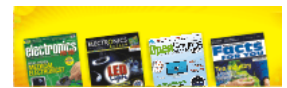




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Aerial Eye to Guard Against Terrorism

An eye in the sky to monitor and guide anti-terrorism campaigns—that's the power given to defend us by a new unmanned aerial vehicle developed by a startup company incubated at IIT Bombay

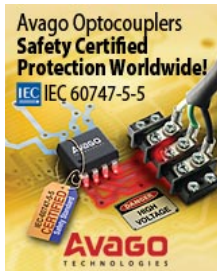
VANISHA JOSEPH



The completely autonomous hovering unmanned aerial vehicle named Netra promises to be of great help to counter insurgency operations

JULY 2010: The thought of terrorist attacks in Mumbai on Nov. 26, 2008 still sends chills down our spines. Be it the attack on a city that never sleeps or the daily battle fought by our soldiers on snow-capped mountains at the line of control (LoC), every terror attack throws up harder challenges for the armed forces, making the urge for a watchful eye stronger.

Netra, the unmanned aerial vehicle (UAV), which is like a small eye zooming in the sky, can gather real-time intelligence on the ground and become the perfect weapon to outsmart terror elements. Developed by ideaForge, a start-up company incubated at IIT Bombay, it is a



completely autonomous system controlled by a ground-control software application with an intuitive graphical user interface.

"Netra is a completely autonomous system for surveillance and reconnaissance requiring no prior flying experience for an operator. The operator just needs to point and click on the satellite map displayed in the software application for navigation. It keeps sending live video to the ground control station, helping the users (defence personnel, etc) plan their moves based on the aerial video data received," says Ankit Mehta, managing director, ideaForge. It can help in monitoring counter-terrorist operations, insurgency in forested areas, hostage situations and border infiltration besides conducting local law enforcement operations, search-and-rescue operations, disaster management, etc.

Eye in the Sky!

With many UAVs developed and tested in the past to address our defence needs, what makes Netra a cut above the rest? Netra outsmarts other UAVs in the market with features like vertical take-off and landing, which result in greater operability, BlueFire Autopilot, which is the smallest and lightest autopilot, and fail-safe modes, wherein the UAV automatically returns to the base in case of low battery or communication loss.

High operability. Netra has set new yardsticks in terms of operability. It can vertically take off and land, allowing it to be operated from confined areas and even rooftops.

Mastermind behind the watchful eye!

It took two-three years of extensive research and development by a team of five experts at ideaForge to develop Netra. "We began with the development of autopilot, which ended up being the world's smallest and lightest autopilot. There have been challenges at each and every stage throughout the development, right from its first flight till date. And every failure has been an essential part of strengthening our base," recalls Mehta.

"The on-board GPS keeps updating the current position of the vehicle. It stores the take-off GPS position that can act as the landing spot too and be changed in flight, if required. Once it is commanded to land, it decides its path and reaches the landing spot. Then it lands vertically down," says Mehta.

Netra is well-equipped to withstand harsh conditions like wind and poor visibility. "We have studied wind effects on the vehicle and done a lot of aerodynamic design changes for improved wind resistance," says Mehta. Further, it can be operated at night and soon even indoors.

"The thermal camera option allows Netra to operate at night, in fog or any other kind of poor visibility condition. Since the vehicle is completely autonomous, the user need not worry about the navigation issues in such conditions," says Mehta.

Smart auto pilot. The level of autonomy in Netra is higher than in any other UAV as it allows hands-free operation after the operator commands the vehicle to go to a specified destination. "The software displays maps (satellite imagery from Google maps) around the current location of the vehicle along with trajectory of the moving vehicle. For navigation, the user just needs to mark a way-point on the map. Double-clicking the point will command the vehicle to start moving towards that point," says Mehta.

