ACS COLLEGE OF ENGINEERING

NAAC 'A' Accredited

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

Workshop on

Drone training

Date: 19/12/2022

WHAT IS A DRONE?

A drone is an unmanned aircraft. Drones are more formally known as unmanned aerial vehicles (UAVs) or unmanned aircraft systems. Essentially, a drone is a flying robot that can be remotely controlled or fly autonomously using software-controlled flight plans in its embedded systems, that work in conjunction with onboard sensors and a global positioning system (GPS).

UAVs were most often associated with the military. They were initially used for anti-aircraft target practice, intelligence gathering and, more controversially, as weapons platforms. Drones are now also used in a range of civilian roles, including the following:

- search and rescue
- surveillance
- traffic monitoring
- weather monitoring
- firefighting
- personal use
- drone-based photography
- videography
- agriculture
- delivery services

HOW DO DRONES WORK?

Drones have two basic functions: flight mode and navigation.

To fly, drones must have a power source, such as battery or fuel. They also have rotors, propellers and a frame. The frame of a drone is typically made of a lightweight, composite material to reduce weight and increase maneuverability.

Drones require a controller, which lets the operator use remote controls to launch, navigate and land the aircraft. Controllers communicate with the drone using radio waves, such as Wi-Fi.

COMMON DRONE FEATURES AND COMPONENTS :

Drones have a large number of components, including:

- electronic speed controllers, which control a motor's speed and direction;
- flight controller;
- GPS module;
- battery;
- antenna;
- receiver;
- cameras;
- sensors, including ultrasonic sensors and collision avoidance sensors;
- accelerometer, which measures speed; and
- altimeter, which measures altitude.

Drone features vary based on the use it is put to. Examples of features include:

- various types of cameras with high-performance, zoom and gimbal steadycam and tilt capabilities;
- artificial intelligence (AI) that enables the drone to follow objects;
- augmented reality features that superimpose virtual objects on the drone's camera feed;
- media storage format;
- maximum flight time, which determines how long the drone can remain in the air;
- maximum speeds, including ascent and descent;
- hover accuracy;
- obstacle sensory range;
- altitude hold, which keeps the drone at a fixed altitude;
- live video feed; and
- flight logs.

Navigational systems, such as GPS, are typically housed in the nose of a drone. The GPS on a drone communicates its precise location to the controller. An onboard altimeter can communicate altitude information. The altimeter also helps keep the drone at a specific altitude if the controller designates one.

Drones can be equipped with sensors, including ultrasonic, laser or lidar distance sensors, time-of-flight sensors, chemical sensors, and stabilization and orientation sensors. Visual sensors offer still and video data. Red, green and blue sensors collect standard visual red, green and blue wavelengths, and multispectral sensors collect visible and nonvisible wavelengths, such as infrared and ultraviolet. Accelerometers, gyroscopes, magnetometers, barometers and GPS are also common drone features.

For example, thermal sensors make possible surveillance and security applications, such as livestock monitoring and heat-signature detection. Hyperspectral sensors help identify minerals and vegetation, and are ideal for use in crop health, water quality and surface composition.

Some drones use sensors to detect obstacles and avoid collisions. Initially, the sensors were designed to detect objects in front of the drone. Some drones now provide obstacle detection in five directions: front, back, below, above and side to side.

For landing, drones use visual positioning systems with downward-facing cameras and ultrasonic sensors. The ultrasonic sensors determine how close the drone is to the ground.

Types of drones available are :

There are two main types of drone platforms:

1. rotor, including single-rotor and multi-rotor, such as tricopters, quadcopters, hexacopters and octocoptors; and
2. fixed-wing, which include the hybrid vertical takeoff and landing (VTOL) drones that don't require runways.

PERSONAL DRONES

Many personal drones are available for consumer use. They have become standard Black Friday and Cyber Monday deals, offering HD video and still camera capabilities. Operators are often beginners who are looking to simply fly them for fun or racing. These drones usually weigh 10 pounds or less; they can be as light as under a pound.

