A bicycle laser tag system is configured to provide laser tag functionality to a bicycle. The bicycle laser tag system includes a laser, attached to the bicycle and electrically coupled to a microcontroller. A light sensor is attached to the bicycle and electrically coupled to the microcontroller. A trigger is attached to the bicycle and electrically coupled to the microcontroller. A plurality of batteries is electrically coupled to the microcontroller, the laser, and the light sensor. The microcontroller is programmed with instructions for engaging the laser when the trigger is depressed. Then, disengaging the laser when the light sensor detects a second-party laser.
BICYCLE LASER TAG SYSTEM

RELATED APPLICATION

[0001] This application claims priority to provisional patent application U.S. Ser. No. 62/599,218 filed on Nov. 24, 2015, the entire contents of which is herein incorporated by reference.

BACKGROUND

[0002] The embodiments herein relate generally to bicycle accessories.

[0003] Prior to embodiments of the disclosed invention there was no system to integrate laser tag on a bicycle. Embodiments of the disclosed invention solve this problem.

SUMMARY

[0004] A bicycle laser tag system is configured to provide laser tag functionality to a bicycle. The bicycle laser tag system includes a laser, attached to the bicycle and electrically coupled to a microcontroller. A trigger is attached to the bicycle and electrically coupled to the microcontroller. A plurality of batteries is electrically coupled to the microcontroller, the laser, and the light sensor. The microcontroller is programmed with instructions for engaging the laser when the trigger is depressed. Then, disengaging the laser when the light sensor detects a second-party laser.

[0005] In some embodiments, a speaker can be attached to the bicycle and electrically coupled to the microcontroller. A plurality of speaker light emitting diodes can be attached to the bicycle and electrically coupled to the microcontroller. The microcontroller can be programmed with instructions for: engaging the speaker and the plurality of speaker light emitting diodes when the light sensor detects a second-party laser.

[0006] In some embodiments, a battery microchip can be connected to the plurality of batteries. A battery microchip voltage input pin can be electrically coupled to plurality of batteries, a first capacitor and a battery output. A battery microchip ground pin can be electrically coupled to the first capacitor and a ground. A battery microchip shutdown pin can be electrically coupled to the battery microchip voltage input pin. A battery microchip voltage output pin can be electrically coupled to a second capacitor and a ground supplies wherein the battery microchip voltage output pin supplies a direct current voltage. A battery microchip bypass pin can be electrically coupled to a ground with a third capacitor.

[0007] In some embodiments, the laser can further comprise a laser circuit board, electrically coupled to the battery output and first MOSFET with a first resistor. The first MOSFET further includes a first MOSFET source, electrically coupled to the first resistor. A first MOSFET drain can be attached to a ground. A first MOSFET gate can be electrically coupled to the microcontroller.

[0008] The laser can be a laser LED that can be electrically coupled to an infrared transmitter that operates on a 38 kHz carrier signal. A microcontroller programming header can be electrically coupled to the microcontroller.

BRIEF DESCRIPTION OF THE FIGURES

[0009] The detailed description of some embodiments of the invention is made below with reference to the accompanying figures.

[0010] FIG. 1 is a perspective view of an embodiment of the invention shown in use;

[0011] FIG. 2 is a right side perspective view of an embodiment of the invention;

[0012] FIG. 3 is a left side perspective view of an embodiment of the invention;

[0013] FIG. 4 is an exploded view of an embodiment of the invention;

[0014] FIG. 5 is a front view of an embodiment of the battery pack/speaker;

[0015] FIG. 6 is a back view of an embodiment of the battery pack/speaker illustrating the door opened;

[0016] FIG. 7 is a front view of an embodiment of the laser;

[0017] FIG. 8 is a side view of an embodiment of the laser;

[0018] FIG. 9 is a front view of an embodiment of the trigger;

[0019] FIG. 10 is a side view of an embodiment of the trigger;

[0020] FIG. 11 is a top view of an embodiment of the light sensor with attachments;

[0021] FIG. 12 is a front view of an embodiment of the light sensor with attachments;

[0022] FIG. 13 is a left side view of an embodiment of the light sensor with attachments;

[0023] FIG. 14 is a right side view of an embodiment of the light sensor with attachments;

[0024] FIG. 15 is a schematic view of an embodiment of the invention;

[0025] FIG. 16 is a schematic view of an embodiment of the invention; and

[0026] FIG. 17 is a schematic view of an embodiment of the invention.

