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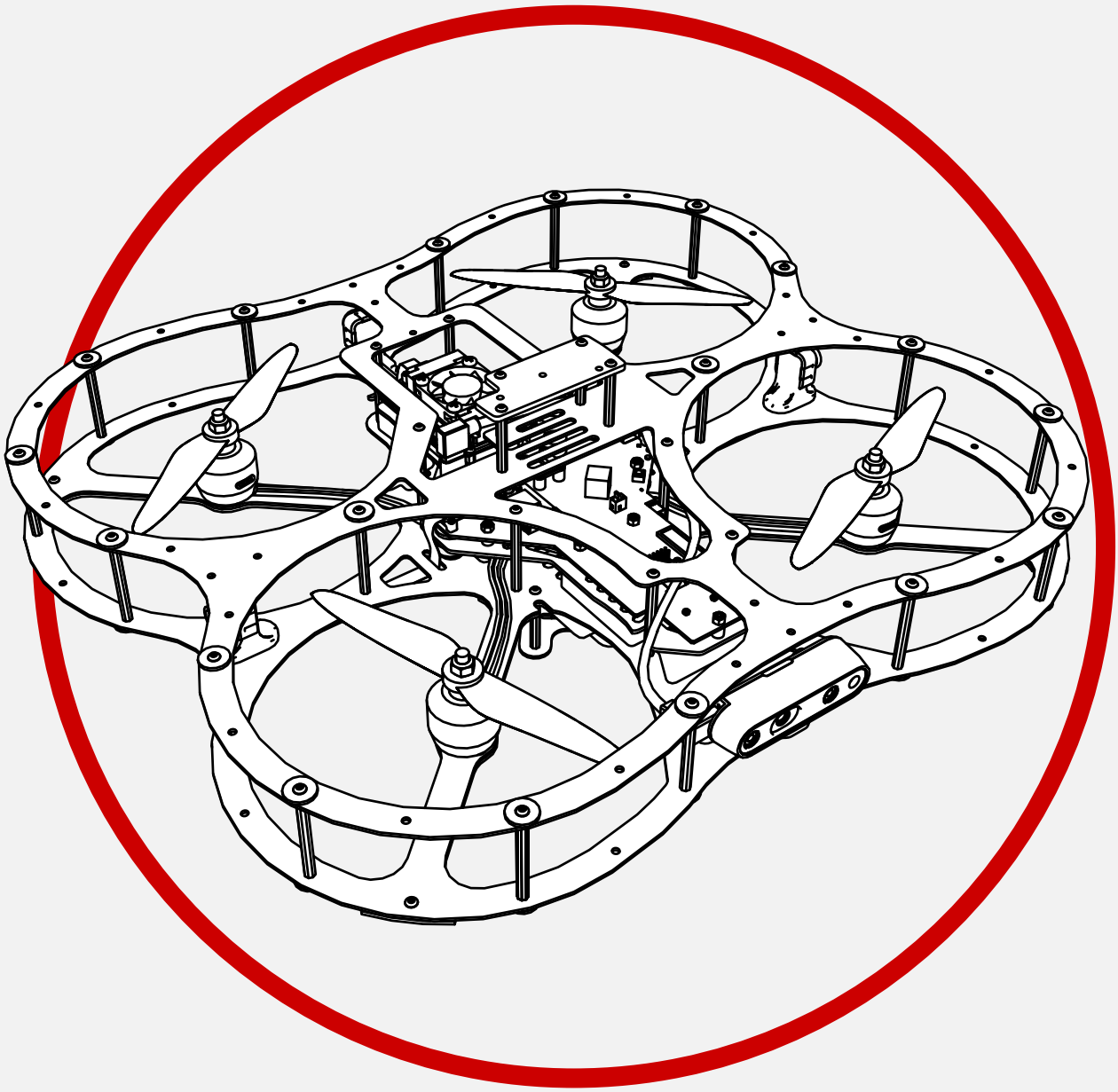

Autonomous Vehicles Research Studio

Setup Guide – QDrone 2 Batteries

v 2.0 – 18*th April* 2023

For more information on the solutions Quanser offers,
please visit the web site at: http://www.quanser.com

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Caution

This equipment is designed to be used for educational and research purposes and is not intended for use by the public. The user is responsible for ensuring that the equipment will be used by technically qualified personnel only. **NOTE:** While the GPIO, and USB ports provides connections for external user devices, users are responsible for certifying any modifications or additions they make to the default configuration.

