# Tiger, Tiger, in the Night…Now Visible in Real Time
Press Release for International Tiger Day – July 29th, 2022

For decades, tiger biologists have dreamt of a "smart" camera, a device that could detect a tiger on the prowl and send images instantly to a cell phone. Whether at dawn, dusk, or midnight, through monsoon rains or stifling heat, the remote unit would function 24/7, with long battery life, to protect and monitor this charismatic species.

Today, on International Tiger Day, we are excited to announce a major breakthrough in conservation technology: for the first time ever, wild tigers and their prey have been detected by AI-powered, cryptic cameras that transmit the images to the cell phones and computers of park managers. Just as important, the elapsed time from the motion sensor triggered by the passing tiger, to running the AI, to transmission to the cell network, to the Internet, and to the end user is less than 30 seconds, making this technology a true real-time system. To complete the wish list, using cellular communication, the camera-alert system can transmit more than 2,500 images on a single battery charge. In short, the dream has come true.
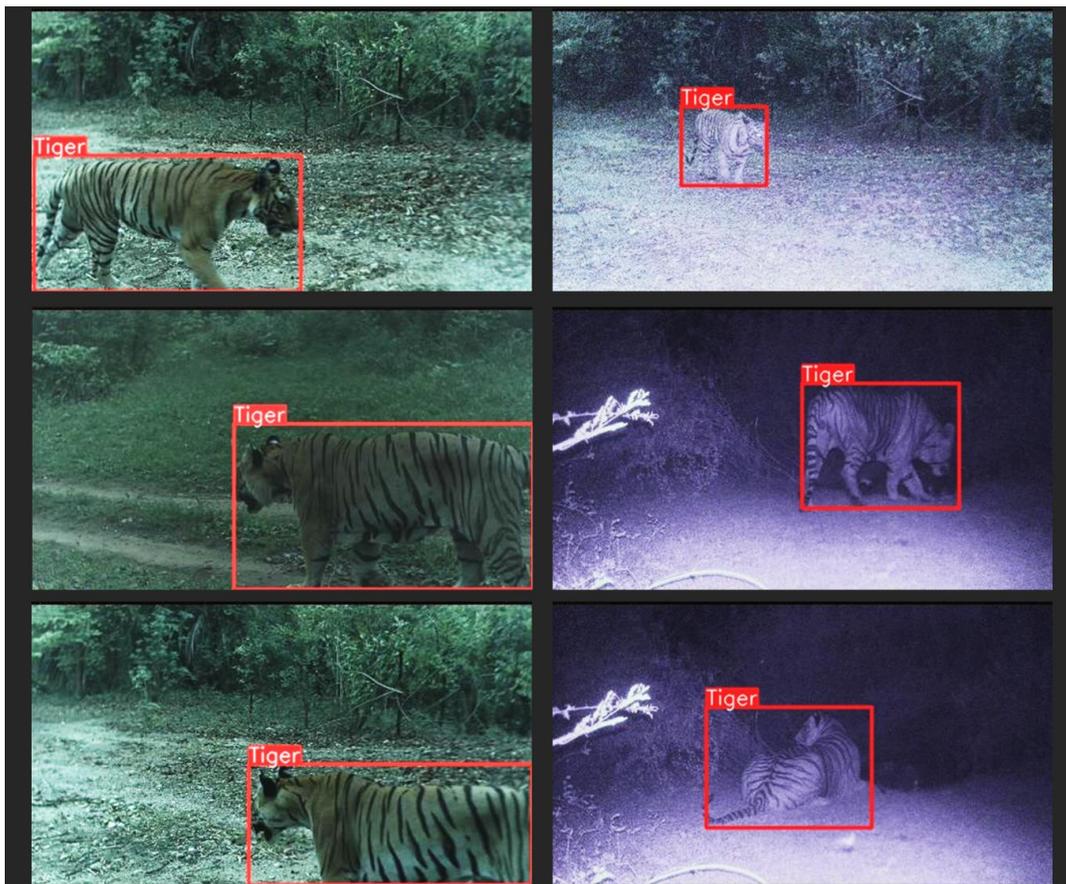

Tigers detected at night and during the day by TrailGuard AI. Image credit: NTCA, Madhya Pradesh Forest Department, Global Tiger Forum, and RESOLVE.

