



Elevate Your Skills:



Discover Drone Technology
with our Training Laboratory

ABOUT THE LABORATORY

The Drone Technology Laboratory for Skill Development and Universities is a specialized facility designed by AKADEMIKA to provide hands-on training and practical experience in the field of drone technology. It serves as a dedicated space where individuals can develop the necessary skills and competencies to effectively operate, maintain, and utilize drones across various industries



KEY FEATURES OF THE DRONE TECHNOLOGY LABORATORY:



State-of-the-art Equipment: The laboratory is equipped with cutting-edge drones, flight simulators, data acquisition tools, and software applications to provide a realistic learning environment. Students have access to a wide range of drone models, ensuring exposure to different configurations and capabilities



Training Modules: The laboratory offers a comprehensive curriculum that covers the fundamental concepts of drones, flight operations, data analysis, and industry-specific applications.



Practical Hands-on Experience: The laboratory emphasizes practical learning through hands-on exercises and simulations. Participants have the opportunity to practice drone flight operations, capture aerial media, process data, and troubleshoot technical issues.



Safety Protocols and Best Practices: Safety is a paramount concern in drone operations. The laboratory promotes the implementation of safety protocols, including pre-flight checks, airspace regulations, emergency procedures, and risk management strategies. Participants learn the importance of responsible drone use and the ethical considerations associated with drone technology.



Opportunities: Upon successful completion of the Training program, Students will enhance their employability Skills and open doors to various career opportunities in sectors such as agriculture, construction, film production, surveying, and more.



The Drone Technology Laboratory aims to bridge the gap between theoretical knowledge and practical application, equipping individuals with the expertise needed to thrive in the rapidly growing field of drone technology.

CURRICULUM

- Videos & Online Tutorials For DGCA drone rules and regulations/ UTM / DIGISKY/ Remote Pilot Licensing / Component & Data, Identify & select different types of drones, drone applications, and important safety precautions.
- Characterization of Different Parts of Drone using various Test Equipments and Software



BLDC MOTORS/ ESC/PROPELLERS :

Identify, select and test hardware assembly of the propulsion system, driver for BLDC motors(ESC) and compatible Propeller, Calculation of Motor and Propeller Efficiency.

FLIGHT CONTROL BOARD : Test, configure and troubleshoot Flight Controller Board (FCB), Electronic Speed Controller (ESC) and its associated peripherals

BATTERIES USED IN DRONES : Identification of different type of batteries, battery specifications and their charging techniques used in drone

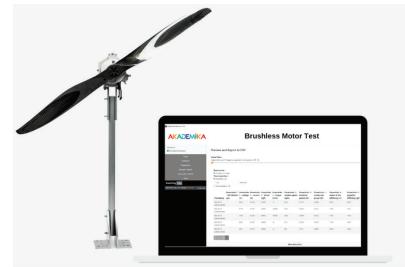
SENSORS : Inspect, test and execute various IMU , GPS navigation and telemetry module, different RF blocks and antennas used in RF transmitter and receiver

- Assembly of various drone parts, Calibration and programming, troubleshooting of a Un Assembled Drone
- Introduction to Flight Simulator , Control Checks, Pre Flight Check and Simulator Exercises to have an Hands – on experience before actual flight
- Introduction to autonomous flight systems, Programming and configuring autonomous missions, Sensors and navigation for autonomous drones
- Advanced flight techniques (obstacle avoidance, precision flying)
- Drone Data Acquisition and Analysis
- Drone Proto-Typing: Design Frames, Propellers etc and Manufacture using a 3 D Printer

WORKBENCH FOR CHARACTERIZATION OF DRONES COMPONENTS

MODEL DT-TMS: THRUST MEASUREMENT SYSTEM (MOTORS & PROPELLER)

This System has the facility to characterize and evaluate the performance of BLDC motors and propellers by measuring thrust, torque, RPM, current, voltage, temperature, propeller efficiency and motor efficiency.



