CLAIMS

1. A wireless electronic detonator comprising:
an on-board primary source of energy,
at least one functional module,
a power switch disposed between the on-board primary source of energy and said at least one functional module, the power switch configured to connect or disconnect said at least one functional module and the on-board primary source of energy, and
a controller to control the power switch,
wherein said at least one functional module comprises at least one explosive fuse and an energy storage element dedicated to an ignition of said at least one explosive fuse, and the on-board primary energy source is configured to transfer energy to the energy storage element via the power switch; and
wherein the controller comprises an optical receiver configured to detect and demodulate a light signal emitted by a control console and the controller generates at an output a control signal according to the demodulated light signal, the control signal being configured to at least control the power switch.

2. The detonator according to claim 1, wherein the optical receiver comprises an optical detector configured to detect the light signal emitted by the control console and convert the light signal into an electric signal.

3. The detonator according to claim 2, further comprising at least one optical filter upstream of the optical detector.

4. The detonator according to claim 2, wherein the optical detector comprises a photovoltaic element.

5. The detonator according to claim 2, further comprising a demodulator configured to demodulate the electric signal.

6. The detonator according to claim 5, wherein the demodulator comprises an analog conditioner configured to transform the electric signal from the optical detector into a digital signal.

7. The detonator according to claim 6, wherein the demodulator comprises a digital processor configured to demodulate the digital signal and generate the control signal to control the power switch.

8. The detonator according to claim 7, further comprising a low-consumption mode configured to cut off a power supply to at least the digital processor.

9. The detonator according to claim 1, further comprising a general cutoff module configured to cut off a power supply to the optical receiver.

10. The detonator according to claim 9, wherein the general cutoff module comprises a phototransistor with a high gain, coupled with a detection resistor configured to detect a very low level of lighting, and a transistor, acting as a switch, the detection resistor being configured to control the transistor.

11. The detonator according to claim 1 is configured to emit a return signal when the optical receiver has at least detected the light signal emitted by the control console.

12. A wireless detonation system comprising the wireless electronic detonator according to claim 1 and the control console configured to emit the light signal to the wireless electronic detonator.

13. The detonation system according to claim 12, wherein the control console comprises a lens configured to focus the light signal towards at least one detonator.

14. The detonation system according to claim 12, wherein the control console comprises a modulator configured to modulate the light signal according to at least one modulation pattern to provide a modulated light signal.

15. The detonation system according to claim 14, wherein the modulated light signal comprises at least one activation sequence.

16. The detonation system according to claim 14, wherein the modulated light signal comprises a data sequence configured to send instructions to the wireless electronic detonator.

17. A method for activating a wireless electronic detonator comprising an on-board primary source of energy, at least one functional module comprising at least one

explosive fuse and an energy storage element dedicated to an ignition of said at least one explosive fuse, a power switch, disposed between the on-board primary source of energy and said at least one functional module, the power switch configured to connect or disconnect said at least one functional module and the on-board primary source of energy, and a controller to control the power switch, the method comprising steps of:
receiving a light signal;
demodulating the light signal received;
generating a control signal, according to the demodulated light signal, the control signal being configured to at least control the power switch; and
transferring energy from the on-board primary energy source to the energy storage element when the power switch is activated in response to the control signal.

18. The activation method according to claim 17, wherein the step of receiving the light signal comprises detecting the light signal and converting the light signal into an electric signal.

19. The activation method according to claim 18, wherein the step of demodulating comprises transforming the electric signal into a digital signal and identifying at least one activation sequence in the digital signal; and wherein the step of generating the control signal comprises activating the power switch in response to an identification of an activation sequence.

20. The activation method according to claim 19, wherein the step of demodulating comprises identifying at least one data sequence in the digital signal; and wherein in response to an identification of a data sequence, the step of generating the control signal comprises generating instructions corresponding to the data sequence.

21. The detonator according to claim 1, wherein the at least one functional module further comprises a discharge device configured to discharge the energy storage element to provide security to the detonator when the detonator is powering off.

22. The detonator according to claim 1, wherein the at least one functional module further comprises an ignition switch configured to allow a transfer of energy between the energy storage element and the explosive fuse.

23. The detonator according to claim 1, wherein the power switch is disposed between the on-board primary energy source and all of the at least one functional module.

24. The detonator according to claim 1, wherein the at least one functional module further comprises an energy storage element isolation switch disposed between the on-board primary source of energy and the energy storage element, the on-board primary source of energy further configured to transfer energy to the energy storage element via the energy storage element isolation switch.