



WATCHSTANDER

TECHNOLOGY'S ANSWER TO MARITIME PIRACY™

The \$7 billion a year problem

A great deal has been written and said about the upsurge of maritime piracy in recent years. It's a huge problem that's estimated to cost the global community \$7 billion every year. It certainly causes untold personal harm and suffering to the unfortunate hostages while also threatening to paralyse large sections of the world economy.

It is imperative that freedom of the seas is protected. 95% of the world's goods are carried by ships. Maritime piracy threatens to destroy this freedom.

Sadly, the piracy problem is an immensely complex bundle of political, cultural, financial, legal, military, economic, social and commercial issues.

WatchStander's maritime security system cannot solve this problem by itself.

But it can *prevent gangs of pirates from boarding ships.*

How?

By using the most sophisticated, cost-effective, legal and non-lethal naval technologies.

This is a critical breakthrough for the world shipping industry until such time as the wider social and political problems are resolved.

WatchStander is the answer to maritime piracy.



The answer to maritime piracy

U.S. Military Technology

The U.S. Government has spent millions of dollars developing sophisticated technologies for use on U.S. warships to prevent successful attacks by terrorists or other adversaries. The systems are installed on most ships in the U.S. fleet and are proving their effectiveness almost daily.

The Applied Research Laboratory (ARL) of The Pennsylvania State University is one of the primary research and development facilities for these technologies. The ARL is one of the chief sources of intelligent controller technologies.

WatchStander LLC, aware of the impact piracy was having on the commercial marine industry, believed that some of the advanced technologies developed at ARL could be modified and adapted to provide a significant advance in counter-piracy capability.

In 2011, WatchStander LLC obtained a license from ARL to adapt these technologies to provide defence for seagoing commercial vessels, thus leveraging-off the millions of dollars already invested in them by the U.S. Government. This meant WatchStander LLC was able to complete these adaptations very rapidly and cost effectively.

WatchStander is the result. Any vessel fitted with WatchStander is correspondingly more secure from pirate attack than unprotected vessels. WatchStander strips would be attackers of the element of surprise then employs non-lethal weapon combinations in the proportional application of escalating force to cause attacks to be broken off.

This is how it works...



Long-range, high-resolution radar surveillance

The system uses radar to detect all targets within effective range. The eyes of the [WatchStander](#) system are a state-of-the-art, mast-mounted SIMRAD 4G radar scanner with a detection range of up to 40km. At this range it can pinpoint objects the size of a dolphin's dorsal fin or piece of driftwood with clarity.

The system tracks everything it detects; clouds, buoys, even seabirds... and then analyses those tracks.

In territories like the Indian Ocean, Gulf of Aden, and Arabian Sea there are thousands of vessels of all sizes going about their legitimate business: merchant vessels, ferries, passenger ships, commercial fishing boats and dhows.

