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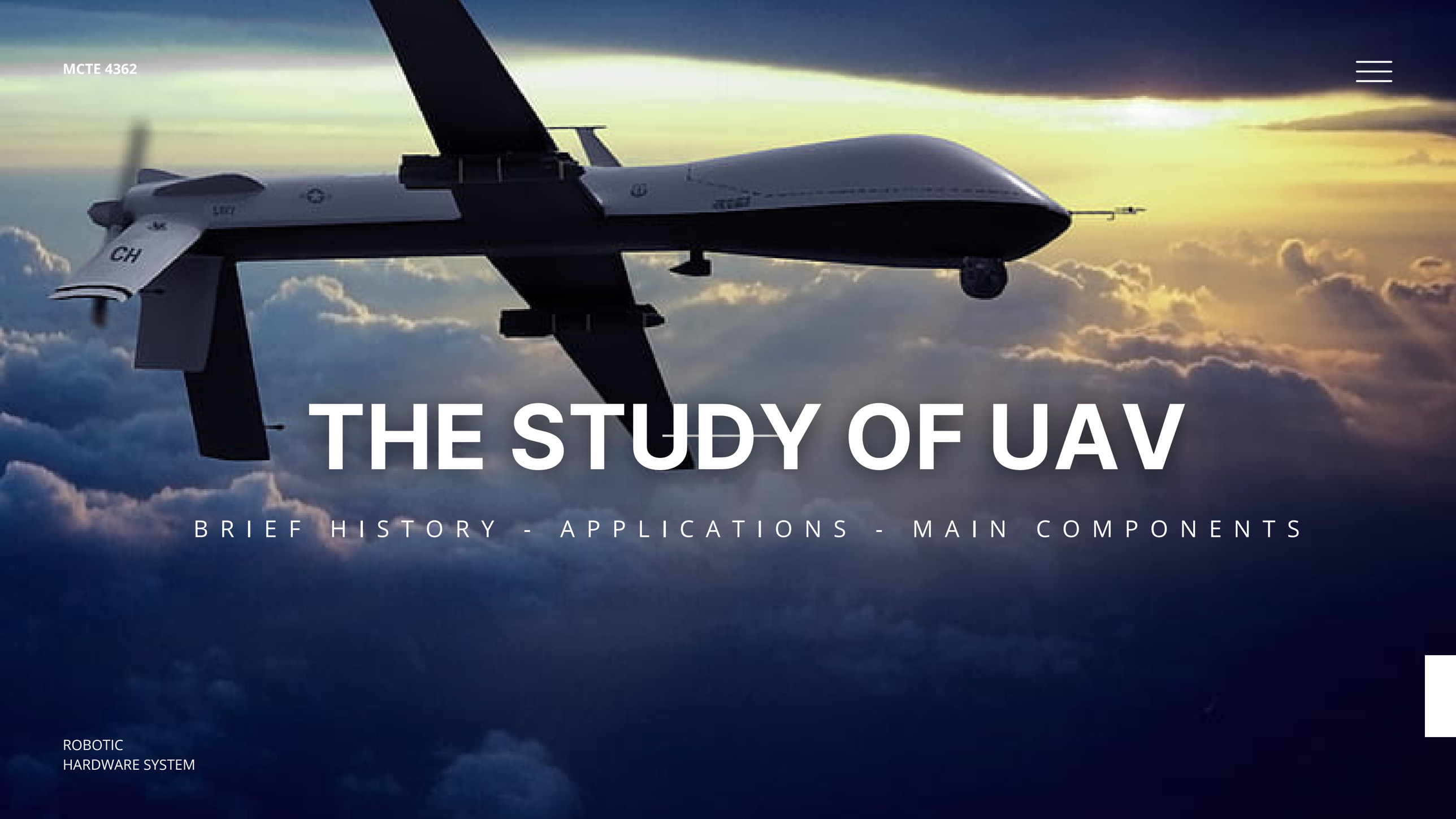


THE STUDY OF UAV

BRIEF HISTORY - APPLICATIONS - MAIN COMPONENTS

ROBOTIC
HARDWARE SYSTEM

WHAT IS UAV?