DETAILED DESCRIPTION OF CERTAIN EMBODIMENTS

[0027] By way of example and referring to FIGS. 1-17, one embodiment of the present system comprises user 68 is shown riding on seat 64 upon first bicycle 66. First bicycle 66 is attached to battery pack 10 connected to light sensor 42. This enables user 66 to shoot a laser at second light sensor 42 on second bicycle 68.

[0028] Battery pack 10 is attached to bicycle 66 with battery pack straps 12. Battery pack straps 12 are mechanically coupled to hook fastener 14 and loop fastener 16 which can be combined to form a hook and loop fastener. Battery pack 10 can be opened and closed with speaker door 18. Inside battery pack 10, first LED set 20 is connected to microcontroller 22, which is further connected to second LED set 20. Microcontroller 22 is further attached to batteries 24 and speaker 26. When light sensor 42 detects a second-party laser, microcontroller 22, makes an audio visual signal.

[0029] Turning to FIGS. 1-15, laser 28 is attached to bicycle 66 with laser strap 30. Laser strap 30 is further attached to laser hook fastener 32 and laser loop fastener 34. Laser 28 further comprises strap slot 56, which is adapted to
receive laser strap 30 to connect to bicycle 66. Laser 28 is electrically coupled to microcontroller 22 with laser wire 60 and laser ground wire 70.

[0030] Bicycle 66 is further attached to trigger 36. Trigger 36 is attached to bicycle 66 with screw 38 and nut 40. Trigger 36 is electrically coupled to a microcontroller eighteenth pin on microcontroller 22 with trigger wire 58 and trigger LED wire 72.

[0031] Bicycle 66 is further attached to light sensor 42. Light sensor 42 further comprises clasp 44 and clasp arm 46. Clasp 44 is attached to bicycle 66 with clasp screw 50. Light sensor 42 is attached to clasp arm 46 with light sensor screw 50. Clasp 44 is attached to clasp arm 46 with arm screw 52 and arm nut 54. Light sensor 42 is electrically coupled to microcontroller 22 with light sensor wire 62, light sensor LED wire 74, light sensor signal wire 76, light sensor infrared receiver power wire 78, and ground wire 80.

[0032] Turning to FIG. 16, batteries 24 can be internally wired as follows. Batteries 24 are electrically coupled to battery microchip 82 with battery switch 84. Battery microchip 82 is shown as being a TC 1014, 3.3V LDO Regulator, but others can be effective as well. Batteries 24 are shown as being four AA 1.5V batteries. Battery microchip 82 further comprises a battery microchip voltage input pin electrically coupled to batteries 24, a first capacitor C1 and a 6V battery output. Battery microchip 82 further comprises a battery microchip ground pin which is electrically coupled to the first capacitor and a ground. A battery microchip shutdown pin is electrically coupled to the battery microchip voltage input pin. A battery microchip voltage output pin supplies 3.3 VDC and is electrically coupled to a second capacitor C2 and a ground. A battery microchip bypass pin is electrically coupled to a ground with a third capacitor C3. In some embodiments, the first capacitor C1 can be 1 μF, the second capacitor C2 can be 1 μF, and the third capacitor C3 can be 470 pF.

