CLAIMS

What is claimed is

1. A system comprising:

a sled having airbags thereon adapted to grip an aircraft without a mechanical linkage to the aircraft while ~~for~~ supporting ~~an~~ the aircraft from underneath the aircraft;

an electromagnetic catapult to accelerate the sled along a desired path, wherein the electromagnetic catapult includes a first series of magnets and a second series of magnets that are independently controlled, wherein the first set of magnets can be activated in a first sequence to propel the sled along the desired path and the second series of magnets can be activated in a second sequence to levitate the sled a constant distance above the ground; and

an operational control subsystem to provide power switching times and duration to the first series of magnets and the second series of magnets to create a magnetic field to levitate and accelerate the sled.

2. The system of claim 1, wherein the electromagnetic catapult is mounted to an aircraft runway.

3. The system of claim 1, wherein the second series of magnets includes a high-density permanent magnet array to levitate the sled along the desired path.

4. The system of claim 1, wherein the electromagnetic catapult includes one or more linear motors.

5. The system of claim 1, further comprising an energy conversion system connected to the electromagnetic catapult, wherein the energy conversion system is configured to convert energy from a rechargeable energy storage system into electricity that powers the creation of the magnetic field.

6. The system of claim 1, wherein the sled is a saddle-shaped sled that supports and balances the aircraft.

7. The system of claim ~~6~~ 1, wherein the ~~saddle-shaped sled includes~~ airbags are adjustable ~~to support~~ when supporting the aircraft.

8. A method comprising:

positioning, using a computer, a sled underneath and in contact with wings and a fuselage of an aircraft, wherein the sled is positioned ~~at~~ below a center of mass of the aircraft, wherein the sled includes support levers attached to a set of wing support bags;

expanding the sled to grip the ~~fuselage~~ aircraft from underneath the aircraft and thereby ~~to prevent~~ preventing the aircraft from sliding or rotating about the center of mass; ~~and~~

adjusting the support levers to assist in takeoff of the aircraft; and

activating a series of magnets within an electromagnetic catapult to independently accelerate the sled along a desired path on a ground surface by creating a moving magnetic field and levitate the sled above one or more rails.

9. The method of claim 8, further comprising stowing a landing gear of the aircraft after expanding the sled.

10. The method of claim 8, wherein the electromagnetic catapult includes multiple railways that specify the desired path and the method further comprising selecting one of the multiple railways.

~~10.~~11. The method of claim 8, further comprising levitating the sled above the ground surface using magnetic forces generated by a high-density permanent magnet array.

~~11.~~12. The method of claim ~~10~~ 11, further comprising measuring a distance between the sled and the ground surface.

~~12.~~13. The method of claim ~~11~~ 12, further comprising actively adjusting the magnetic forces generated by the high-density permanent magnet array to keep the distance between the sled and the ground surface within a desired range.

~~13. The method of claim 8, wherein the electromagnetic catapult includes multiple railways that specify the desired path and the method further comprising selecting one of the multiple railways.~~

14. An aircraft launch system comprising:

a guideway configured to automatically guide an aircraft along a desired route, wherein the guideway includes a plurality of magnets running along the length of the guideway;

a sled movably coupled to the guideway and configured to support and grip the aircraft without a mechanical linkage to the aircraft when the sled moves along the guideway during an assisted takeoff, wherein the guideway uses the plurality of magnets to create lift for the sled and the aircraft and thrust to propel the sled along the guideway to enable the assisted takeoff;

an operational control subsystem to compute power switching times and duration to be applied to each of the plurality of magnets thereby creating a change in an electromagnetic field created by the magnets.

~~15. The aircraft launch system of claim 14, wherein magnets include permanents and electromagnets.~~

~~16.~~15. The aircraft launch system of claim 14, wherein magnets are part of one or more linear motors.

~~17.~~16. The aircraft launch system of claim 14, further comprising a feedback control system to maintain the sled at a constant distance above the guideway.

~~18.~~17. The aircraft launch system of claim 14, wherein the sled is magnetically levitated.

18. The aircraft launch system of claim 14, wherein the sled has a plurality of operational modes and a plurality of supporting levers coupled to wing supporting airbags; and wherein the sled is configured to adjust the supporting levers according to which of the operational modes the sled is operating under.

19. The aircraft launch system of claim 14, wherein magnets include permanents and electromagnets.

20. The aircraft launch system of claim 19, wherein the plurality of operational modes includes a transfer mode, a takeoff mode, an un-locked mode and a locked mode.

~~19.~~21. The aircraft launch system of claim 14, wherein the sled has a saddle-shape with airbags attached to support the aircraft.

~~20.~~22. The aircraft launch system of claim ~~19~~ 21, wherein the saddle-shape conforms to a fuselage of the aircraft below a center of mass of the aircraft.

~~21.~~23. The aircraft launch system of claim ~~20~~ 22, wherein the sled includes a coating to reduce sliding between the ~~saddle~~ saddle-shaped sled and the fuselage of the aircraft.

~~22. The aircraft launch system of claim 14, wherein the sled has a plurality of operational modes.~~

~~23. The aircraft launch system of claim 15, wherein the plurality of operational modes includes a transfer mode, a takeoff mode, an un-locked mode and a locked mode.~~

24. An electromechanical thrust assembly comprising:

a sled configured to grip the vehicle by surface adhesion and airflow below the sled and above wings of the vehicle during an assisted takeoff;

one or more tracks to guide ~~a~~ the sled along a desired route;

a means for positioning a vehicle on the sled;

a means for creating a first dynamic magnetic field to levitate the sled; and

a means for creating a second dynamic magnetic field to propel the sled along the one or more tracks to provide the assisted takeoff for the vehicle.

25. The electromechanical thrust assembly of claim 24, further comprising a means for regulating a distance between the sled and the one or more tracks.

26. The electromechanical thrust assembly of claim 24, further comprising a means for regulating the speed of the sled as it is propelled along the one or more tracks.

27. The electromechanical thrust assembly of claim 24, further comprising a means for securing the vehicle to the sled.