UAV stands for Unmanned Aerial Vehicle, which is an aircraft that operates without a human pilot on board. Instead, it is controlled either autonomously by onboard computers or by a remote operator on the ground. UAVs are commonly used for a variety of purposes, including military reconnaissance, surveillance, and targeted strikes; commercial applications such as photography, mapping, and inspection of infrastructure; and scientific research, among others. UAVs can range from small quadcopters to large, sophisticated drones with advanced sensors and long-range capabilities

BRIEF HISTORY OF ROV

Unmanned aerial vehicles (UAVs), also known as drones, have a history that goes back to the early 20th century. The first UAVs were developed as early as 1917 by the US Army, which used them for target practice. During World War II, both the US and the Germans used UAVs as reconnaissance vehicles. In the 1950s and 1960s, UAV technology advanced rapidly, and the US Air Force began using them for surveillance and reconnaissance purposes. These early UAVs were primarily used for intelligence gathering, and they were flown remotely by ground-based operators.

In the 1970s, UAV technology began to evolve into more sophisticated systems capable of carrying out a wider range of missions. The US military began using UAVs for reconnaissance and surveillance, as well as for gathering data on weather patterns and other environmental factors.
In the 1990s, UAVs began to be used more widely for military purposes, including as weapons platforms. The US military began deploying UAVs in combat zones, using them to gather intelligence, conduct surveillance, and carry out precision strikes against enemy targets.

In recent years, UAV technology has advanced even further, with the development of smaller, lighter, and more sophisticated drones that can be used for a wide range of civilian and commercial applications, such as mapping, surveying, search and rescue, and agriculture.

APPLICATIONS OF ROV

AERIAL PHOTOGRAPHY AND VIDEOGRAPHY

UAVs equipped with high-resolution cameras are used for aerial photography and videography. They are used in filmmaking, real estate, tourism, and surveying.

AGRICULTURE

UAVs are used for precision agriculture. They can be used to monitor crop health, detect pests and diseases, and optimize irrigation

SEARCH AND RESCUE

UAVs equipped with thermal cameras and other sensors are used in search and rescue operations. They can cover large areas quickly and provide real-time data to rescue teams.

APPLICATIONS OF ROV

INSPECTION

UAVs are used for inspection of power lines, wind turbines, and pipelines. They can access hard-to-reach areas and provide high-resolution images for analysis.

CONSTRUCTION

UAVs are used for surveying and mapping of construction sites. They can provide accurate measurements and 3D models of construction sites.

DELIVERY

UAVs are used for delivery of small packages in urban areas. Companies like Amazon and UPS are testing UAVs for delivery.

APPLICATIONS OF ROV

MILITARY AND DEFENSE:

UAVs are used for military and defense purposes, including intelligence gathering, surveillance, and precision strikes.

ENVIRONMENTAL MONITORING

UAVs are used for environmental monitoring, such as monitoring wildlife, mapping forests, and tracking changes in the environment.

ENTERTAINMENT

UAVs are used for entertainment purposes, such as light shows and aerial displays.

Entertainment

MAIN COMPONENTS OF UAV

FRAME

TWO MAIN TYPES OF UAV'S FRAME

FIXED WING UAV

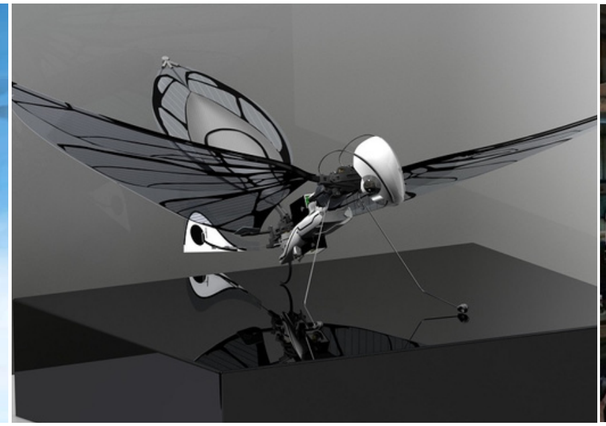
ROTATORY WIGS UAV

FRAME

OTHER TYPES OF UAV'S FRAME

MULTIROTOTR UAV

HYBRID UAV



FLAPPY WING UAV

BALLOON AND AIRSHIP UAV

PROPULSION SYSTEM

Unmanned Aerial Vehicles (UAVs) use a variety of propulsion systems depending on their size, mission, and range requirements. Here are some of the most common propulsion systems used in UAVs:

Electric Motors
Often use for small UAV as the motor have good power to weight ratio making them efficient to use.