[0033] Laser 28 further comprises laser circuit board 86 electrically coupled to the 6V battery output and first MOSFET M1 with a first resistor R1. First MOSFET M1 further comprises a first MOSFET source electrically coupled to the first resistor R1, a first MOSFET drain attached to a ground and a first MOSFET gate electrically coupled to microcontroller 22. Laser 28 is shown a laser LED 88 which could be an infrared 940 nm 1.2 V, 20 mA LED. Laser LED 88 is electrically coupled to infrared transmitter 90 which can be configured to operate on a 38 kHz carrier signal.

[0034] Microcontroller 22 is shown as a Texas Instruments® MSP430G2453PW208, though other microcontrollers may also work. Microcontroller 22 can be programmed with in microcontroller programming header 92. Microcontroller programming header 92 further comprises a header first pin that is electrically coupled to the 3.3 VDC supply voltage. A header second pin is electrically coupled to a microcontroller sixteenth pin and the 3.3 VDC supply voltage with a second resistor. The microcontroller sixteenth pin as the combined functionality of reset, nonmaskable interrupt input, and Spy-Bi-Wire test data input/output during programming and test. A header third pin is electrically coupled to a microcontroller seventeenth pin. The seventeenth pin has the combined functionality of 1) selecting a test mode for JTAG pins on the microcontroller first pin. The device protection fuse is connected to TEST and 2) a Spy-Bi-Wire test clock input during programming and test. A header fourth pin is connected to ground.

[0035] The microcontroller first pin is the digital supply voltage and is electrically coupled to a ground with a fourth capacitor and the header first pin. The microcontroller twentieth pin is connected to ground. The microcontroller tenth pin is electrically coupled to light sensor 42 in an RC Circuit with fourth resistor R4 and sixth capacitor C6.

[0036] Light sensor 42 further comprises light sensor 94 which is electrically coupled to the RC circuit, a communication line and a ground. The communication line is further electrically coupled to a microcontroller thirteenth pin with an eighth resistor RBA. Light sensor 42 is electrically coupled to second MOSFET M2. Second MOSFET M2 further comprises a second MOSFET source electrically coupled to a plurality of light emitting diodes 96, a second MOSFET drain attached to a ground and a second MOSFET gate electrically coupled to microcontroller 22 at a microcontroller fourteenth pin.

[0037] The plurality of light emitting diodes 96 further comprises sixth resistor R6A in parallel with fourth LED D4 and fifth LED D5, this is in parallel with sixth resistor R6B, sixth LED D6 and seventh LED D7. The plurality of light emitting diodes 96 is further electrically coupled to the 6V battery output.

[0038] Speaker 26 further comprises Third MOSFET M3. Third MOSFET M3 further comprises a third MOSFET source electrically coupled to a speaker driver D14B, a third MOSFET drain attached to a ground and a third MOSFET gate electrically coupled to microcontroller 22 at a microcontroller eighth pin with a speaker drive line. The speaker driver D14B is electrically coupled to the 6V battery output, a fifth resistor R5 and speaker LS1.

[0039] One functionality of some embodiments of the present invention is to coordinate LEDs with the speaker. This can be done by having a plurality of speaker LEDs electrically coupled to fourth MOSFET M4. Fourth MOSFET M4 further comprises a fourth MOSFET source electrically coupled to the plurality of speaker LEDs, a fourth MOSFET drain attached to a ground and a fourth MOSFET gate electrically coupled to microcontroller 22 at a microcontroller seventh pin with a speaker LED line.

[0040] The plurality of 6V battery output, speaker LEDs further comprises a seventh resistor R7A electrically coupled to an eighth LED D8 and a ninth LED D9. A seventh resistor R7B is electrically coupled to LED DI0 and an eleventh LED D11. A seventh resistor R7C electrically coupled to a twelfth LED D12 and a thirteenth LED D13. The seventh resistors R7A, R7B, R7C are arranged in parallel and electrically coupled to the 6V battery output.

