Version 1

**PFL UGV Operator Manual 2023**

A logo of a drone

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**Introduction**  
Thank you for choosing the PFL UGV for your autonomous vehicle research and development needs. The safety of our operators and research staff is our top priority. Please take the time to thoroughly read and understand this entire manual before operating the vehicle.

**Description**  
The PFL UGV is an all-electric, battery-powered unmanned ground vehicle built for off-road use on level surfaces. It has a skeleton frame construction with adjustable suspension and 12-inch wheels. Maximum load capacity is 300kg including passengers, cargo, batteries and all other components. The lithium-ion battery pack provides up to 4 hours of operating time on a single charge above 50%. Maximum speed is 40km/h.

**Operator Training & Certification**  
Only operators who have completed the mandatory PFL UGV training course and received certification are authorized to operate this vehicle. Recertification is required annually. The certificate must be carried at all times during vehicle operation and shown upon request. No unauthorized or untrained personnel are permitted to operate or ride as a passenger.

**Pre-Operation Inspection**  
Before each use, perform a full inspection of the vehicle and documentation. Check for any leaks, damage or loose/missing components. Inspect brakes, steering and suspension for proper function. Ensure batteries are fully charged. Verify all fluids are at proper levels. Inspect tires for wear and inflation. Check and secure all loads for safe transport.

**Starting Procedures**

1. Turn on battery power switch located on main, remove EStop.
2. Check instrument cluster for system status and warnings.
3. Check brake fluid
4. Turn key to on power position
5. Calibrate brake pedal
6. Test steering, brakes, and throttle before departing.
7. Push-back from makerspace garage door, then power on

**Operation**

* Yield right of way always.
* Steer clear of pedestrians, and slow down when passing.
* Scan constantly for hazards or obstacles and adjust speed accordingly.
* Announce and use approved hand signals before turns or stops.
* Do not exceed 25kph on wet or uneven surfaces. Slow and brake smoothly.
* Come to a complete stop before allowing passengers to access the vehicle.
* Always hold down brake when vehicle is at rest or engage parking break

**Loading & Transporting**

**Cargo Area**  
The rear cargo bed has a maximum weight limit of 150lbs (68kg) securely tied down. Do not exceed this limit. Ensure all cargo is balanced and will not shift during transport. Passengers must remain properly seated during transport and are prohibited from accessing the cargo area while the vehicle is in motion.

**Passenger Safety**  
A maximum of 2 passengers are permitted if accompanied by the certified operator. Passengers must remain seated with legs inside the vehicle frame and hold on tightly at all times. No standing, horseplay or sudden movements are allowed. Remove helmets before exiting the vehicle.

**Shutdown & Storage**

1. Bring vehicle to a complete stop on level ground outside makerspace.
2. Disembark, and roll vehicle inside makerspace
3. Engage parking brake and turn off vehicle power.
4. Place chalks under front tires, front and back
5. Inspect vehicle for debris, leaks or damage before storing.
6. Store vehicle in secured indoor location above 50% battery charge.

**Batteries & Electrical Systems**

* Do not open battery enclosures or touch any exposed wires or connectors. High voltages can cause electric shock or fire.
* Inspect battery terminals regularly for corrosion and tighten as needed.
* If vehicle will not be used for an extended period, remove battery packs and store separately in a cool, dry location.
* Do not modify electrical components or installations

**Emergency Protocols:**

**Indoor Fire:**

* Stop vehicle motion immediately and shut down all electronics/power.
* Instruct all passengers to calmly evacuate the area. Do not run.
* Locate the onboard fire extinguisher (under driver seat) and pull pin.
* Aim nozzle at base of flames and squeeze lever, sweep side to side.
* Use a smothering motion from a safe distance of 10 feet or more.

**Outdoor Fire:**

* Stop vehicle and evacuate passengers safely upwind to a distance of at least 50 feet.
* One operator should remain with fire extinguisher while others clear area.
* Approach fire from the downwind side for best visibility and aim.
* Discharge extinguisher using the P.A.S.S. method - Pull, Aim, Squeeze, Sweep.
* Move around fire for complete coverage and watch for rekindling.
* If fire grows or changes direction, evacuate immediately and call for help.

**Collision Emergencies**

Pre-Collision Procedures:

* Brake firmly and steer to avoid impact if possible. Warn passengers.
* If collision is unavoidable, steer to lightly hit any object at an angle from the side.
* Slow as much as safely possible and brace for impact. Hold on tight.

