Drone Applications for Land Records in India

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Abstract

India is emerging as a potential user of drone technology for digital land survey and records and the Government, Local Bodies, Industry and Agencies have come to realize that drones have reduce compliance costs, enable real-time monitoring, facilitate high-quality data collection, and helps monitor large areas in less time, with multiple uses besides land records survey such as Aerial photography for journalism and film. Express shipping and delivery. Gathering information or supplying essentials for disaster management. The government has passed Drone (Amendment) Rules, 2022 which states that remote pilot certificate (earlier it was called license) will not be required for flying small to medium size drones of up to 2kg for non-commercial purposes. Drone Rules, 2021 were notified by the Central Government on August 25, 2021. Based on a premise of trust, self-certification and non-intrusive monitoring. security considerations. India has embarked on a land record modernisation programme to survey lands, upgrade records and establish ownership, to resolve disputes that stall development projects, sparking lengthy court battles, and map lands and authenticate ownership. The Haryana state used drones from Science and Technology Park, Pune to take high-resolution images, to update boundaries, illegal constructions and encroachments of forests and public lands, every three months basis, and validated with existing land records and verified with village councils in rural areas before being updated digitally. Drones image identify precise data, positioning, identify change and provide quick, economic, safe and accurate data for numerous purposes, predominantly that for land surveying. Drone data provides most valuable insights in terms of evaluation, planning, site operations and maintenance, and reduce ground truthing, in different topographic situations and generate high resolution images. Drone survey can be used by Land Surveyors, rockfall survey, Project Consultants, Smart City Planners, Urban Planners, Asset owners, Government Organisations, Railway Authorities, Road Constructors, Architectures, Civil Engineers, Contractors, Disaster Assessment cells, Insurance companies, Mining companies, Government property tax department, Archaeologists, Land Administrators, Land Owners, Real Estate Developers, Forest Officials, Conservationists, Utility applications, Statistics, Transport Authorities, Development committees, and Emergency response activists. Karnataka, Maharashtra, **and** Haryana have initiated to carry out a drone survey across India to create high-resolution digital maps, with the help of the Survey of India. The Karnataka Government has digitally mapping

the settlements, buildings, farm land, roads, water bodies, lakes and all associated features, being digitally captured. Similar initiatives have been adopted in Telangana, Odisha, Maharashtra, Gujarat and in many Indian States. The Survey of India has been engaged in aerial mapping of villages in India using drones, under the 'Survey of villages and mapping with improvised technology in village areas', (SVAMITVA) Scheme of Ministry of Panchayati Raj, Government of India, with a target to map India's over 6.6 lakh villages by Dec 2024. The objective of the scheme is to create accurate land records for property rights, direct benefit transfers and panchayat level planning, to reduce land disputes and provide clear legal title ownerships to actual land owners. Drones are cheaper, cost effective in use, manufactured in India, and their images are far superior to satellite images, which has led to increased use of Drones to curb deforestation, check illegal mining and quarrying, encroachment of Government lands, unauthorised constructions, land use, change detection, and all issues related to digital land records and title ownership.

Key Words: Digital Land Survey and Records, Aerial Photography, High Resolution Images, SVAMITVA, Unmanned Aerial Vehicle (UAV).

Retrospect

A drone is an unmanned aircraft or ship that is guided remotely or autonomously. Above is a multi-copter drone, named for it's many propellers. UAV stands for Unmanned Aerial Vehicle, something that can fly without a pilot onboard. The most important parts of a drone are the operating system and the flight controller. Batteries power the rotors causing them to spin the propellers and generate lift. The flight controller uses the data collected by accelerometers, barometers, magnetometers, gyroscopes, and the controller to stay in the air.

The drones have major components such as Propellers, Motor, ESC (Electronic Speed Controller), Flight Controller (FC), Radio Transmitter sends the radio signal to ESC to pilot to control motor speed, Radio Receiver: Received the signal from the pilot, and Battery having High-power capacity, Lithium Polymer (LiPo) is used for most drones. Drones now have many functions, ranging from monitoring climate change to carrying out search operations after natural disasters, photography, filming, and delivering goods. But their most well-known and controversial use is by the military for reconnaissance, surveillance and targeted attacks.