[0041] From this framework, a control can be made to operate the microcontroller. For instance, when the light sensor 42 receives an input from a laser 28 of another user, then light sensor 42 can register a hit through microcontroller 22 and engage the plurality of light sensor LEDs. A user could then depress trigger 36 ten times to reset the plurality of light sensor LEDs. Additionally, when light sensor 42 registers a hit, the ability to utilize laser 28 could be stopped by simply running first MOSFET M1 to drain until microcontroller 22 is reset, again, this could be by depressing trigger 36 ten times.

[0042] As used in this application, the term “a” or “an” means “at least one” or “one or more.”

[0043] As used in this application, the term “about” or “approximately” refers to a range of values within plus or minus 10% of the specified number.
As used in this application, the term “substantially” means that the actual value is within about 10% of the actual desired value, particularly within about 5% of the actual desired value and especially within about 1% of the actual desired value of any variable, element or limit set forth herein.

All references throughout this application, for example patent documents including issued or granted patents or equivalents, patent application publications, and non-patent literature documents or other source material, are hereby incorporated by reference herein in their entires, as though individually incorporated by reference, to the extent each reference is at least partially not inconsistent with the disclosure in the present application (for example, a reference that is partially inconsistent is incorporated by reference except for the partially inconsistent portion of the reference).

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Any element in a claim that does not explicitly state “means for” performing a specified function, or “step for” performing a specified function, is not to be interpreted as a “means” or “step” clause as specified in 35 U.S.C. §112, ¶6. In particular, any use of “step of” in the claims is not intended to invoke the provision of 35 U.S.C. §112, ¶6.

Persons of ordinary skill in the art may appreciate that numerous design configurations may be possible to enjoy the functional benefits of the inventive systems. Thus, given the wide variety of configurations and arrangements of embodiments of the present invention the scope of the invention is reflected by the breadth of the claims below rather than narrowed by the embodiments described above.

What is claimed is:

1. A bicycle laser tag system, configured to provide laser tag functionality to a bicycle; the bicycle laser tag system comprising:
   a laser, attached to the bicycle and electrically coupled to a microcontroller;
   a light sensor, attached to the bicycle and electrically coupled to the microcontroller;
   a trigger, attached to the bicycle and electrically coupled to the microcontroller;
   a plurality of batteries electrically coupled to the microcontroller, the laser, and the light sensor;
   wherein the microcontroller is programmed with instructions for:
   engaging the laser when the trigger is depressed; and
   disengaging the laser when the light sensor detects a second-party laser.

2. The bicycle laser tag system of claim 1, further comprising:
   a speaker, attached to the bicycle and electrically coupled to the microcontroller;
   a plurality of speaker light emitting diodes, attached to the bicycle and electrically coupled to the microcontroller;
   wherein the microcontroller is programmed with instructions for:
   engaging the speaker and the plurality of speaker light emitting diodes when the light sensor detects a second-party laser.

3. The bicycle laser tag system of claim 2, further comprising:
   a battery microchip, connected to the plurality of batteries and further comprising:
   a battery microchip voltage input pin, electrically coupled to plurality of batteries, a first capacitor and a battery output;
   a battery microchip ground pin, electrically coupled to the first capacitor and a ground;
   a battery microchip shutdown pin, electrically coupled to the battery microchip voltage input pin;
   a battery microchip voltage output pin, electrically coupled to a second capacitor and a ground supplies wherein the battery microchip voltage output pin supplies a direct current voltage;
   a battery microchip bypass pin, electrically coupled to a ground with a third capacitor.

4. The bicycle laser tag system of claim 3, wherein the laser further comprises:
   a laser circuit board, electrically coupled to the battery output and first MOSFET with a first resistor; wherein the first MOSFET further comprises:
   a first MOSFET source, electrically coupled to the first resistor;
   a first MOSFET drain, attached to a ground; and
   a first MOSFET gate electrically coupled to the microcontroller.

5. The bicycle laser tag system of claim 4, wherein the laser is a laser LED, electrically coupled to an infrared transmitter that operates on a 38 kHz carrier signal.

6. The bicycle laser tag system of claim 1, further comprising a microcontroller programming header electrically coupled to the microcontroller.