

each of the plurality of switches, a dedicated switch controller configured to control states of at least one of the plurality of switches based on the sensor feedback. In addition or alternatively, the plurality of switches includes at least one transistor switch.

SUMMARY OF INVENTION

[0004a] According to an aspect of the present invention, there is provide an aerial vehicle comprising:

- a control unit configured to send control signals in order to control flight of the aerial vehicle;

- a plurality of propulsion units configured to control attitude of the aerial vehicle;

- a plurality of propulsion controllers configured to send commands to a corresponding propulsion unit of the plurality of propulsion units based on the control signals such that there is one propulsion controller of the plurality of propulsion controllers for each propulsion unit of the plurality of propulsion units; and

- a plurality of inertial measurement units (IMU), each IMU of the plurality of IMUs being configured to provide attitude information to a corresponding one of the plurality of propulsion controllers such that there is one IMU of the plurality of IMUs for each of the plurality of propulsion controllers, wherein when there is a failure at the control unit, each of the plurality of propulsion controllers are configured to automatically generate the commands and control the plurality of propulsion units in order to attempt to stabilize the aerial vehicle.

BRIEF DESCRIPTION OF THE DRAWINGS

[0005] FIGURES 1A-1E are examples of UAVs in accordance with aspects of the present disclosure.

[0006] FIGURE 2 is an example functional diagram of a UAV in accordance with aspects of the disclosure.

[0007] FIGURE 3 is an example functional diagram in accordance with aspects of the disclosure.

[0008] FIGURES 4A-4C is an example functional diagram in accordance with aspects of the disclosure.

[0009] FIGURE 5 is an example flow diagram in accordance with aspects of the disclosure.

[0010] FIGURE 6 is another example flow diagram in accordance with aspects of the disclosure.

DETAILED DESCRIPTION

[0011] The technology relates to decentralized control and battery systems for aerial vehicles and in particular, unmanned aerial vehicles (UAVs). In order to mitigate potential dangerous situations caused by failures at a centralized control system, the control system may be reconfigured to a decentralized configuration. For instance, the IMU may be moved from the center of the UAV and replicated it at each of the propulsion or speed controllers, so if the control unit, one or more IMU, or any parts of the control system fail, the UAV will not drastically shut down. Rather, this new configuration may allow the UAV to follow a more gradual descent.

[0012] For instance, each propulsion or speed controller may be an electronic speed control (ESC) or any type of controller that controls speed electronically including electromechanical speed controllers. Each propulsion controller may have a corresponding IMU. Ideally, each IMU may be arranged in the same plane as or parallel to a motor of the propulsion unit controlled by the propulsion controller for its corresponding IMU. As such, the IMU may provide pitch, yaw and roll information, which may be used to calculate the attitude of the IMU. This information may then be provided to the corresponding propulsion controller. As such, each propulsion controller is “aware” of the attitude of its corresponding propulsion unit (or rather motor of the corresponding propulsion unit) and can use this information when controlling the propulsion units. Of course, the number and exact placement of each IMU and each propulsion controller may be different for different physical configurations of UAV.

[0013] The UAV may still be subject to failures. These failures may be arranged in a failure table which identifies certain incoming signals as a failure. Such tables may be stored locally at each propulsion controller for reliable and efficient retrieval and comparison of incoming signals. Once a failure is identified, the propulsion controllers may be able to automatically stabilize the aircraft. For instance, using the information of the corresponding IMU, an propulsion controller may control its corresponding propulsion unit in order to stabilize the UAV or move the UAV to a particular attitude. At the same time, the other propulsion controllers may use the corresponding IMUs to attempt to achieve the same result.