Hardened USB Data Storage System

DATA PROTECTION SYSTEM FOR TECHNOLOGY MARKETS AND MILITARY APPLICATIONS

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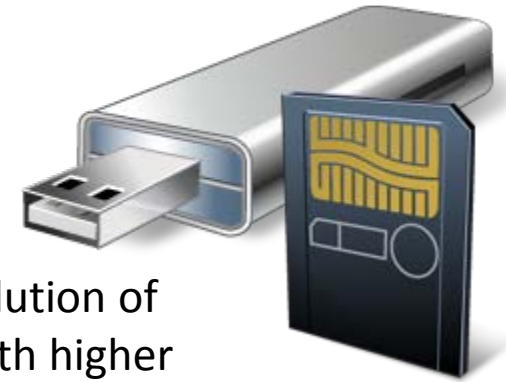
Physical damage comes in many forms

- physical shock
- static discharge
- fire
- water damage
- thermal failure

- explosive blast
- corrosive environment
- hydraulic pressures
- natural disasters
- mechanical failure

We endeavor to safeguard our data, yet it is subject to vulnerable conditions which may render the data useless and forever lost.

With the advent of solid state drives (SSD) and the evolution of technology, smaller, faster, and larger storage drives with higher reliability factors have been developed…

however, these drives are prone to many of the environmental dangers and hazards mechanical hard drives endured.

To help safeguard the fragile data on storage devices crucial to key vertical markets a host of protective measures have been designed to work in unison offering the best data protection available from all of the aforementioned hazards, which is the scope of this project.
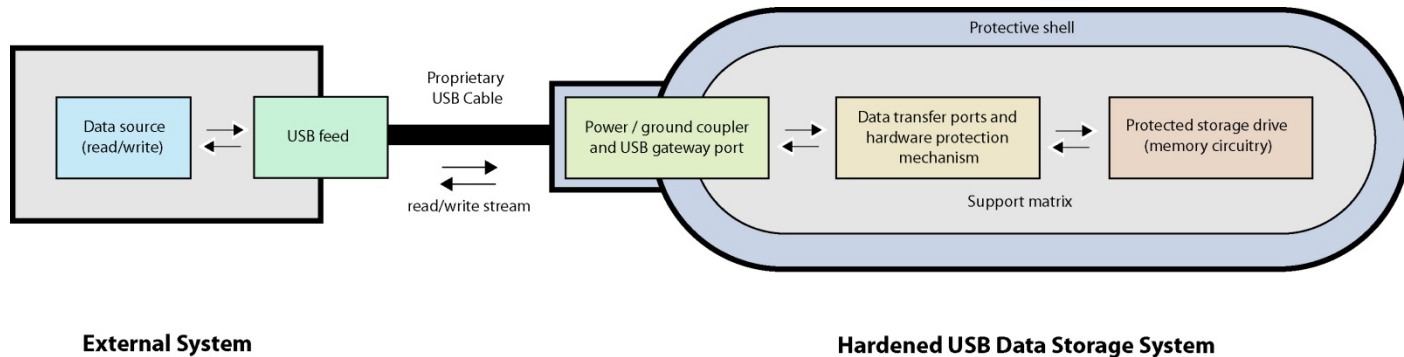
The solution is an industrial and military grade memory containment and USB data transfer mechanism which is resistant to:

- electromagnetic interference (EMI)
- high-voltage surges and spikes
- electromagnetic pulse (EMP)
- resilience to breakdown of mechanical components
- explosive blast (relative to initial and secondary concussions from a blast)
- shock resistance (relative to high G loads and sudden impacts)
- crush resistance (relative to hydraulic forces)
- radiation resistance (relative to gamma, cosmic, x-ray and other forms)
- thermal resistance (relative to extreme cold or heat)
- corrosion resistance (relative to environmental and/or engineered chemical corrosion)
- dust and moisture resistance (relative to IP68 standards)
- security and anti-tamper features as required

Memory is fully protected via proprietary USB data transfer mechanisms and other unique methodologies which aid in the devices ability to operate effectively; rendering the data mechanically and environmentally resistant against most natural and/or manmade hazards.

General system architecture

Proprietary
USB Cable

Data source
(read/write)

USB feed

read/write stream

Protective shell

Power / ground coupler
and USB gateway port

Data transfer ports and
hardware protection
mechanism

Protected storage drive
(memory circuitry)

Support matrix

External System

Hardened USB Data Storage System

The exterior case is designed to withstand explosive blast forces and fragmentation by small and large objects at close range to the threat as well as secondary collisions and impacts.