FCC Notice This device complies with Part 15 of the FCC rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.
Note: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.
Contains FCC ID: SQG-60SIPT

Industry Canada Notice This Class A digital apparatus complies with CAN ICES-3 (A). Cet appareil numérique de la classe A est conforme à la norme NMB-3 (A) du Canada.
Contains IC: ST60-2230C-PU

Waste Electrical and Electronic Equipment (WEEE)

This symbol indicates that waste products must be disposed of separately from municipal household waste, according to Directive 012/19/EU of the European Parliament and the Council on waste electrical and electronic equipment (WEEE). All products at the end of their life cycle must be sent to a WEEE collection and recycling center. Proper WEEE disposal reduces the environmental impact and the risk to human health due to potentially hazardous substances used in such equipment. Your cooperation in proper WEEE disposal will contribute to the effective usage of natural resources.

CE Compliance CE

This product meets the essential requirements of applicable European Directives as follows:

- 2014/35/EU; Low-Voltage Directive (safety)
- 2014/30/EU; Electromagnetic Compatibility Directive (EMC)
- 2014/53/EU; Radio Equipment Directive (RED)

Warning: This is a Class A product. In a domestic environment this product may cause radio interference, in which case the user may be required to take adequate measures.

Caution

During flight QDrone 2 sound pressure level has been measured at 92 dBA at 1m away from the QDrone 2 and it is considered hazardous. Users shall ensure that they are not exposed to a sound level greater than the hazardous level as defined by the local authority. Use protective earpieces during operation.

Caution

The Intel RealSense D435 RGB-D camera is classified as a Class 1 Laser Product under the IEC 60825-1, Edition 3 (2014) internationally and EN 60825-1:2014+A11:2021 in Europe. The camera complies with FDA performance standards for laser products except for conformance with IEC 60825-1 Ed. 3 as described in Laser Notice No. 56, dated May 8, 2019.
Do not power on the product if any external damage is observed. Do not open or modify any portion of any laser product as it may cause the emissions to exceed Class 1. Invisible laser radiation when opened. Do not look directly at the transmitting laser through optical instruments such as a magnifying glass or microscope. Do not update laser product firmware unless instructed by Quanser.

Regular maintenance of QDrone 2:

- Inspect the propellers before flight to confirm they are not damaged or loose (able to move while the motor is not moving).
- Prior to using the QDrone 2, visually inspect the LiPo battery for damage (e.g., bloating). **DO NOT USE** the battery if damaged.
- Ensure that the battery and its cables are secured using the provided straps to avoid movement or damage during flight.
- Inspect the QDrone 2 frame before and after each flight to confirm that no major structural damage exists. Repair if needed.

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A. LiPo Battery Safety

Caution: Before using any batteries, chargers/balancers, or power supplies, users must first read the manuals packaged with their equipment. Quanser supplies these guidelines for charging batteries, but it is the users' responsibility to ensure they are operating their equipment safely and correctly. Quanser is not responsible for any damages resulting from use of batteries, power supplies, chargers, or balancers.

Caution: Prior to using the QDrone 2, visually check the battery for bloating or damage. If the battery exhibits bloating **DO NOT USE** it. Visual bloating of the battery is dangerous - discard it in accordance with your country's relevant recycling and disposal laws.

Note: Use and store batteries in a dry environment.

Caution: Do not charge the battery under direct sunlight.