Some popular personal drones include the following:

- Autel EVO II offers high-end video.
- DJI FPV Combo is built for racing.

COMMERCIAL DRONES:

Stronger, more capable drones are also available for use in commercial settings. Insitu, a Boeing company, offers the ScanEagle, a UAV with a 10-foot wingspan and weighs 35 pounds. Insitu also builds the Integrator, an 80-pound aircraft with a 16-foot wingspan. Insitu drones do not take off from runways. Instead, they use VTOL capabilities in the company's launchers and recovery system. Sensors available include electro-optic imagers, mid-wave infrared imagers, infrared markers and laser rangefinders.

UAV RECEPTION AND DRONE REGULATIONS:

Rapid adoption of drones over the past decade has sparked privacy, security and safety complaints and concerns. Voyeurs and paparazzi use drones to obtain images of people in their homes and other locations once assumed to be private. Drones are also used in unsafe locations, such as urban areas and near airports.

In the U.K., the Civil Aviation Authority (CAA) restricts drones from flying above 500 feet. Any drone weighing more than a half-pound must be registered with the CAA. The agency has also published its "Dronecode":

- **D**on't fly near airports or airfields.
- **R**emember to stay below 400 feet and at least 150 feet away from buildings and people.
- **O**bserve your drone at all times.
- **N**ever fly near aircraft.
- **E**njoy responsibly.

TRAINING IN DRONE TECHNOLOGY:

Drone education is expanding. Embry-Riddle Aeronautical University has long been a training center for the aviation industry. It now offers a Bachelor of Science in Unmanned Aircraft Systems and a Master of Science in Unmanned Systems.

There are several self-study resources available for individuals who want to become certified commercial drone pilots as well.

EVENT IMAGES:

Training on assembling the drone


GPS Map Camera
Kambipura, Karnataka, India
VFR8+H79, Kambipura, Karnataka 560060, India
Lat 12.891438°
Long 77.465716°
19/12/22 10:03 AM GMT +05:30
Google


GPS Map Camera
Kambipura, Karnataka, India
VFR8+H79, Kambipura, Karnataka 560060, India
Lat 12.89142°
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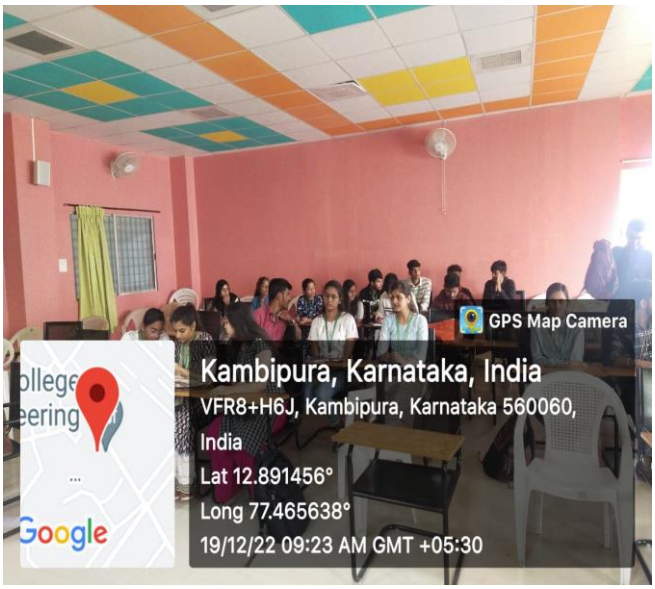

Students along with Faculties of CSE

CSE Faculties and Students with Drone training resource person.

EO#	EVENT OUTCOMES
EO1	Appreciate and apply the basic principle of aviation
EO2	Comprehend the complexities involved during development of drone vehicles
EO3	Apply the concepts of fundaments of drone, basics of drone structures, and drone materials during the development of an aircraft

EO-PO Mapping

PO's Attained: PO1,PO2,PO3,PO5

PSO's Attained: PSO1,PSO2,PSO3

Event Coordinator **HOD**