Apart from taking on dangerous tasks, drones can also monitor areas that do not necessarily pose a risk to human workers. Still, the reliance on human workers can add a considerable margin of error and accuracy. Drone automation shows potential for reducing this risk of error. Individuals, commercial entities, and governments have come to realize that drones have multiple useful features, which include: Aerial photography for journalism and film. Express shipping and delivery. Gathering information or supplying essentials for disaster management. There are two types of Drones namely the Single-rotor helicopter drones and the Fixed-wing hybrid VTOL drones. The Single-rotor helicopter drones are VTOL and hover flight Long endurance (with gas power) Heavier payload capability, while the Fixed-wing hybrid VTOL

drones are VTOL and hover Long-endurance flight Fast speed Heavier payload capability. Drones has potential to be used as aerial inspections, surveillance and even helping to protect wildlife and disaster management, and many exciting drone usage. They are likely to find many more applications in the building inspection, construction industry, oil and gas refinery inspection, agriculture surveillance and mapping, rescue operations, aerial photography, thermal imaging and more.

Drone Technology in India

The drone technology is increasingly being adopted across industries in India and abroad. Drones reduce compliance costs, enable real-time monitoring, facilitate high-quality data collection, and helps monitor large areas in less time. These advantages are driving their adoption for civil and industrial applications. An airborne drone is a device that does not require a pilot on board; therefore, it is also called an Unmanned Aerial Vehicle (UAV). Drones are machines remotely operated by a pilot; completely independent drones are in the final stages of development. Drones manufactured in India find various applications across fields, including commercial, recreational, and defence. The Indian UAV market has the ability to become one of the most competitive markets across the globe., tremendous manufacturing opportunities, boost employment in India, and is broadly segmented into Original Equipment Manufacturers, End Users and emerging markets.

The types of UAVs available in India are fixed wings, rotary wings, medium-altitude long-endurance, high-altitude long-endurance, combat aerial vehicles, etc. The drone manufacturers in India have been constantly working on innovation and product optimization. The drone technology is increasingly being adopted across industries in India and abroad. Drones reduce compliance costs, enable real-time monitoring, facilitate high-quality data collection, and helps monitor large areas in less time. These advantages are driving their adoption for civil and industrial applications.

The prominent drone manufacturing companies in India including a few military drone manufacturers in India are Dhaksha Unmanned Systems, Chennai, Tamil Nadu, Ideaforge Technology, Mumbai, Maharashtra, Io TechWorld Avigation, Gurugram, Haryana, Raphe Mphibr, Noida, Uttar Pradesh, Adani-Elbit Advanced Systems India, Hyderabad, Telangana, Adroitec Information Systems, New Delhi and Paras Aerospace, Bangalore, Karnataka.

Policies and Programmes

The government has passed Drone (Amendment) Rules, 2022 which states that remote pilot certificate (earlier it was called license) will not be required for flying small to medium size drones of up to 2kg for non-commercial purposes. Drone Rules, 202115 were notified by the Central Government on August 25, 2021. Based on a premise of trust, self-certification and non-intrusive monitoring. security considerations.

The Ministry of Civil Aviation, Government of India, has announced the New Drone Policy on August 25, 2021, permitted Drone Use in India, with classification as under:

1. Nano unmanned aircraft system: weighing less than or equal to 250 grams;
2. Micro unmanned aircraft system: weighing more than 250 grams, but less than or equal to Two kilograms;
3. Small unmanned aircraft system: weighing more than Two kilograms, but less than or equal to 25 kilograms;
4. Medium unmanned aircraft system: weighing more than 25 kilograms, but less than or equal to 150 kilograms
5. Large unmanned aircraft system: weighing more than 150 kilograms.