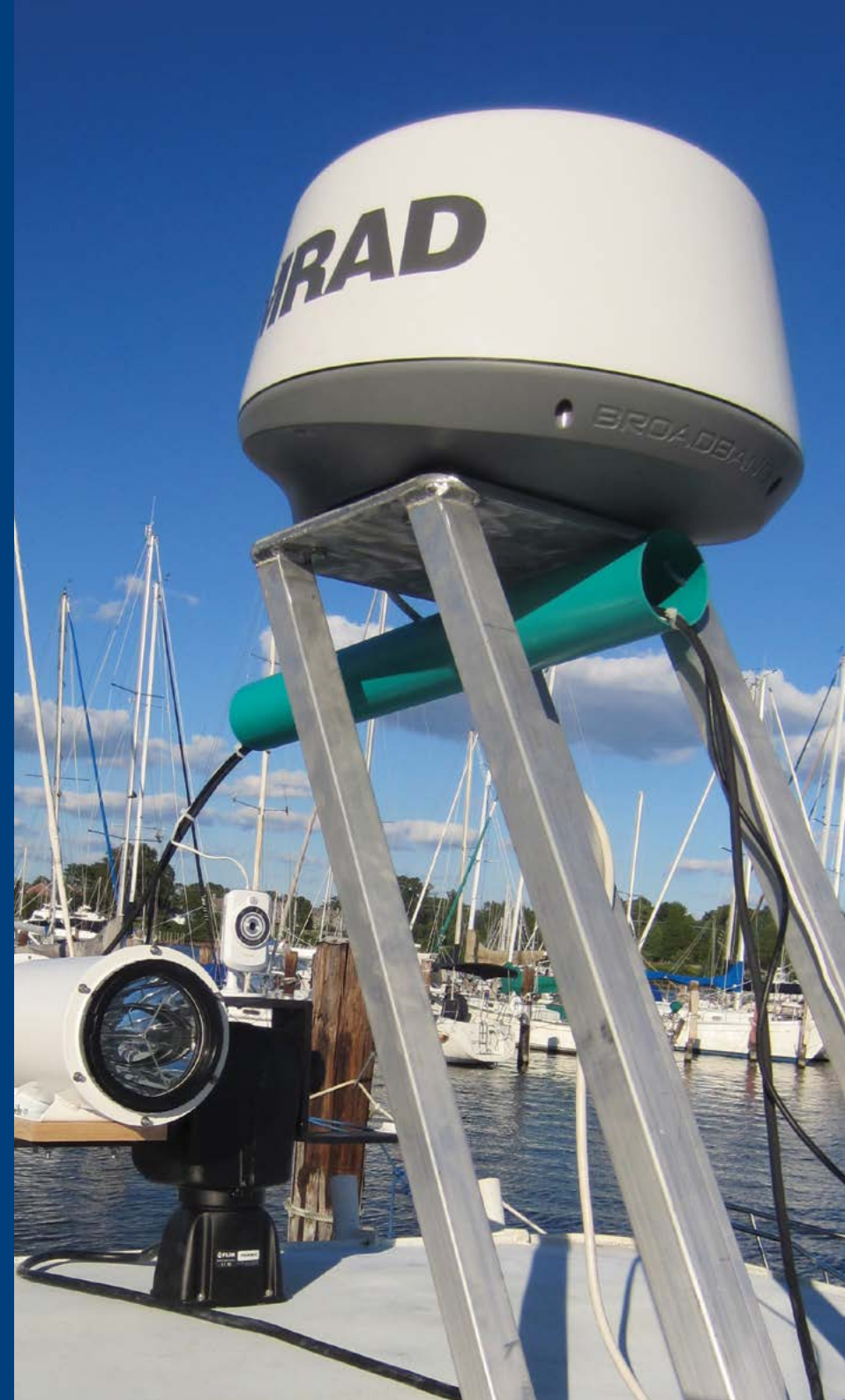
Some 40,000 vessels are spread across these 2 million square nautical miles of ocean going about their business. Unfortunately, so are the craft of some 140 pirate gangs.

The scanner will observe any vessel or object within range - there is a 1:286 chance that it will pose a potential pirate threat.

But which are small craft carrying potential pirates? Which are innocent fishermen or other seafarers?

The dilemma that masters, security teams and navies constantly face is that, legally, unidentified strangers acting suspiciously in a small craft aren't criminals until they've actually committed a crime. Of course, by the time the act of piracy has been committed, it's too late to repel the attack.

WatchStander resolves this dilemma.



Automatic 'antagonistic behaviour' recognition

This is the key to the effectiveness of the [WatchStander](#) system.

The system software is so sophisticated that it builds tracks of every potential target's behaviours and automatically determines which ones are likely to be pirates.

If any observed vessel conforms to the known pattern of pirate pursuit behaviour, the master and crew will be alerted. An automated defensive response will follow immediately.

Any vessel movement or behaviour characterised by, say, ceasing forward propulsion, launching skiffs, drifting, stalking, circling, following or changing direction to set a course toward the defended ship will trigger an instant alert.

