CLAIMS

1. A UAV charging system comprising a first unmanned aerial vehicle (UAV) and an energy UAV, the first UAV and the energy UAV being equipped with electric propulsion powered by a rechargeable battery, the battery of the energy UAV having a relatively larger capacity than the battery of the first UAV, the energy UAV including a charging element extending from the energy UAV connected at one end to a battery charger and having a charging connector at the other end, the battery charger being powered by the battery of the energy UAV, the first UAV having a complementary connector for removably connecting to the charging connector such that when the complementary connector is connected to the charging connector, the battery charger charges the battery of the first UAV, the charging system including a guidance controller for controlling movement of the UAV and, as necessary, moving the UAV to a charging position, the charging connector engaging the complementary connector, and the battery of the first UAV being charged from the battery of the energy UAV through the charging system, wherein

   - the charging element includes two or more conductors,

   - the conductors being charging wires, the charging wires being extendable when the UAVs are in the charging position so that the UAVs can maintain the charging position apart from one another,

   - the extendable charging wires being spring loaded, and

   - the extendable charging wires being on a spring-loaded spool that can extract and retract the charging wires.

2. The UAV charging system of claim 1, wherein the first UAV and the energy UAV are multi-rotor helicopters.

3. The UAV charging system of claim 2, wherein the multi-rotor helicopter is a quadcopter.

4. The UAV charging system of claim 1, wherein the electric propulsion is provided by four propellers driven by four brushless direct current (DC) electric motors.

5. The UAV charging system of claim 1, wherein the charging element includes a rod operably extending upward from the energy UAV.

6. The UAV charging system of claim 1, wherein the charging element is movable between an active position in which the charging element extends upwardly from the UAV and an inactive position in which the charging element is positioned along a body of the UAV.

7. The UAV charging system of claim 1, wherein the charging connector and the complementary connector form a mechanical connection.

8. The UAV charging system of claim 1, wherein the charging connector includes an inductive coil, the complementary connector includes an inductive coil, and when the charging connector and the complementary connector are connected, they form an inductive coupling such that energy can be transferred via electromagnetic coupling.

9. The UAV charging system of claim 8, wherein the battery charger generates an alternating current for the inductive coupling.

10. The UAV charging system of claim 9, wherein the alternating current is generated by an inverter connected to a battery of the energy UAV.

11. The UAV charging system of claim 1, wherein the charging connector and the complementary connector include magnetic elements for creating and securing the connection.

12. The UAV charging system of claim 11, wherein the charging connector includes an electromagnet.

13. The UAV charging system of claim 11, wherein the complementary connector includes a permanent magnet.

14. The UAV charging system of claim 1, wherein the guidance controller includes a digital camera.

15. The UAV charging system of claim 14, wherein the digital camera is mounted on the first UAV.

16. The UAV charging system of claim 14, wherein the guidance controller uses images captured by the digital camera to determine a relative position between the first UAV and the energy UAV and moves the UAV to the charging position based on the relative position.

17. The UAV charging system of claim 14, wherein the digital camera lens is coaxial with a portion of the complementary connector.

18. The UAV charging system of claim 1, wherein the charging system includes a plurality of energy UAVs, and the guidance controller moves any one of the energy UAVs toward the first UAV to a charging position.