Caution: Do not charge the battery when the battery feels hot.

Caution: Always be present when charging batteries and **do not leave batteries connected to the chargers or the QDrone 2 overnight**.

Caution: Charge and store LiPo batteries in a location where a battery fire or explosion (including smoke hazard) will not endanger life or property.

Caution: Keep LiPo batteries away from children and animals.

Caution: Never charge a LiPo battery that has ballooned or swollen due to overcharging, undercharging or from a crash.

Caution: Never charge a LiPo battery that has been punctured or damaged in a crash. After a crash, inspect the battery pack for signs of damage.

Caution: Never charge the LiPo battery in a moving vehicle.

Caution: Never overcharge the LiPo battery.

⚠ **Caution**: Never leave the LiPo battery unattended during recharging.

⚠ **Caution**: Do not charge LiPo batteries near flammable materials, liquids or objects.

⚠ **Caution**: Ensure that charging leads are connected correctly. Reversing polarity charging can lead to battery damage, fire or explosion.

⚠ **Caution**: A LiPo battery fire is a chemical fire. Have a suitable fire extinguisher (class D/for electrical fires) or a large bucket of dry sand near the charging area. Do not try to extinguish electrical battery fires with water.

⚠ **Caution**: Reduce risks from fire/explosion by storing and charging LiPo batteries inside a suitable container: a LiPo storage sack/bag or metal/ceramic container is advised.

⚠ **Caution**: Protect your LiPo batteries from accidental damage during storage and transportation. Do not put battery packs in pockets or bags where they can short circuit or come into contact with sharp or metallic objects.

⚠ **Caution**: If your LiPo battery is subjected to a shock (such as a crash) you should place it in a metal container and observe signs of swelling or heating for at least 30 minutes.

Ensure that the metal container doesn't short the leads of the battery, which may cause a fire!

⚠ **Caution**: Do NOT attempt to disassemble, modify, or repair the LiPo battery.

⚠ **Caution**: Never use a battery that is warm from charging or charge a battery that is warm from usage.

Note: Consider how you would deal with a LiPo battery fire/explosion as part of your normal fire safety and evacuation planning.

Note: When discarding a LiPo battery, discard it in accordance with your country's relevant recycling and disposal laws.

Note: Monitor charging LiPo batteries for signs of overheating.

B. QDrone 2 Batteries

QDrone 2 is powered using a single pack Lithium-Polymer (LiPo) 4S 3700mAh battery (Figure 1a). For safety, these batteries are shipped uncharged and must be charged prior to first use. Check the voltage of the supplied batteries using the RC battery voltage tester provided (Figure 1b). **Note that the connection starts on the left most pin of the tester with the black (ground) cables and the red cable goes to the right.**

For the supplied batteries the safe operating ranges are between 14.0 V and 16.8V, with the latter being the maximum voltage. If the battery's voltage is below 16V, it must be charged prior to use with the QDrone 2.

a. LiPo 4s 3700mAh with balancer cable (5 wire connector) and XT60 female connector (2 wire connector)

b. RC battery voltage tester

Figure 1: Battery voltage testing and connection in QDrone 2

Caution: A battery voltage below 13.3V increases the risk of uneven charge between the three cells. If you experience issues charging a battery that is consistently below 13.3V, discard it in accordance with your country's relevant recycling and disposal laws.

C. Charging the QDrone 2 Batteries

1. Power the battery charger/balancer (Figure 2a) with the supplied power supply (Figure 2b).
2. Connect the 5-pin battery balancer cable to the 5 pin connector for the battery charger (Figure 2c).
3. The top LEDs on the EV-Peak charger will indicate the status of the battery from low to full charge.

a. charger / balancer

b. charger/balancer power supply cable

c. QDrone 2 connection to charger

Figure 2: Wiring and using the RC battery charger/balancer

Note: When the charger/balancer beeps continuously, or the status on the charger stopped flashing at 100%, the battery is fully charged.

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