Due to the device's compact size, shape and weight, high-pressure ejections from a primary blast would place the device in close proximity to the initial blast point making the device easier to locate in the aftermath of an explosive blast.
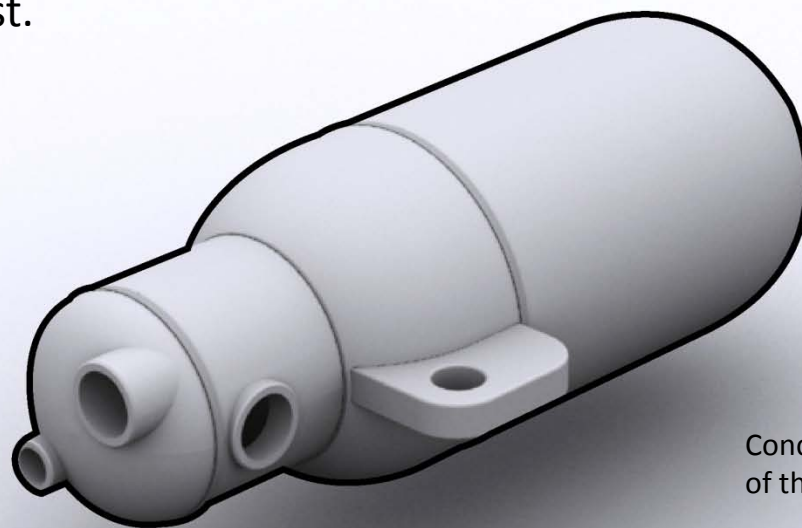
Conceptual design and form factor of the blast resistant shell

The design is robust and resilient enough where, in the event of a breach of the exterior case from high-velocity objects or secondary collisions the memory component and its data may still remain intact even if submerged in water, corrosive liquids or subject to high-voltage forces and electromagnetic pulses at varied magnitudes. The memory is also protected from thermal migration due to electrical and flash fires as well as fuel and chemical pool fires and rapid changing temperature extremes.

Approximate footprint of the blast resistant shell

Market Sectors and Applications

Industrial

- Industrial testing applications where data accumulated from cameras, measuring devices, sensors and probes must be protected to withstand toxic, vibration, shock, temperature, corrosion, hydraulic forces, high voltages and other extreme environments where electronic communication is not otherwise possible
- Back-up data system for any application

Scientific

- Scientific testing applications where data accumulated from cameras, measuring devices, sensors and probes must be protected to withstand toxic, vibration, shock, temperature, corrosion, hydraulic forces, high voltages and other extreme environments where electronic communication is not otherwise possible
- Apparatus designed for severe weather monitoring (inside hurricanes, tornados, violent storms)
- Back-up data system for any application
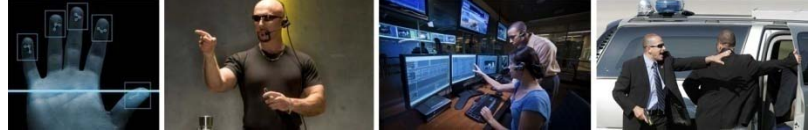
Security

- Audio and video data recorders for cameras and microphones
- Monitoring and surveillance of remote stations and locations where electronic communication is not otherwise possible or recommended
- Back-up data system for any application

Aerospace

- Data recorder (Black Box) for civilian, commercial, military aircraft and supersonic airborne vehicle types (recommended where small footprint and large data storage protection is crucial)
- Monitoring equipment for experimental aviation systems
- Space applications, for the protection of systems profiles and backup data required in space platforms, satellites, deep-space probes, and spacecraft
- Back-up data system for any application

Intelligence

• Collecting and protecting audio and video data in potentially volatile situations where electronic communication is not otherwise possible (security and tamper resistant measures can be deployed within the system)

Military

- Data recovery from monitoring equipment within strategic environments (subject to explosive forces within mine and blast zones, deflection from released ammunition and other firepower)
- Remote monitoring of strategic sites where electronic communication is not otherwise possible (recoverable data as audio and/or video)
- Ruggedized Digital Video Recorder within autonomous vehicles (land, sea, air vehicles)
- Black Box data recorder within all vehicle types (recommended where small footprint and large data storage is crucial)
- Personnel data storage device capturing strategic field information via audio, video and other off-line data pertinent to the soldier's activities
- Protection of guidance system data in autonomous projectiles, rockets and missiles where subject to electromagnetic pulse(EMP) or high-altitude magnetic pulse (HEMP) disturbances
- For the transport of critical and sensitive data
- Back-up data system for any application

<u>Conclusion</u>

The provision of superior data protection is vital to future technological advancements in key critical markets.

• The proposed **Hardened USB Data Storage System** is a robust design founded on unique and patentable methodologies.