SPECIFICATIONS:

- ✖ Measuring the Thrust Range -5 to 5 Kgf and Torque Range (-2to 2 Nm) of the Motors
- ✖ Measuring the Electrical Current 0 to 55A and Voltage (0 to 50V)
- ✖ Measure the Motors Angular Rotation Speed upto 190K eRPM Coil Resistance : 0.003 - 240 Ohms

The Software is capable to control the system manually and view live data as it is recorded.

- ✖ Facility to control the entire system from a Python API is provided
- ✖ Facility to upload the .CSV files from the flight controller to perform flight replay tests
- ✖ Facility to Plot Real time Graphs, Manual Motor Control, Manual Servo Control .
- ✖ Facility for Automated Tests like Ramps, Steps, Measure (Kv), measure no of poles etc.

Accessories:

Optical RPM Probe, No-Solder Board,5 Propellers of different sizes (7.0"x 4.0"), (8.0 x 4.0), (8.0; x 6.0), (8.0 x 8.0), and (9.0 x 4.0).
2 motors with ratings: at 1500Kv and 2300Kv, respectively Motor Controller ESC.

MODEL DT-DBMTS : DRONE BATTERY MANAGEMENT TRAINING SYSTEM

The Battery Management Training System has the features to monitor Cell Balancing, Changing and Discharging of Batteries, Endurance Testing of Drone with Specific LiPo Battery and Motor Combination and Calculation of C Rating for an LiPo Battery



Battery Capacity: 16,000mAh, 6 S, 24 V

High Precision Wattmeter and Power Analyzer with Facility to Measure.

8 parameters to serve as a key to electric power safety & performance.

Measuring Voltage (V), Current (A), Power (W), Capacity (Ah), and

Energy (Wh), Minimum Voltage (Vm), Peak Current (Ap), and Peak Power Wp).

Servo Driver/ Tester: To control the speed of the Motor

ESC: Constant Current (A): 80, BEC: Yes (5V/5A)

BLDC Motor, Speed: 18000 rpm +/- 10%, Propeller: 16 ": Diameter: 16 ", Pitch: 5.5 "

BLDC Motor and Propeller System mounted on a Stand acting as a Load to the Battery Management Training System

Set up is provided with work table as per below specifications:

- ✖ Working bench of dimension (LxWxH): 4 x 2.5 x 3 (ft.) approx.
- ✖ Base structure made with 38X38X1.5 mm CRC Epoxy coated pipes and top made of 19mm thick plywood with edge bidding.
- ✖ MS drawers 03 numbers with handle & lock on drawer.
- ✖ Two Pole MCB (16A Good quality ISI mark) to be provided for safety of work table.
- ✖ Workbench is provided with Anti-static mat, castor wheel and multiple sockets/ Switches for external use.

ASSEMBLY, PROGRAMMING AND CONFIGURATION OF DRONES

MODEL DT-MICRO-U: UN-ASSEMBLED DRONE KIT

TECHNICAL SPECIFICATIONS

The Unassembled Micro Drone Quad Copter Training System has the Following Features:

- ✖ Arm® Cortex®-M7 processor STM32H753IIK6 and coprocessor STM32F103 with Floating Point Unit (FPU), 480MHz high-speed operations and 2MB flash.
- ✖ Facility for more complex algorithms and models.
- ✖ TELEMTRY Ports with full flow control, 4 power input ports - 2 for Drone CAN power inputs and 2 for SMBUS/I2C power inputs,
- ✖ An independent LDO powers every sensor set with independent power control.
- ✖ A vibration isolation System to filter out high-frequency vibration and reduce noise to ensure accurate readings, allowing vehicles to reach better overall flight performances.
- ✖ 1 UART4(Serial and I2C)
- ✖ Lidar Sensor for distance measurement.
- ✖ 2.4GHz remote module System, Frequencies-Hopping and Low Power Consumption with Throttle curves, Pitch curves, Endpoint adjustments and Servo reversing



Un-Assembled Quad copter kit includes

- ✖ GPS Module (4 no.): Concurrent GNSS: up to 10 Hz.