Pirates on the suspicious vessel will become aware that their progress is being minutely observed at a range of three nautical miles.

[WatchStander](#) will identify them as a potential threat.

Because [WatchStander's](#) operation is fully automated, the ship's crew can take cover in a citadel or other safe location while [WatchStander](#) defends the ship.



Immediate automated defensive response - at distance

The pirates will know they are being tracked for three reasons:

1. The ship they are targeting will be sounding its siren in an alarm response.
2. A loud hailer within earshot of the pirates will warn them that the ship has a lethally-armed security team aboard (irrespective of this being the case).
3. 12 million candlepower light cannons, mounted on military-grade revolving pan/tilt platforms on the ship's bridge wings, will be directed toward them with unerring accuracy. It will continue to track and focus on them, at range, no matter which direction they take or what manoeuvres they adopt, though a 360° arc.

This sensory bombardment from the bridge-wing arsenal will continue automatically, irrespective of the steps taken by the master and crew to protect themselves, perhaps by resorting to the use of a reinforced 'citadel'.

Any innocent vessels inadvertently targeted will merely need to steer a course away from the 'prey' vessel to escape the activity.

The pirates may well choose to reappraise their options at this point. They rarely continue attacking vessels that are aware of their intentions and which may have armed security teams aboard.

This 'stand-off' warning state will not continue if the criminals persevere with their attack.



Progressively damaging, powerful unmanned countermeasures

The system automatically triggers one of the selected integrated countermeasures and engages the pirate craft with them.

The closer the suspect skiffs come to their intended 'prey', the more physically intolerable the close-tracking countermeasure weapons will become.

If the pirates elect to continue, facing a PeakBeam strobe light, they will expose themselves to an escalating risk of temporary damage to their eyesight. The US Navy Army and Marine Corps use this weapon because it is so effective.

Alternatively, powerful directional 'warbling' loud hailers could be emitting sounds at decibel levels which initially produce ear discomfort, then intolerable pain and finally expose attackers to risk hearing damage.

Another effective option are antipersonnel lasers from LaserSec.

Note: While damage from such devices is theoretically possible, in practice the instinctive human response is to rapidly retreat from the source of such intense, threatening discomfort.

Impenetrable, legal, non-lethal defence

If pirates persevere through the 800m range sensory barrage by using shields, defectors or some form of sensory protection devices to the point where they are within a 200 metre proximity of the ship, they may face other weapons which will cause painful injury.

Directional video cameras will record all this action. Importantly, the legal position of criminals or potential wrong-doers who choose to put themselves in harm's way, in face of an overwhelming threat, is very weak.

From the ship owners' viewpoint, arming a vessel with fixed, non-lethal weapons removes the regulatory hurdles and delays associated with bringing firearms aboard and into foreign ports.

WatchStander makes an attack an untenable option for pirates to take control of a vessel, irrespective of its speed, its freeboard, its cargo, its level of awareness or readiness - or the military capabilities of those on board.

The pirates will be temporarily physically incapacitated - long before the attack succeeds.

Note: If an armed security team is onboard, WatchStander can provide the team leader with prioritised targeting information to support the application of lethal force.

Round-the-clock, eagle-eyed, intelligent, inexhaustible, automatic, unyielding, relentless - WatchStander.

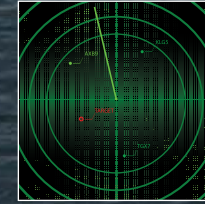
U.S. technology's answer to maritime piracy.



Crew take cover

On first 'threat' alert, officers and all hands take cover.

TARGET



Automatic antagonistic behaviour recognition

The system software tracks and analyses behaviour 'threats' and determines which craft are pirates.



ANY FREEBOARD ANY SPEED ANY VIABLE CONDITIONS

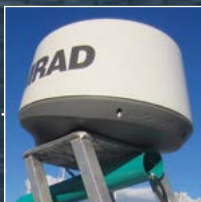


Approach prioritised

System attacks nearest of multiple assailants in changing 'close proximity' order.