• A design concept with the potential to safeguard electronic data from corruption while operating in remote volatile environments, be it natural or manmade.

• A system that is fully customizable to meet the requirements and specifications of the end user.

• A system whose design infrastructure has future potential to protect mobile electronic system the same way it currently protects data in memory.

Project collaboration CV's

Christopher P. Knight

20+ years experience in prototype engineering, industrial and mechanical design engineering, design methodology and practices, knowledge of industrial materials (metals, plastics and composites), fabrication and production methodologies, 3D solid modeling, rapid prototyping, physical model prototypes and designs, graphical user interface (GUI) design for hardware and software applications, subsurface print overlay methodologies for electronic control surfaces, audio electronics for commercial applications, think-tank and collaborative methods of invention.

Effectively developed a plethora of industrial design solutions for military, space medicine, homeland security, international airport security systems, corporate and industrial security hardware. Proven track record of problem solving.

Christopher P. Knight

Career Achievements

• Designed, developed ,tested and deployed **Blast Resistant Autonomous Video Equipment (BRAVE)** in conjunction with the U.S. Department of Homeland Security Science & Technology Directorate's SECURE Program.

• International patent for **Blast Resistant Memory** protection device utilizing *Black Box* technology for the Visual Defence SecurEye System (patent holder).

• Design and production of the Visual Defence **mPress** and **Help Phone** access control and IP intercom platform for door management systems including the design of proprietary vandal-resistant and climate-hardened interactive control surface.

• Design of **ruggedized ship console and shock damping system** for Israeli Navy Sa'ar Class Missile Boats commissioned by the Israeli Defence Forces (IDF).

• Design of **user interfaces (GUI) for numerous video management and access control software** applications currently in use by international airports.

• Fabrication of "true scale" **force-balance and pressure-tap models for wind tunnel testing** at RWDI Wind Tunnel Testing Facilities. Also initiated **3D model test-bed** for computational fluid dynamics (CFD) reporting and **sun-shade study** analysis of 3D generated urban projects (Guelph, Ontario).

• Department of Space Medicine (DCIEM), Downsview, Ontario. Production of **umbrella application** for motion-sickness generator utilized in crew experiments during space shuttle flights.

• Inventor and industrial design lead for **eVent, home automation of heating and air-conditioning systems** for residential, commercial and industrial applications.

Christopher P. Knight

Related Employment History

Company: Visual Defence Inc. (Richmond Hill, Ontario)
Position: Industrial Designer Engineer, Inventor of Corporate Products, Graphical User Interface Designer
Date: 2004 – present

Company: Self employed
Position: Consultant in varied design-related capacities
Date: 1998 - 2003

Company: Rowan Williams Davies & Irwin (RWDI) Wind Tunnel Research Lab, (Guelph, Ontario)
Position: Prototype designer, physical model engineer, 3D wind tunnel simulations analysis
Date: 1994 - 1997

Certificates

• (2010) U.S. Department of Homeland Security Science & Technology Directorate's SECURE Program. SECURE Certification for Blast Resistant Autonomous Video Equipment (BRAVE).

• (2011) Volpe Centre, Research and Innovative Technology Administration (RITA), Washington, DC, Department of Transportation. Certification for surpassing testing standards and approval of Blast Resistant Autonomous Video Equipment (BRAVE).

Christopher P. Knight

Security Clearances

Currently hold high-level security clearances for entry into the United States with permissions to conduct testing at Aberdeen Proving Grounds facility in Baltimore, Maryland on behalf of the US Army and United States Department of Homeland Security. (Expires December 2014 with renewal pending)

Project Contributions

- Design originator of hardened USB data storage system and application concepts
- Lead development team to create fully-working solution of USB data storage system
- Collaborate with team members to solve problems associated with system hardware
- Design hardware wrapper for all components of the final product

Wayne Sabourin

20+ years experience in quality assurance and control practices, software and hardware test management, test planning and personnel staffing, implementation of quality assurance processes, coordinating field acceptance testing. Additional skill-sets include requirement analysis, automation tools in Visual Test, Quick Test Professional and WinRunner, thorough understanding of Java, C++, .NET coding, solid experience in client server models used in mission-critical surveillance applications.

Highly technical with computer hardware, operating systems and software applications. "In-the-know" regarding future trends and technical advances in all facets of computer systems and applications.