Gasoline
Use in large UAV as it provides more power for long duration flight times however it is heavier and less efficient.

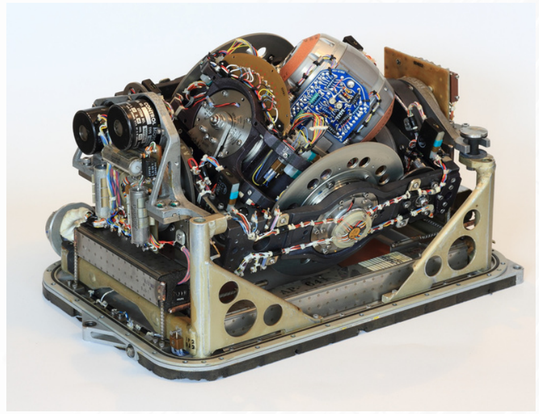
Jet Engine
Equipped in high performances drones such as military drones for high speed and power. Nevertheless it is loud and consume a lot of fuel.

Hybrid System
This power systems equipped to have both advantages of electric motors and gasoline egines. Usually use for high endurance and speed.

NAVIGATION & CONTROL SYSTEM

The navigation and control system of a UAV are critical for its safe and effective operation. Here are some of the common components of a UAV's navigation and control system:

Global Navigation Satellite System (GNSS)
GNSS is a positioning system that uses a network of satellites to provide accurate location information to the UAV.



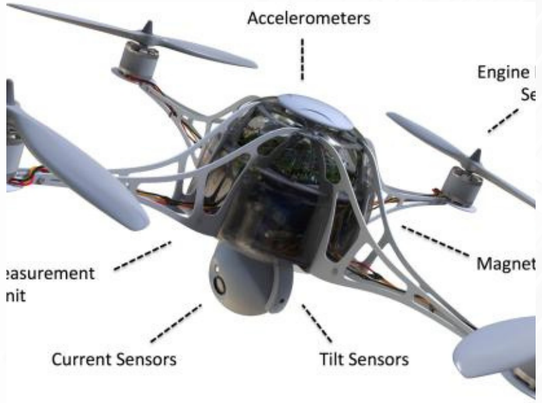
Inertial Navigation System (INS):
INS uses accelerometers and gyroscopes to measure the UAV's velocity, acceleration, and orientation. This data is combined with GNSS data to provide precise position information.

Autopilot
An autopilot system controls the UAV's flight path based on inputs from the navigation system. It can also stabilize the aircraft and control its altitude, speed, and heading.

NAVIGATION & CONTROL SYSTEM

The navigation and control system of a UAV are critical for its safe and effective operation. Here are some of the common components of a UAV's navigation and control system:

Ground Control Station (GCS)
The GCS is the operator's interface with the UAV. It displays information about the UAV's flight, allows the operator to input commands, and provides a communication link between the UAV and operator.



Sensors
The UAV may also have additional sensors, such as cameras or LiDAR, for specific mission requirements.

Flight Control Computer
The flight control computer processes data from the navigation system and autopilot to control the UAV's flight. It also provides information to the operator, such as altitude, speed, and location.

DATA COLLECTION OF ROV

Unmanned Aerial Vehicles (UAVs) can collect a wide variety of data depending on their sensors and payloads.

DATA TYPE COLLECTED

- **Imagery: U**AVs can capture high-resolution still images and video footage using cameras mounted on the aircraft. This imagery can be used for mapping, monitoring, and surveillance.
- **LiDAR data:** LiDAR (Light Detection and Ranging) sensors can be mounted on UAVs to collect 3D data about the environment. This data can be used for creating digital elevation models, topographical maps, and identifying surface features.
- **Thermal data:** UAVs can be equipped with thermal cameras to collect thermal data. This data can be used for detecting temperature anomalies, identifying areas of heat loss or gain, and tracking wildlife.
- **Atmospheric data:** UAVs can be equipped with sensors to measure temperature, humidity, air pressure, and other atmospheric data. This data can be used for weather monitoring and forecasting.
- **Gas and chemical data:** UAVs can be equipped with sensors to detect and measure gases and chemicals in the environment. This data can be used for air quality monitoring and detecting hazardous materials.
- **Radio frequency data:** UAVs can be used for radio frequency (RF) spectrum analysis to detect and identify sources of RF interference.