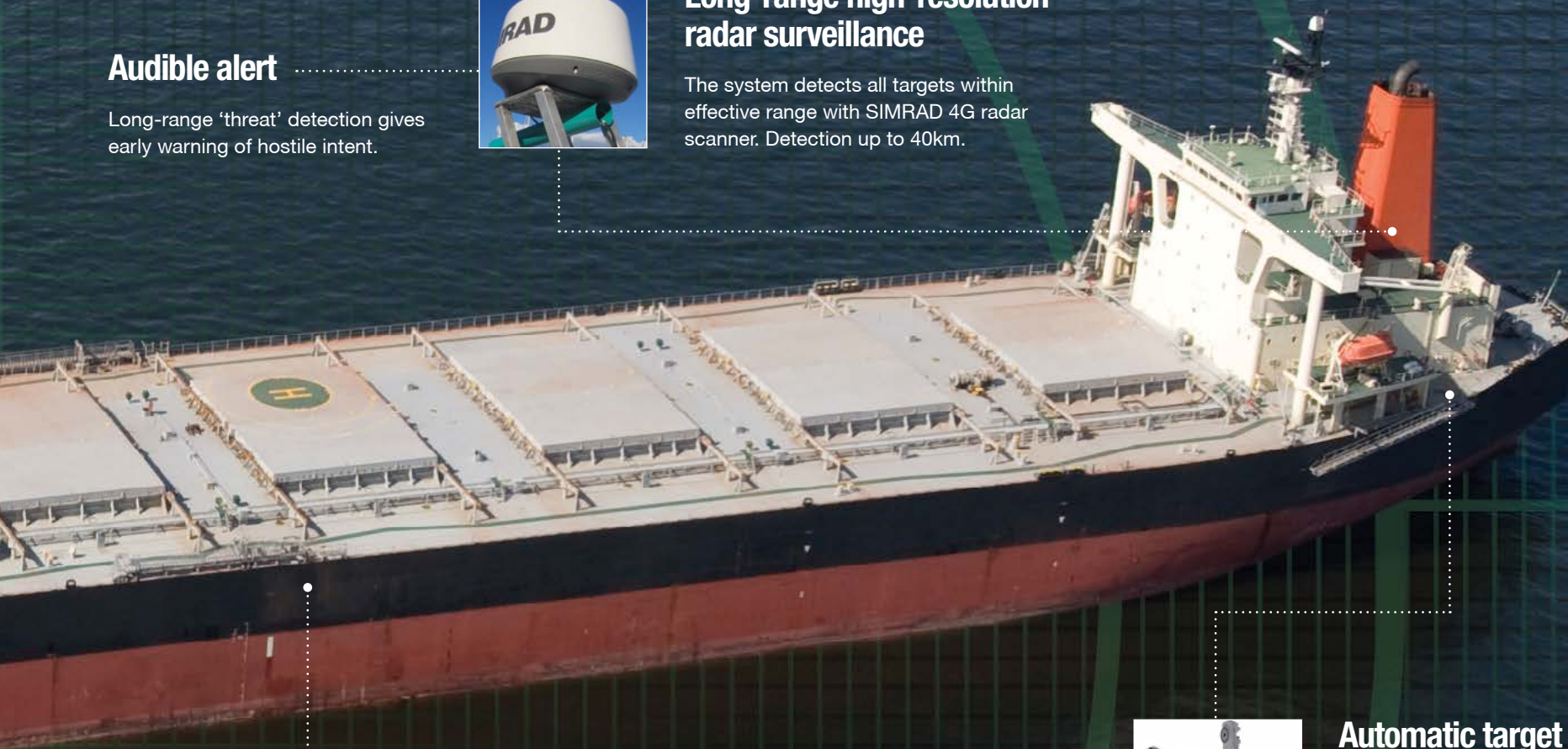
Audible alert

Long-range 'threat' detection gives early warning of hostile intent.