Remote pilot licence to be issued by DGCA within 15 days of pilot receiving the remote pilot certificate from an authorised drone school through the digital sky platform. Under New Drone Policy Aug 2021, approval process is simplified, user-friendly online single-window system developed, remote pilot license fee made very minimal (Rs 100), several approvals procedures abolished and simplified, permitted no permission for operating drones in green zones, permitted no remote pilot licence required for micro drones (for non-commercial use) and nano drones. The government has passed Drone (Amendment) Rules, 2022 which states that remote pilot certificate (earlier it was called license) will not be required for flying small to medium size drones of up to 2kg for non-commercial purposes.

The Government of India has initiated the Digital Sky Platform an unmanned traffic management (UTM) system which will facilitate registration and licensing of drones and operators in addition to giving instant (online) clearances to operators for every flight, enable online registration of pilots, devices, service providers, and NPNT (no permission, no take-off). Further the Government of India has been promoting various measures for the creation of demand structure for drones. States are in the process of organizing Done Melas and also Drone Schools for promotion of done use extensively.

Drone Application in Land Records in India

The drones, with high-resolution fitting cameras, will be used to map land parcels in the villages and for fixing locations of village boundaries, canals and roads in these villages, stated authorities. Nearly 200 drones were procured by the Centre to map 6.62 lakh villages in the country. While surveying with drones, images of the ground are taken from multiple vantage points. Through processing these images, a photogrammetry software can then create Orth mosaics and 3D models, from which it can measure accurate distance, as well as surfaces and volumes of physical objects.

Drones are becoming a powerful tool within the mapping and surveying industry. They can effectively perform work for 3D mapping, land surveys, photogrammetry, and topographic surveying with increased efficiency by flying above the ground. Haryana state's Project Udaan,

is a mapping project using unmanned aerial vehicles (UAVs) to update land records of Gurgaon, Sohna and Manesar in northern India. The drone images are being used to update decades-old land records, check encroachments and resolve disputes over land and property.

India has embarked on a land record modernisation programme to survey lands, upgrade records and establish ownership, to resolve disputes that stall development projects, sparking lengthy court battles, and map lands and authenticate ownership. The Haryana state used drones from Science and Technology Park, Pune to take high-resolution images, to update boundaries, illegal constructions and encroachments of forests and public lands, every three months basis, and validated with existing land records and verified with village councils in rural areas before being updated digitally. Drones image identify precise data, positioning, identify change and provide quick, economic, safe and accurate data for numerous purposes, predominantly that for land surveying. Drone data provides most valuable insights in terms of evaluation, planning, site operations and maintenance, and reduce ground truthing, in different topographic situations and generate high resolution images.

Drone survey can be used by Land Surveyors, rockfall survey, Project Consultants, Smart City Planners, Urban Planners, Asset owners, Government Organisations, Railway Authorities, Road Constructors, Architectures, Civil Engineers, Contractors, Disaster Assessment cells, Insurance companies, Mining companies, Government property tax department, Archaeologists, Land Administrators, Land Owners, Real Estate Developers, Forest Officials, Conservationists, Utility applications, Statistics, Transport Authorities, Development committees, and Emergency response activists.

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The Survey of India has been engaged in aerial mapping of villages in India using drones, under the 'Survey of villages and mapping with improvised technology in village areas', (SVAMITVA) Scheme of Ministry of Panchayati Raj, Government of India, with a target to map India's over 6.6 lakh villages by Dec 2024. The objective of the scheme is to create accurate land records for property rights, direct benefit transfers and panchayat level planning, to reduce land disputes and provide clear legal title ownerships to actual land owners.   The SVAMITVA Project has brought in all agencies in the generation of digital land records data under Survey of India, and given a boost to the drone industry in the country, generate immense employment opportunities to youngsters.   The SVAMITVA initiative is a digital data repository backbone support for the Local Self Government (LSG) at Gram Panchayat, Taluk Panchayat and Zilla Parishad level and propel faster development and decision making at micro level, empowering local communities at 3 tires.

Conclusion

Drones are cheaper, cost effective in use, manufactured in India, and their images are far superior to satellite images, which has led to increased use of Drones to curb deforestation, check illegal mining and quarrying, encroachment of Government lands, unauthorised constructions, landuse, change detection, and all issues related to digital land records and title ownership.

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