The BlueFire Autopilot, which is the brain of Netra, takes on thereafter. The autopilot controller takes over the tasks of take-off and navigation as per the flight plan, at every instance providing the corrections and auto stabilising the platform due to inherent motion and wind gusts. This flight plan can be dynamically changed during flight, providing high levels of autonomy to the operator.

"The intelligent autopilot communicates with the ground station, gathers data from all the sensors, stabilises the vehicle and navigates it. It has been developed in-house by ideaForge and is world's smallest and lightest autopilot available promising to relieve the operator from skilful manoeuvring," says Mehta. Further, built-in intelligence of the controller allows failsafe operation in case of communication failure with base station or low battery.

▶ *Foolproof safety plan.* Netra can fly for half an hour on a single battery charge, thanks to use of high-quality Li-Po batteries having the highest energy density (energy/weight ratio). Even if the battery gives way, Netra has several levels of fail-safe modes like low-battery fail-safe and communication-loss fail-safe. In the case of low battery, the UAV automatically comes back and lands by itself. During a communication failure between the vehicle and ground control station, Netra starts coming back and when it regains communication, it hovers and waits for the next command.

"To ensure safe operation, the vehicle keeps track of the battery voltage and signal strength. Whenever these two reach a critical value, it triggers the fail-safe mode and the vehicle starts coming back," says Mehta.

Every element of data security has been taken care of. "Users have the option to switch over to a licenced frequency band which is not easily accessible by a third person. This will be a hindrance against any meddling. Soon we will give the option of digital transmission that would be encrypted, making it impossible to tap," says Mehta.

Very portable. Netra is extremely small, lightweight and portable, requiring only two men to carry the system along with the control station to field locations. It weighs only 1.5 kg and is 90×90 cm² in size.


"Weight is of prime importance in case of flying vehicles. We did many optimisations in every component we used. Further, the body is made of carbon fibre, which is a very light and strong material," says Mehta.

Peek into the future

Looking ahead, ideaForge is determined to make continuous improvements in Netra. "In the immediate future, better communication and improved image intelligence are the areas that we wish to focus on. We are also working on reaching out to potential customers. We are targeting armed forces, paramilitary forces, special task forces, ATS, security agencies, fire fighters, disaster management groups, etc and have already started holding demonstrations for them," says Mehta, on an optimistic note.

The author is a business correspondent at EFY Bengaluru

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kranveer choudhay 359 days ago

sir ... good evening mane netra project bnaya hain but kuch problem hain ... iski remote range 40 meter hain n jab ye remot range se bhar jata hain to fall down please give some ideas

 Reply 1 Reply

chethan Murthy 269 days ago

I think you have used a short range transmitter. If you need a long range you should go to higher range transmitters say 433MHz radio transmitter module. It has a range of 150 to 200 meters. As transmitting the radio frequency above 500 meters is illegal and banned in our country. You can go to the GSM control using mobile phones if you need even bigger range.

 Reply 1 Reply

parveen kumar 238 days ago

hey chetan can you please help me on this project .i am also want to make it in my next sem.

 Reply

renu 354 days ago

wht is netra? explain in short

 Reply 2 Replies

chethan Murthy 269 days ago

Nethra means eyes. Its the Project name. The project is designed to see things on the ground from the sky.

 Reply

Anik kumar 99 days ago

Nethra means eyes then how can can see without eyes. Then also it is two eye sensors

 Reply

prasad 303 days ago

is it takes much more time to get charged?? i hav seen it last year in iit pawai some swedish guyz made it... told me that it takes 4 hours to charge and flies only for 10 min...

 Reply

vinay 292 days ago

any 1 can tell me how can i made this?

 Reply

Manju HM 270 days ago

What is the cost of netra ?

 Reply

Jaya Krishna 127 days ago

sir how to develop this project

 Reply

lahiru 51 days ago

Dear sir how we can buy this in shop or any place?

 Reply

christian dipen 46 days ago

i am going to make this project.... lets see it works or not???

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