The Star

Engineering drones for Society 5.0

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Innovation in the skies: Imagination soars when you start to engage with drones.

Society 5.0, also known as the Super Smart Society, promotes the use of emerging technologies in our daily lives.

The utilisation of unmanned aerial vehicles (UAVs), typically known as drones, marks an evolution in digital applications that permeates various sectors of the economy, including security surveillance, agriculture, infrastructure, entertainment and transport deliveries.

The drone market in Malaysia is projected to grow by 7.57% from 2024 to 2029, resulting in a market volume of US$14.2mil (RM61.6mil) in 2029.
Internationally, it is expected that there will be some 2.1 million drone users by 2029. User penetration is projected to be 4.2% this year and is expected to hit 5.9% by 2029. The average revenue per user is expected to amount to US$2.14mil (RM9.3mil), as reported by Statistica.com.

With the benefits observed in the Fourth Industrial Revolution, learning about drones should be a requirement in schools and universities, as it is evident that this technology will play a role in every aspect of our lives.

It is pivotal that education on drone design, construction, flight and integration begins with an understanding of regulatory standards, design requirements, hardware, and the integration of electronics and software for navigation, controls and security.

Standards and regulations

There are three categories of drones in Malaysia: small unmanned aircraft systems, small unmanned surveillance aircraft, and unmanned aircraft systems.

The Civil Aviation Authority of Malaysia regulates drone applications, while the Standards and Industrial Research Institute of Malaysia ensures safety standards for electronic equipment.

The Malaysian Communications and Multimedia Commission oversees allocated frequency and payload links, and the Department of Survey and Mapping Malaysia handles surveillance and measurement activities.

Teaching and learning

The best way to learn about drones is by building one. This process starts with understanding why a UAV system is needed and having knowledge of airframes, aerodynamics and propulsion power.

The use of three-dimensional printing technology to build frames and hardware platforms based on microcontrollers and microprocessors is recommended.

To ensure flight safety, incorporating sensory technology and camera imagery for precise navigation in unknown environments is important.

Lessons should also cover the evolution of lithium polymer batteries, which provide higher energy density and longer flights.

Drone intelligence

Intelligence is a big part of the innovation process for drone development. An intelligent drone, enhanced with machine learning and artificial intelligence, can have a tremendous impact.

Computer vision for image processing and object detection enables real-time obstacle avoidance, terrain mapping and target tracking.

Reinforcement learning allows autonomous drones to learn optimal flight paths through trial and error.

Deep learning models are explored for advanced tasks such as semantic segmentation and object recognition.

Sustainable solutions

Imagination soars when you start to engage with drones. A well-designed drone course offers practical exposure to technology and deepens understanding of science, technology, engineering and mathematics disciplines.

Students learn engineering and software programming through a hands-on and entertaining approach, interacting with drones to enhance their critical thinking and problem-solving skills.

From the perspective of the United Nations Sustainable Development Goals, drones with sensors can autonomously monitor environmental parameters such as air and water quality.

Automated data analysis enables the early detection of environmental changes or anomalies, contributing to proactive conservation efforts.

Furthermore, rapid logistics have become crucial, especially in the healthcare sector. Delivery drones can dynamically alter their routes based on real-time traffic patterns, weather changes or unexpected hindrances. This ensures timely and safe deliveries, even in unpredictable scenarios.

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