Adv GPS Module (1 No): GNSS U-BLOX M9N CAN BUS is a new product from CUAV brand. NEO 3 Pro continues the hardware design of NEO V2, upgrade the GNSS module to Ublox NEO M9N, supports Beidou, Galileo, Glonas and GPS receive the same time, and the horizontal positioning accuracy is up to 0.7m. Integrated with safety switch, buzzer, RGB light.



- ✖ **Propellers (50 nos.)** : Length: 10", Pitch: 4.5"
- ✖ **Frame (10 no.)**: Wheel Base 450mm, Material Glass Fiber + Polymide Nylon, Motor Mounting Hole Dia.: 3 mm, Arm Size: 220 x 40 mm.
- ✖ **Landing Gear (10 Nos)** : Compatible to the Frame specification
- ✖ **BLDC Motors (50 nos.)**: Brushless 920 RPM Voltage: 7.2v~11.1v / 2s~3s Lipo, Shaft Length: 10mm or more, Max Watts: 260W, Minimum 900 KV or more, Screw Size:M3
- ✖ **Electronic Speed controllers (50 nos.)**: Brushless ESC 30A up to 2-4S Brushless ESC,BEC output : 5V 2A.
- ✖ **FCB (Flight Controller Board) (4no.)**: Up to 14 PWM / servo output, Bus interface (UART, I2C, SPI); provide redundant power input, Multicolor LED lights, Provide a multi-tone buzzer Interface/Motor Winding Tone.
- ✖ **FCB (Flight Controller Board) (1 no.)**: Up to 16 PWM / servo output, Triple redundant IMU & double redundant barometer on separate buses, Integrated Microchip Ethernet PHY for highspeed communication, dual processor, 2x I2C ports for external compass, airspeed sensor, etc. on GPS connector, PPM/SBUS input, DSM/SBUS input, 2 x CAN port, 8x UARTS 6 Available for customer use, Dual SMBUS/I2C Power Module Inputs



- ❖ **FPV Camera (Sensor) (5 no.):** Image Sensor: CCD, Power: DC 5-36V., Operating Current: 5V@60-mA; Horizontal Resolution: 600TVL.
- ❖ **FPV Live video transmitting goggles -Receiver (2 no.):** Varifocal 5.8G 40CH Diversity FPV Goggles, Varifocal lenses for adjustable focus, catering to individual eyesight needs 5.8Ghz frequency with 40 channels for stable and interference-free FPV transmission, Diversity feature for enhanced signal reception, reducing signal loss and improving image quality ,Built-in DVR (Digital Video Recorder) for recording flight footage directly onto a micro SD card, Large 5-inch HD LCD screen for immersive FPV experience
- ❖ **Camera Transmitter (5 no.) :** Channels: up to 40CH, Frequency: 5.6GHz-5.9GHz, Antenna: RP-SMA Male
- ❖ **RF Transmitter and receiver (5 pair) :** 10 channels, 2.40 - 2.48GHz frequency , Power ; 12V, Battery 8 AA; **Telemetry (5 Nos) :** 915 MHz , Mavlink Protocol, Receiver Sensitivity: -121dBm , Transmit Power up to 20dBm
- ❖ **Lidar (2 Nos) :** Operating Range: 0.2m~8m (90% reflectivity), Accuracy: ±6cm@(0.2m-3m), ±2%@(3m-8m), Distance resolution(cm): 1
- ❖ **Gimbal (5 Nos)** 2 Axis Brushless Gimbals, Carbon Fiber Material, Motor drivers, Onboard MPU.
- ❖ **HD Camera/ Action Camera: (5 Nos):** 3840 X 2160 Resolution, 4K 30fps, SD Card Support, 90min run time, SONY 8MP sensor lens.

MODEL DT-SDS 661 DEVELOPMENT KIT

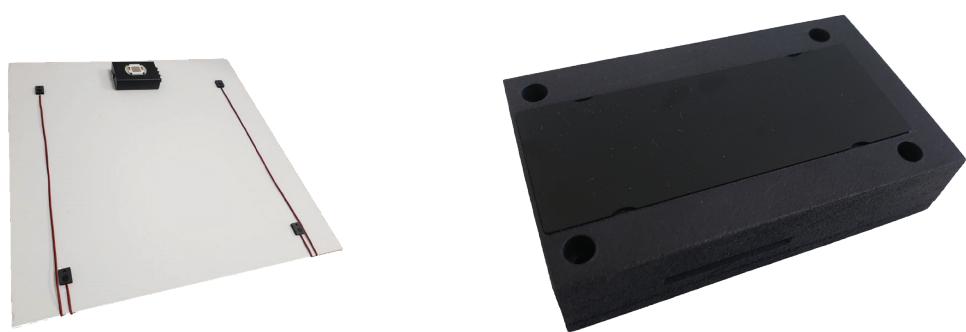
- ❖ Control Unit with integrated gyro Sensor and Ethernet UDP Data Communication.
- ❖ Supplied with an Embedded Computer Quad core Cortex-A72 (ARM v8) 64-bit SoC, 2.4 GHz and 5.0 GHz IEEE 802.11ac wireless, Bluetooth 5.0, BLE, Gigabit Ethernet, 2 USB 3.0 ports; 2 USB 2.0 ports, 2 x micro- HDMI® ports (up to 4kp60 supported),
- ❖ Sensor Board incorporating four toroidal optic sensor modules with an infra-red optimized housing and carbon fiber mounting plate.
- ❖ The software package includes algorithms, host processing SDK, demonstration software and visualization tools.
- ❖ Set of IR Sensors and controller board for indoor environment testing
- ❖ **SENSOR MODULE:** The sensor unit has the facility to be installed on the drone in a position providing field of view to landing beacons on the ground.
- ❖ **BEACON INSTALLATION:** The beacons are possible to be installed on the ground or a moving target, aimed upward. For full 6dof tracking, the beacons include one high powered beacon and 4 lower powered beacons. Each beacon has a unique code.
- ❖ **FIELD OF VIEW:** The sensor has a 120-degree field of view. Line of sight between sensor and beacon is required.
- ❖ **RANGE:** up to 30m in full sunlight.
- ❖ **ALGORITHM SOFTWARE:** Lightweight, capable of running on a embedded computer
- ❖ **HIGH SPEED** Tracking speeds up to 400 Hz
- ❖ **HARDWARE INTERFACE:** UDP RJ45 Connection between sensor board and embedded computer.
- ❖ **SOFTWARE INTERFACE** SDK and API should be available for data interface.

❖ **Performance Parameter**

Absolute Angular Accuracy <0.2 over 120 Degree FoV
Absolute Positional Accuracy: As low as <1cm
Repeatability2 <0.5 cm lateral, <0.1 Degree rotational
Sensitivity3 <0.2 cm lateral, <0.05 Degree rotational
Field-of-view 120 Degree x 120 Degree
Operating light levels 10 – 100,000 lux
Interface Ethernet (UDP)
Power supply from USB host (5v 200mA = 1W)
Raw measurement frequency Over 10,000 FPS Capture latency <2ms

❖ **Power Distribution Board with Power Module – 10 Nos**

❖ **Mission Planning Software for Configuration and Calibration of the Drones**
❖ **Facility to interface the GCS over a Smartphone or Computer Accessories: Lipo Battery – 20**
❖ **Nos and Charger -10 Nos,**
❖ **USB Cable – 5 Nos, Lipo Checker- 10 Nos**



WORKBENCH FOR PROGRAMMABLE NANO DRONE

SPECIFICATION

- ✖ Programmable: C++ based API structure making it extremely easy to program
- ✖ HD Camera: HD videos and photos – Capability to do ROS based image processing
- ✖ Drone weight: 65 grams
- ✖ Inbuilt Camera
- ✖ Connectivity technology: WiFi
- ✖ Material: Nylon

QAV250mm carbon fiber frame
5" propellers

- ✖ Battery: Lithium Polymer, 150 LiPo quick charge ,
Charging time: 30 – 40 minutes approx.
for a full charge, 2 Lithium Polymer batteries (included).