Wayne Sabourin

Career Achievements

• **Visual Defence:** Provide system acceptance testing for proprietary digital video security recorders (DVSS) and IP intercom systems (mPress and Help Phone) as well as proprietary Command & Control Centre (3C) event management and surveillance systems integrating a plethora of technologies from video, audio, access control, and blast proof storage systems utilized in mass transit systems (ground and air) internationally. Clients include Zurich Intl. Airport, British Airport Authority, Frankfurt Intl. Airport and Police, Abidjan Intl. Airport, Ottawa Intl. Airport, VIA Rail Montreal, Norway Rail, Stockholm Lokaltrafik (transit), MBTA (transit).

• **Delano Technology:** Designed and implemented Automation Framework Foundation (AFD) allowing Quality Assurance Engineers to build efficient automated test scripts in WinRunner software. Also implemented automation suites and provided test coverage of manual testing modules.

• **Symantec:** Developed and implemented automated test suites and systematically trained and managed Symantec's associated SQA Engineers to use the suites. Also a major contributor in the construction of the Mobile Essentials network lab utilizing Novell and Microsoft NT server setups, then developed an MFC application to assist the population of data within the application.

• **Gold Disk Inc.:** Implemented and maintained the automated bulletin board system, allowing users to send and retrieve software updates. Also contributed to the Quality Assurance of the Company's products line including off site testing stages.

Wayne Sabourin

Related Employment History

Company: Ganz (Mississauga, Ontario)
Position: Quality Assurance Lead
Date: 2010 – present

Company: Self employed
Position: Consultant in varied computer science related capacities
Date: 2006 – present

Company: Visual Defence Inc. (Richmond Hill, Ontario)
Position: Software and Hardware Quality Assurance Manager
Date: 2004 – 2010

Company: Trango Systems
Position: Quality Assurance Lead
Date: 2001 – 2002

Company: Delano Technology
Position: Software Quality Assurance Engineer
Date: 2000 – 2001

Company: Symantec
Position: Quality Assurance Engineer / Support
Date: 1996 - 2000

Wayne Sabourin

Certificates

- Cisco Certified Network Associate (CCNA)
- Certified Software Quality Analyst (CSQA)
- JAVA training and certification through Sun Microsystems.

Project Contributions

- Co-inventor of hardened shell system
- The creation of test plans and use cases based on requirements.
- Execution of all test cases as well as providing detailed progress reports per milestone.
- Implement and manage system for defect tracking as well as report generation.
- Manage release process of all system design.

Frank Lin

20+ years experience in electronics engineering, spearheading security and surveillance markets with development of systems products for analogue and digital video surveillance systems, global deployment of commercial and industrial IP security surveillance projects.

Effectively developed a plethora of engineered design solutions for military, homeland security, international airport security systems, and industrial security hardware.

Frank Lin

Career Achievements

• Engineering consultant in the deployment of the first large-scale, full *IP* video surveillance system in North America: **Terminal 1 of Pearson International Airport Toronto Canada**

• Engineering consultant in system-wide integration of digital video surveillance system in the United Kingdom: **BAA Heathrow International Airport, London UK**

• Participated in solution proposal and development of digital mobile video surveillance systems in subway and bus systems for **Stockholm Local Transit Authority, and Euromaint** (Video Surveillance System in Trains) Stockholm Sweden.

• Provided onsite customer technical support, training, trouble shooting for **Stockholm Local Transit Authority, and Euromaint** (Video Surveillance System in Trains) Stockholm Sweden.

Frank Lin

Related Employment History

Company: Jobana Technology Inc. (Toronto, Ontario)
Position: Founder, Product technical strategy and technology research and development, Future Surveillance System architecture research and development, Board of Director of HDcctv Alliance, Product and System Development Consultant to China Security Surveillance Technology Inc.
Date: 2010 – Present

Company: Visual Defence Inc. (Richmond Hill, Ontario)
Position: Product Manager, systems design and engineering, proof-of-concept prototyping and testing, technical coordination and support
Date: 2004 – 2010

Company: TV Ontario (Toronto, Ontario)
Position: Broadcast Technologist, testing and troubleshooting studio equipment, systems support
Date: 2004 – 2006

Company: Xiamen Hiray (China)
Position: Management of system design and deployment of Audio-Video and surveillance systems for commercial and industrial applications
Date: 1998 – 2001

Frank Lin

Certificates

- Bachelor of Science Electronic Engineering (BSEE) Shanghai Jiaotong University
- CCNA Certification
- MicroSoft Embedded XP Development Certification
- PMI/PMP (Project Management) in progress

Project Contributions

- Research and development of systems electronic architecture
- Prototyping hardware design
- Testing all facets of systems architecture for quantifiable specifications
- Troubleshooting and upgrade modifications as required

Enquiries:

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• Wayne Sabourin at: waynesabourin@hotmail.com or alternately by telephone, 416.262.7119 (Ontario, Canada)

PLEASE NOTE: