits those opportunities.

That effort got a lift with 28 million US kids 5 to 11 years old now eligible for child-sized doses of the Pfizer-BioNTech vaccine. Moves elsewhere, like Austria's recent decision to require all adults to be vaccinated and even the US authorising booster shots for all adults on Friday, help by further reducing the chances of new infection.

Vaccinating kids also means reducing silent spread, since most have no or mild symptoms when they contract the virus. When the virus spreads unseen, scientists say, it also goes unabated. And as more people contract it, the odds of new variants rise.

David O'Connor, a virology expert at the University of Wisconsin-Madison, likens infections to "lottery tickets that we're giving the virus." The jackpot? A variant even more dangerous than the contagious delta currently circulating.

"The fewer people who are infected, the less lottery tickets it has and the better off we're all going to be in terms of generating the variants," he said, adding that variants are even more likely to emerge in people with weakened immune systems who harbor the virus for a long time.

Researchers disagree on how much kids have influenced the course of the pandemic. Early research suggested they didn't contribute much to viral spread. But some experts say children played a significant role this year spreading contagious variants such as alpha and delta.

Getting kids vaccinated could make a real difference going forward, according to estimates by the COVID-19 Scenario Modeling Hub, a collection of university and medical research organizations that consolidates models of how the pandemic may unfold. The hub's latest estimates show that for this November through March 12, 2022, vaccinating 5- to 11-year-olds would avert about 430,000 COVID cases in the overall US population if no new variant arose. If a variant 50 per cent more transmissible than delta showed up in late fall, 860,000 cases would be averted, "a big impact," said project co-leader Katriona Shea, of Pennsylvania State University.

Delta remains dominant for now, accounting for more than 99 per cent of analysed coronavirus specimens in the United States. Scientists aren't sure exactly why. Dr. Stuart Campbell Ray, an infectious disease expert at Johns Hopkins University, said it may be intrinsically more infectious, or it may be evading at least in part the protection people get from vaccines or having been infected before.

"It's probably a combination of those things," he said. "But there's also very good and growing evidence that delta is simply more fit, meaning that it's able to grow to higher levels faster than other variants that are studied. So when people get delta, they become infectious sooner."

Ray said delta is "a big family" of viruses, and the world is now swimming in a sort of "delta soup."

"We have many lineages of delta that are circulating in many places with no clear winners," Ray said, adding that it's hard to know from genetic features which might have an edge, or which non-delta variants might dethrone delta.

"I often say it's like seeing a car parked on the side of the road with racing slicks and racing stripes and an airfoil on the back and a big engine," Ray said. "You know it looks like it could be a real contender, but until you see it on the track with other cars, you don't know if it's going to win."

Another big unknown: Dangerous variants may still arise in largely-unvaccinated parts of the world and make their way to America even as US children join the ranks of the vaccinated.

Walker, the Louisville mom, said she and her husband can't do anything about distant threats, but could sign their daughter up for vaccination at Jefferson County Public Schools sites on a recent weekend. Solome is adopted from Ethiopia and is prone to pneumonia following respiratory ailments after being exposed to tuberculosis as a baby.

She said she wants to keep other kids safe because "it's not good to get sick."

As a nurse leaned in to give Solome her shot, Walker held her daughter's hand, then praised her for picking out a post-jab sticker appropriate for a brave kid who just did her part to help curb a pandemic. "Wonder Woman," Walker said. "Perfect."

https://indianexpress.com/article/explained/explained-covid-shots-kids-prevent-variants-7636822/