Modular Hardware

12 GPIO pins to add external hardware
2 DAC channels
Accessible to UART, I2C, SPI, ADC
4 extra reversible motor drivers
3V and 5V output power for hardware

- ✖ Payload: 15 gram
- ✖ Range: 50 - 70 m
- ✖ Flight Time: 7+ Min
- ✖ Speed: up to 7 m/sec
- ✖ Two high-speed motors for more thrust, extra maneuverability and sharper turns
- ✖ Microcontroller: STM32F303, 256kb
- ✖ Camera: Photo, Video@720p
- ✖ Motor Driver: 4 MOSFET (unidirectional) & 4 H-Bridge drives (Bidirectional)
- ✖ Propulsion: Brushed coreless DC motors
- ✖ Gyro accelerometer to prevent nosedives and reduce choppiness.
- ✖ Accessories: All accessories are provided with the kit for its full feature functioning



Set up is provided with work table as per below specifications:

- ✖ Working bench of dimension (LxWxH): 4 x 2.5 x 3 (ft.) approx..
- ✖ Base structure made with 38X38X1.5 mm CRC Epoxy coated pipes and top made of 19mm thick plywood with edge bidding.
- ✖ MS drawers 03 numbers with handle & lock on drawer.
- ✖ Two Pole MCB (16A Good quality ISI mark) to be provided for safety of work table.
- ✖ Workbench is provided with Anti-static mat, castor wheel and multiple sockets/ Switches for external use

APPLICATION BASED MICRO & SMALL DRONES



Drone Category as per DGCA	Micro & Small
Type	Quadcopter / Hexacopter
All up weight	< 2 Kg / 5Kg /10Kg/20Kg/25Kg
Endurance	14 min to 40 min
Speed	7m/s and above
Flight Altitude	5 m to 500m AGL as per application
Communication Range	1Km to 2 Km as per application
Obstacle Avoidance	Omni-directional obstacle detection & avoidance
Wind Resistance	10m/s

- Flight modes
 - Fully Automated from take-off to landing
 - Automated waypoint navigation (pre-defined as well as dynamically adjustable way points during flight)

Computing Hardware

- Compact handheld controller with joysticks and screen for complete GCS operation including map display and real time video display

GCS Software Characteristics

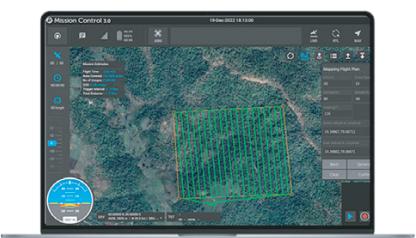
- Geographic Map display along with UAV location, UAV trajectory, waypoints & flight plan
- Real-time video from the UAV with on-screen display of important parameter

Failsafe features

- Return to Home on communication failure
- Return to Home on low battery
- Return to Home on High Winds
- Dual GNSS receivers onboard for redundancy.

Payloads

- Spraying System (upto 10 Litres)
- 10X Optical Zoom Daytime Camera
- Thermal Infrared Camera



Applications

- Surveillance
- Photography
- Agriculture
- Mapping & Survey



MODEL DT-SIM: DRONE SIMULATOR TRAINING SYSTEM

Suitable for Learn to fly and practice new maneuvers with the intuitive simulator.

Features : Game-like challenges that make flight training fun and interactive.

Software and Controller. Compatible with windows 7/8/10. & VR compatible 75 or more flying sites to give training in maximum types of environments. 18 or more types of drones Ability to edit and custom import aircrafts into software

Controller specifications – 15 channels USB plug for PC compatibility Toggle switch for 4 different types of flight operating modes Gimbals with adjustable spring and throttle tension



MODEL DT-FRK: DRONE'S FIELD REPAIR KIT

Drone Field Repair Kit includes drone-specific tools and items necessary to repair simple issues swiftly and with ease.