Long-range high-resolution radar surveillance

The system detects all targets within effective range with SIMRAD 4G radar scanner. Detection up to 40km.



Non-lethal weapons array with progressively injurious effect

A 12 million candle power highly-collimated searchlight induces temporary states of blindness (for 10-15 seconds) at a range of 800m to 1km. Injury progressively escalates with closer proximity.



Automatic target tracking

Deck and/or Bridge Wing mounted military grade pan/tilt 360° swivel platforms track/target assailants.

Our software

The naval surveillance data-recognition software adaptation at the heart of the [WatchStander](#) system was developed during the period November 2010 - September 2012 at the Advanced Research Laboratory (ARL) at Pennsylvania State University. The team involved in the adaptive commercial development also developed the original U.S. Navy software.

Pennsylvania State University

Over 1,000 academics, defence experts, scientists, engineers and technicians are deployed at this facility, tasked with keeping US forces at the forefront of military and weapons technology. From time to time, formerly 'top secret' military technologies are made available for wider commercial use, under the articles of the University's charter.

[WatchStander](#) is one such technology.

[WatchStander](#) LLC President, David Rigsby, who has a lifetime of experience in the perimeter surveillance and defence sector, has a long-standing association with ARL. He was among the first to recognise the value of naval perimeter security technology to maritime anti-piracy defence.

The progress of [WatchStander](#) was a race against the clock as piracy exploded in the Indian Ocean region. The Corporation was formed solely with this objective in mind. The Corporation, funded by private capital, is headquartered in the Northern Virginia suburbs of Washington, D.C. but maintains a European sales office in London.



Development and testing

It has been necessary to balance the urgent need for the [WatchStander](#) system to be brought into action against the need for careful scientific scrutiny and process. This has been achieved by adhering strictly to the standards laid down at ARL for its Government programmes.

On completion of the initial phases of development, tests were carried out on land to establish the functionality of the system and these were followed by exhaustive on-water trials off the U.S. coast, under the watchful eye of an independent accreditation agency.

Officials of the highly-respected 'Flag Victor' organisation have verified the system's performance.

The Countermeasure Suite

It is well-known in defence circles that there are occasions when the use of non-lethal weapons is indicated. An established, non-lethal weapons industry has emerged, providing a range of highly-sophisticated military-grade weapons offering varying degrees of capability to discourage, deter or defend against would-be assailants. The [WatchStander](#) system makes the fullest use of this category of weapons. In broad terms, these devices attack the sensory nerves of potential assailants, at distance, making it unpleasant or painful to persist in an attack. If the attack gathers momentum, the intensity of the sensory barrage increases to the point of being unbearable and then to the point of inflicting injury on the assailant.

Non-lethal countermeasures available in the [WatchStander](#) Suite include: light, sound, laser devices, pepper dispensing projectiles and evidence cameras. These devices are bridge-wing mounted on automatically-targeting, revolving 360° pan/tilt platforms.



Effective sea conditions

The **WatchStander** system is designed to function in any sea and weather conditions in which mounting a pirate attack from one or more small craft (skiff) would be viable. It is accepted that the use of small craft and crude boarding methods, such as grappling ladders and hooks, is limited to comparatively settled sea/weather conditions.

Installation and fitting

The **WatchStander** system is simple to install. Able electricians and fitters can comfortably install and test a system in approximately one working day. This can be undertaken by arrangement at any convenient port of call, minimising delay and downtime.

Training

The amount of training required by ship officers and crew is minimal. In effect, the system needs to be switched on and monitored from time to time. If an alert sounds, the main objective for the master, officers and crew will be to act in the interest of self-preservation. The system will automatically mount a defence without any intervention from those on board. When an attack is seen to have failed or the attackers have withdrawn out of the surveillance range, normal duties can be resumed. **WatchStander** will continue to provide defensive cover.

Maintenance, supplies, safety, reliability

The system requires no maintenance beyond the normal skills of crew members. Most of the countermeasure choices require no replenishment. When the countermeasures are deployed, they will be directed seaward toward the approaching craft. They are incapable of targeting the ship's crew, who will be in secure positions within the deck housing or below decks as the intensity of countermeasure weapons increases.

