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THE SAFARILAND GROUP

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RE: CAS Theory of Operation

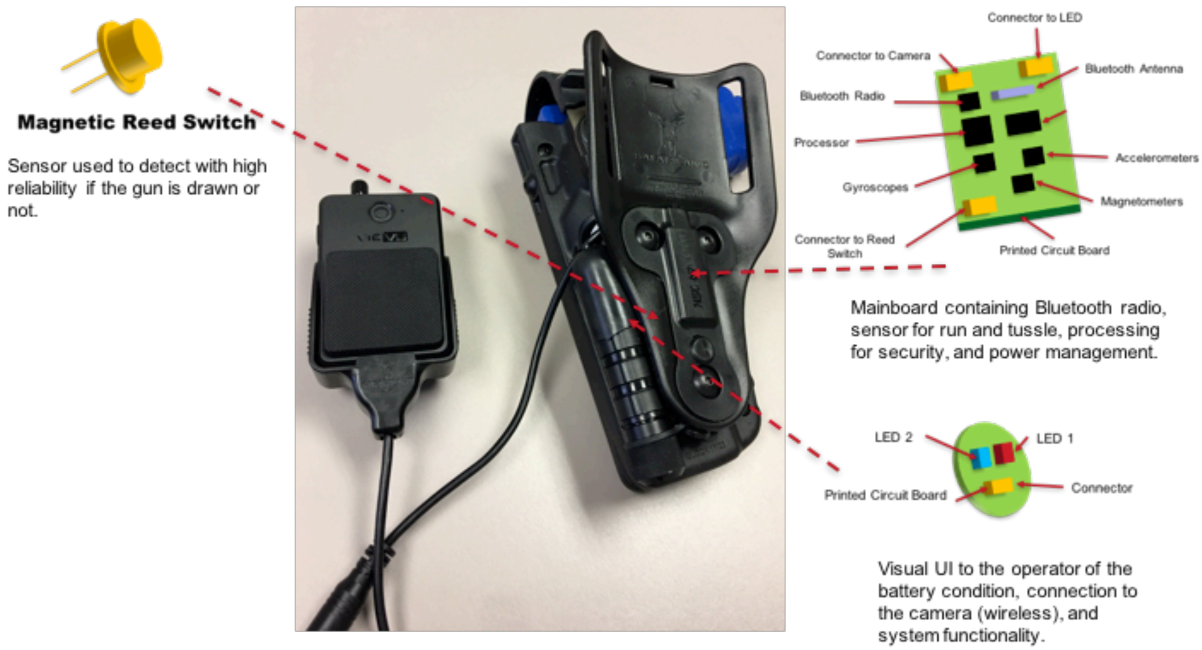
To Whom it May Concern,

The following is theory of operations of the CAS Technology:

1.1 CAS Blocks

CAS Components

The CAS electronics are comprised of the holster mainboard, the LED board, and the magnetic reed switch sensor. The mainboard is built into the back of the holster. The LED board resides a top a battery tube containing CR123A batteries (rechargeable or non-rechargable). The magnetic reed switch sensor lies within a plastic housing which begins at the holster's backing plate and runs through the holster body enabling the switch to be near the weapon holstered.



The mainboard contains a single threaded, sequential microcontroller programmed with using a real time operating systems with a loop program. The microcontroller is connected to a Bluetooth Low Energy (BLE) transceiver radio through means of virtual serial, SPI, or UART connection. The microcontroller is also connecter to a magnetic reed switch through ADC connections. Power from the microcontroller and main board come from a battery tube containing a CR123A batteries (rechargeable or non-rechargeable). Voltage regulation for the power on the CAS mainboard is on the main board using a DC-DC voltage regulator chip. Un-regulated power is brought via wired connections between the main board and the

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LED Battery board. Wired connections exist between the mainboard, the LED board and the magnetic reed switch.

1.2 CAS Operation

Once a battery is installed in the battery tube, the system is powered up. If the built in self test on the embedded micro-controller is successful a signal is sent to the LED board to flash the LED's in a Red Blue sequence.

Once powered up the device uses BLE standards TEDs interfaces to advertise being ready to pair to a Bluetooth master device.

The operator of the device then pairs the device with a Bluetooth master device.

Once paired, when the operator removes the gun from the holster, the ferrite metal from the barrel will no longer be present and the reed switch changes state. This state change is sensed through the monitoring of the ADC ports on the embedded processor. When the state change occurs the embedded micro-controller (which contains the BLE transceiver) sends a message to the master Bluetooth device, notifying it of the state change of the holster.

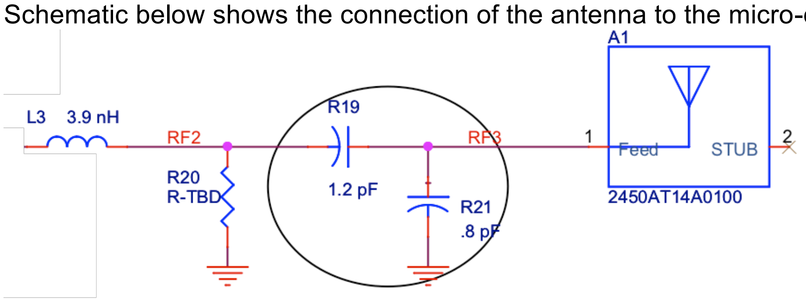
In reverse once the gun is replaced in the holster, the ferrite metal from the barrel is once again detected by the reed switch. This state change is sensed through the monitoring of the ADC ports on the embedded processor. When the state change occurs the embedded micro-controller (which contains the BLE transceiver) sends a message to the master Bluetooth device, notifying it of the state change of the holster.

The voltage regulation IC mentioned before has the ability to sense the voltage level coming from the battery. When the voltage level is low, a signal is sent via a wire on the mainboard to the micro-controller. The micro-controller thus in turn periodically flashes the red LEDs on the LED board. The flashing of the red lights tells the operator the batteries need to be changed soon.

1.3 CAS Antenna and Ground Planes

The transceiver is connected to a low profile 2.4 GHz Mini Chip Antenna with Small Area and GND size for RF emissions. The antenna was tuned using the micro-controllers suggested processes (in http://infocenter.nordicsemi.com/pdf/nwp_017.pdf).

Schematic below shows the connection of the antenna to the micro-controller:



where the value for R20 was tuned using the method mentioned above.

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Ground planes in the main board are made using a flooded copper plane with via stitching as needed. The flooded ground plane layer is consistent with standard 062 PCB technology for 4-8 layer printed wire board.

If you have any questions or require additional information, please contact me at 909.923.7300 x 103041, or terry.oshea@safariland.com.

Sincerely,

T.J. O'Shea

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