Items included in the Drone Field Repair Kit are:

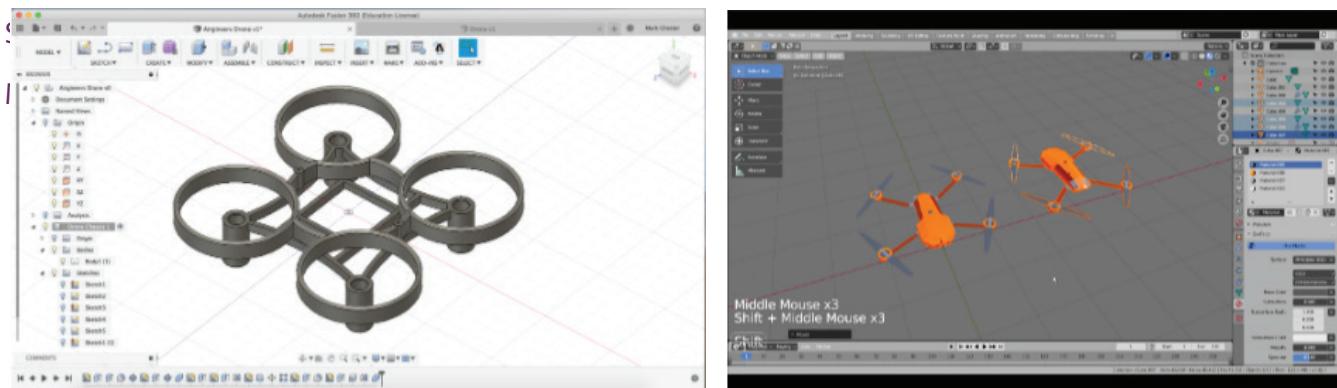
- ✖ ALLEN KEY SET – 1 No
- ✖ SCISSORS – 1 No
- ✖ SOLDERING IRON – 3 Nos
- ✖ DE-SOLDERING PUMP – 3 Nos
- ✖ SOLDER WIRE – 500 gm
- ✖ FLUX Box – 3 Nos
- ✖ 3M DOUBLE TAPE – 3 Nos
- ✖ CABLE WIRES (28 AWG) – 3 meter
- ✖ XT60 Connectors (Male and Female) – 20 Nos
- ✖ Heat sink – 50 Nos

DRONE PROTOTYPING STATION

This Training Station enables the students to design and prototype the Frames and Propellers used in Drones

SPECIFICATION

Modeling Software :



Flexible 3D modeling and design: Use Solid, Surface, Mesh Modeling.

Interactive assemblies: Detailed visualizations of complex products with exploded views and animations.

Design Workspace: Creates Mechanical designs for prismatic geometry to create solid bodies

Render Workspace: Photo-realistic rendering and documentation: Annotate dimension and document models with real-life rendering technology.

Integrated CAD and CAM

3D Printer :

Built Volume : L:250mm X W: 250mm X H: 300mm

Nozzle Temperature : 290 C , Printing Speed: 80mm/sec

Connectivity : USB Drive, WiFi, LAN, Bed calibration

Sensor : Yes

Material Compatibility : PLA + , ABS +, PETG
PC, Carbon Fiber

Print Head : Direct Drive Extruder with Swapable
Nozzles Screen

User Interface : Full Colour TFT with Touch

Layer Thickness : 0.12 -0.6 mm,

Power requirements : 1000W



KEY BENEFITS OF A WELL DESIGNED DRONE LABORATORY

- ❖ Hands on Training
- ❖ Safety and Risk Management
- ❖ Industry Relevant Skills

JOB OPPORTUNITIES AS

Drone Pilot / Operator



Drone Technician/ Maintenance



Drone Software Developer



Drone Data Analyst



Drone Entrepreneur



OUR PRODUCTS

- ❖ FIBER OPTIC NETWORK
- ❖ COMPUTER NETWORKS
- ❖ ANALOG & DIGITAL COMMUNICATION

- ❖ IoT and WIRELESS COMMUNICATION
- ❖ RF/MICROWAVE/ ANTENNA
- ❖ TEST & MEASURING INSTRUMENTS



FIBER OPTIC NETWORK



COMPUTER NETWORKS



ANALOG & DIGITAL COMMUNICATION



IoT and WIRELESS
COMMUNICATION



RF/MICROWAVE/ ANTENNA



TEST & MEASURING
INSTRUMENTS

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