For the past three months, India's National Tiger Conservation Authority, the Global Tiger Forum, and the Wildlife Wing of the State of Madhya Pradesh have partnered with Clemson

University and the NGO RESOLVE to bring the world's most advanced, real-time wildlife monitoring system to the Kanha-Pench Tiger Conservation Landscape, in Madhya Pradesh.

The new technology, prototyped effectively in Africa for the past four years, and now available in Asia, is called TrailGuard AI. This tiny AI-embedded camera-alert system runs powerful computer models on-board the camera to weed out false positives before transmission of data, thus saving precious battery life, and sending only what the end user requires. Intel and the AI company CVEDIA both played critical roles in supplying the necessary computer chips and AI models to make this possible. First designed to detect poachers in African parks, the camera becomes a wildlife detector simply by updating the AI model to detect a range of endangered wildlife species. Where cell connectivity is excellent, as in much of India, TrailGuard AI takes advantage of the strong signal. Where there is no cell service, this system transmits images over long-range radio (LoRa).
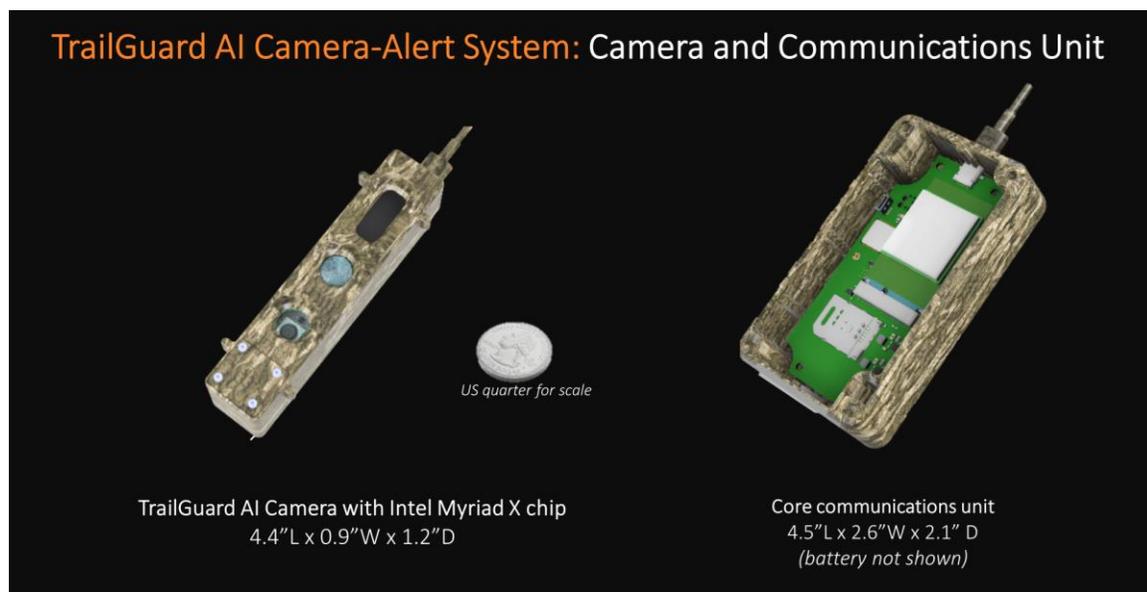
TrailGuard AI is the world's first AI-powered camera-alert system to monitor endangered wildlife and detect illegal activity in protected areas and remote locations and transmit images in real-time. Image credit: RESOLVE

The technology cannot come soon enough. In 2010, during the Year of the Tiger in the Chinese calendar, the Global Tiger Initiative spearheaded an effort to double the size of the wild tiger population—for shorthand, Tx2—after reports that the global population had dropped to an estimated 3,500. The situation has improved across much of the range, such that in 2022, also the Year of the Tiger in the Chinese calendar, the population has doubled in a number of range states.

Landscape-scale conservation is the most effective way to save area-sensitive, wide-ranging top predators like tigers. The deployment centered on Kanha-Pench, the most important of the 76 Tiger Conservation Landscapes in this predator's range. The twin anchors of this landscape, Kanha National Park and Pench National Park, and their surrounding habitats, hold more than 500 tigers, the most anywhere. "I am glad to see the technology working so well. It holds great promise," said Dr. H.S. Negi, former additional chief of wildlife in Madhya Pradesh and Senior Advisor, Global Tiger Forum.

"Technology has come as a final destination for dealing with tiger management. It supplies the support system for dealing with human-tiger conflict and enables forest management to offset limitations to do with manpower, and human resources." – Dr. Ramesh Krishnamurthy, landscape ecologist.

