provides the energy required for the launch sequence. The flywheel is spun up by a small electric motor that is powered by a generator, and an electric clutch engages the flywheel when the launch cycle is initiated. The flywheel drives a cable drum that wraps cable around the drum during the launch sequence. One of the disadvantages with this launcher is that the flywheel may take several minutes to come up to launch speed. Another disadvantage is the requirement of a generator as a power source, which can add a great deal of weight to the system.

BRIEF SUMMARY

[0014] Improvements to UAV launching systems are thus desirable. In particular, improvements that eliminate the use of hydraulic fluid and compressed nitrogen or air are desirable. Improvements that eliminate the use of a flywheel to provide energy for a launch sequence are desirable. Systems that are lighter, more reliable, allow more control of g-load, that do not threaten leaks, that do not take several minutes to launch, and that do not take several minutes to re-set are desirable.

[0014a] According to an aspect, there is a launching system for an unmanned aerial vehicle, comprising:

(a) a launcher rail;

(b) a shuttle configured to travel along the launcher rail;

(c) a drive mechanism for moving the shuttle along the launcher rail, the drive mechanism comprising (i) a length of tape running along the launcher rail, (ii) an electric drive motor that drives movement of the tape, and (iii) a drive reel to which one end of the tape is secured and around which the tape is wound during launch, wherein the shuttle is detachably secured to the tape via a rotary assembly system and a pawl, wherein engagement of the pawl with respect to the rotary assembly maintains attachment of the shuttle to the tape, wherein release of the pawl from the rotary assembly allows the shuttle to release from the tape.

[0014b] According to an aspect, there is a launching system for an unmanned aerial vehicle, comprising:

(a) a launcher rail;

(b) a tape configured to travel a length of the launcher rail;

(c) a shuttle secured to the tape at a shuttle to tape interface configured to allow the shuttle to detach from the tape upon launch of the unmanned aerial vehicle;

(d) a power reel driven by an electric drive motor that drives movement of the tape;

(e) a payout reel;

(f) a primary arrestment strap to halt movement of the shuttle along the launcher rail after launch; and

(g) a secondary arrestment strap.

[0014c] According to an aspect there is a launching system for an unmanned aerial vehicle, comprising:

(a) a launcher rail;

(b) a tape configured to travel a length of the launcher rail;

(c) a shuttle secured to the tape at a shuttle to tape interface configured to allow the shuttle to detach from the tape upon launch of the unmanned aerial vehicle;

(d) a power reel driven by an electric drive motor that drives movement of the tape;

(e) a payout reel;

(f) an arrestment feature to halt movement of the shuttle along the launcher rail after launch; and

(g) an anti-rollback latch system configured to secure the shuttle to the strap and prevent its rollback after launch.

[0015] Embodiments described herein thus provide a launching system for an unmanned aerial vehicle that uses a launcher rail, a shuttle configured to travel along the launcher rail, and a drive mechanism for moving the shuttle along the launcher rail. The drive mechanism can include a length of tape secured to the shuttle, an electric drive motor that drives movement of the tape, and a drive reel to which one end of the tape is secured and around which the tape is wound during launch. The tape may be nylon, a nylon blend, or some other material. The electric motor may be a DC motor or some other motor that comports with the weight and size requirements

for the particular system. The electric motor may be battery powered. In a specific design, the electric motor is powered by a Lithium Ion battery.

[0016] This disclosure provides a UAV launching system that provides launch using completely electric launch components, including the braking and control system. There are no hydraulic systems on board that could present environmental issues in the event of a leak. The launch system described may be mounted to a base or pallet that can in turn be mounted to a trailer, dolly type wheel base, a flat bed truck, train flat car, ship deck, or any other appropriate launching location or surface. The modularity of the components used also allows scalability for higher energy UAV launches.