DATA TRANSMISSION

Unmanned Aerial Vehicles (UAVs) need to communicate with a ground control station (GCS) to transmit data and receive commands. The choice of communication method for a UAV depends on the range, bandwidth, and security requirements of the mission. UAVs may use one or multiple communication methods depending on the operational needs.

Radio Communication

Most UAVs use radio communication to transmit data and receive commands from the GCS. The radio system can operate on different frequencies, depending on the range and bandwidth requirements. Some UAVs may also use encrypted communication for security purposes.

Satellite Commucnication

Some UAVs use satellite communication for beyond-line-of-sight operations. This method allows the UAV to operate in remote areas and over long distances.

Cellular Commucnication

Some UAVs can use cellular networks to transmit data and receive commands. This method is limited by the range of cellular networks but can be useful in urban areas with good network coverage.

DATA TRANSMISSION

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Wi-Fi and Bluetooth Communication

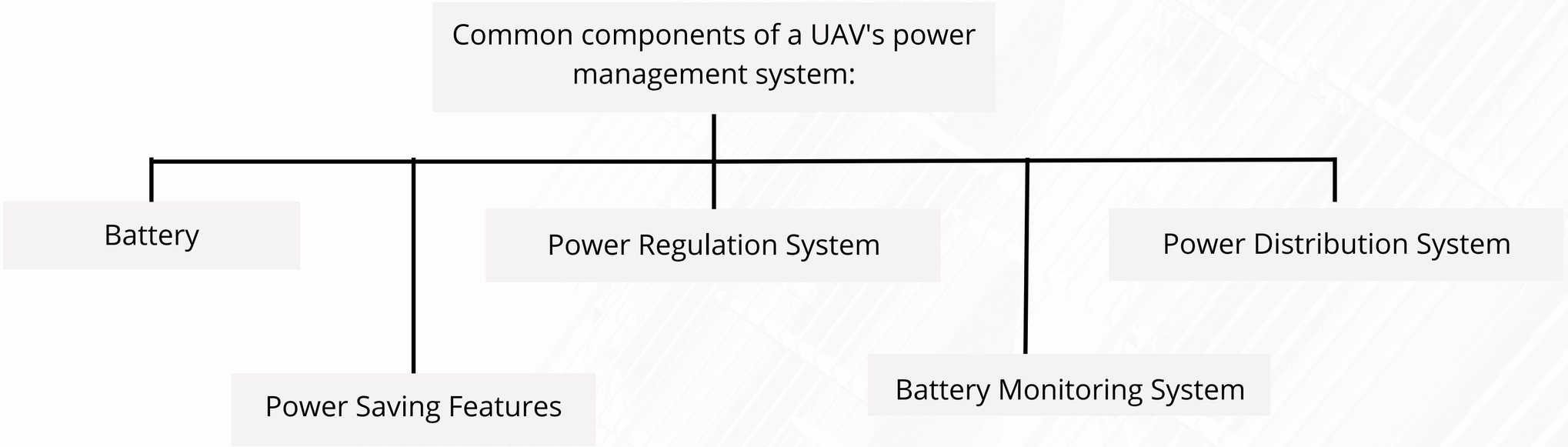
Some UAVs use Wi-Fi or Bluetooth communication for short-range operations. This method can be useful for indoor operations and when the UAV is in close proximity to the GCS.

Optical Communication

Some high-altitude UAVs use optical communication to transmit data at high speeds. This method uses laser beams to transmit data and requires a clear line of sight between the UAV and the ground.

POWER MANAGEMENT

The power management system of a UAV must be designed to provide reliable and efficient power to the components of the UAV while maximizing flight time and range. It must also be designed with safety in mind, to prevent damage to the UAV and ensure safe operation.



THANK YOU

'The sky is honestly the limit, so I'm excited to see what the future holds' Carmella

ROBOTIC
HARDWARE SYSTEM