The technology covers parks and can also monitor human or tiger use in corridors connecting reserves. "India ranks first among all range states, holding 70% of the world's tigers, and has a great track record of good practices. Monitoring not just source areas, but outer linkages gain relevance for strengthening corridor linkages," said Mohnish Kapoor, Head – Programme and Partnerships, Global Tiger Forum.

Research in Indian tiger reserves also shows that tiger population recovery depends heavily on prey populations, so being able to monitor deer, Indian bison, and wild boar is vital information to predict recovery. "Saving tigers requires effective monitoring of the wild population and the prey base. TrailGuard AI gives managers that tool. TrailGuard AI detects a wide range of species important to Asian wildlife managers, especially when dealing with human-tiger interface areas. The GTF is committed to foster new technology for furthering the cause." – Dr. Rajesh Gopal, Secretary General, Global Tiger Forum.

Other mammals detected and instantly transmitted by TrailGuard AI include leopard, gaur, sloth bear, sambar, langur, and chital. Image credit: NTCA, Madhya Pradesh Forest Department, Global Tiger Forum, and RESOLVE

The field deployment in Kanha-Pench enjoys the enthusiastic support of Tigers United, a consortium of U.S.-based universities and their students—Clemson, Auburn, Louisiana State, and University of Missouri—who cherish tigers as their mascot. Dr. Brett Wright, Professor and Dean Emeritus of the College of Behavioral, Social and Health Sciences at Clemson University and head of Tigers United, said, "Saving tigers is the responsibility of the whole world. That's why we have supported this project and want to help scale the technology to save tigers everywhere."

Mr. Keshav Varma, CEO and Executive Director, Global Tiger Initiative Council, said, "The GTIC is closely collaborating with Tiger Range Countries and like-minded partners in upgrading field monitoring with innovative technology. TrailGuard AI is most welcome at this juncture for a species like the endangered wild tiger, which crosses many land uses and requires a landscape level approach involving several stakeholders".

"International Tiger Day marks a time to pause, to take stock and renew our commitment to saving the world's most charismatic mammal. Through this public-private partnership with the Indian government, and support from leading technology companies—Intel, ANFAEngineering, CVEDIA, Luxonis, and EMnify—we are poised to harness AI for the good of conservation, and monitor endangered wildlife in real-time. This year, 2022, being the Year of the Tiger, we plan to scale TrailGuard AI to support conservationists working across the range to bring back wild tigers," said Dr. Eric Dinerstein, the project lead from the NGO RESOLVE and co-developer of TrailGuard AI.

The Global Tiger Forum (GTF) is an international, inter-governmental body exclusively set up for the conservation of tigers in the wild in the range countries. The forum is working with range country governments, conservation organizations, and research/academic institutes across the globe for utilizing co-operative policies, evolving common approaches, providing technical expertise, developing scientific modules and other appropriate conservation programs.
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The National Tiger Conservation Authority (NTCA) is a statutory body under India's Ministry of Environment, Forests and Climate Change. Its mandate to strengthen tiger conservation in the country by retaining an oversight through advisories/normative guidelines, based on appraisal of tiger status, ongoing conservation initiatives and recommendations of specially constituted Committees. NTCA has been at the forefront of tiger conservation work in India. Its work domain extends from on-the-ground protection initiatives to science-based monitoring of tigers and their habitat using latest technological tools, independent assessment of tiger reserves with MEE framework, financial and technical support to tiger reserves, creating inviolate space for wildlife while ensuring community development to international co-operation are the few thrust areas of NTCA.

Clemson University, a leading public research institution in South Carolina, USA, initiated the Tigers United University Consortium with three other institutions — Auburn University, Louisiana State University and The University of Missouri. Through the consortium, the four universities combine their expertise in academic disciplines important to tiger conservation and protection—wildlife management, engineering, environmental science, conservation social science, veterinary medicine, communications and eco-tourism, to name a few. With more than one university approaching the problem, the odds of success increase.

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RESOLVE is a Washington, DC-based non-profit organization that forges sustainable solutions to critical environmental, social, and health, challenges by creating innovative partnerships where they are least likely and most needed. RESOLVE's Biodiversity and Wildlife Solutions Program tackles the most pressing conservation problems of our time – the approaching extinction of endangered wildlife and threats to habitats, including tropical forests where most of the world's species reside – through technological innovation, ambitious global agreements, and targeted land protection.
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