Future Enhancements

The initial WatchStander system is designed for the protection of a vessel underway. Future enhancements to the system will provide security for vessels in dock, at anchor or drifting.

The proprietary algorithms used in the **WatchStander** Core can be used to develop regional security systems including AIS information and SAR satellite data.

About us



David Andrew Rigsby

Founder & President

A military non-lethal perimeter security expert. David Rigsby has more than 30 years' experience of providing integrated technology solutions for difficult problems in the area of force protection, perimeter defence, and command and control technology, both in the U.S. and overseas.

David co-designed a non-lethal weapons based area security system with the Applied Research Laboratory of the Pennsylvania State University. He also developed a Concept of Operations (CONOPS) for the non-lethal weapons based Area Denial/Force Protection System for the United States Navy.



G. Robert Toney

Chairman

Mr. Toney is the Founder of Toney Capital Holdings, a marine related holding company headquartered in Fort Lauderdale, Florida.

Financial backing from Toney Capital Holdings has made it possible for WatchStander, a one-of-a-kind antipiracy and countermeasure system to debut in the commercial shipping market.

Toney is an active speaker at conferences specializing in vessel financing, international ship foreclosure and maritime legal matters. He is also a member of the Southeast Admiralty Law Institute and the Maritime Law Association.

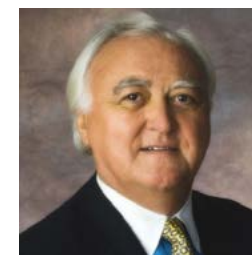


Mark Fitzgerald

Senior Vice President for Strategic & Maritime Affairs

Admiral Mark Fitzgerald earned a BSEE from Northeastern University in 1973 and an MSASE from University of West Florida in 1975. He was designated a naval aviator in October 1975. He retired from active duty on 1 December 2010, following a career of significant distinction.

Fitzgerald had operational control over the first NATO anti-piracy deployment near Somalia as well as numerous U.S. Navy deployments to the west coast of Africa. His experience in developing tactics and procedures to counter the piracy threat in both the Indian Ocean as well as the Gulf of Guinea make him a leader in the counter piracy arena.



Paul Slater

Chief Operating Officer, Marketing & Capital Development

Paul is a leading authority on Project Finance both domestic and international and is a global financial advisor to the Maritime and Energy industries.

His career has progressed from Commercial Banking to Investment Banking and Principal Investment Management and has included periods of corporate and financial restructuring.

An accomplished public speaker and writer, Paul is a regular contributor to numerous international trade and finance conferences as well as press and television commentary.

What the industry says

The **WatchStander** system was recently the subject of a multiple validation testing programme by maritime security and operations consultants from London based Flag Victor, who said:

*"We observed the functions and capabilities of the development version of **WatchStander** at initial dynamic trials conducted on The Chesapeake Bay in Maryland. We validated the system as successfully completing all test objectives in conformance with the projections of the company's management."*

David Gleisem

Director of expert maritime security
and operations consultancy Flag Victor

From the military perspective

"I have been aware of these types of electronic surveillance, recognition and defence systems for some time. The military versions, including the non-lethal countermeasures, are deployed on all the warships in the U.S. fleet."

"It will be fascinating to see whether this advanced U.S. technology will find a new role defending the world's maritime fleets against attack from pirates. In my view this will be a brilliant example of the cross-over of military innovation to a very important new civil purpose."

Admiral Mark Fitzgerald

Former Commander in Chief
of the U.S. European Fleet



TECHNICALSPEC

For the technically minded

WatchStander significantly shifts the advantage to the vessels it protects by:

- Detecting and identifying pirate vessels at ranges of up to 10km
- Detering attacks by signalling to pirates they have been detected and are being tracked in real time
- Disrupting pirates' abilities to conduct successful attacks
- Providing increased reaction time for evasive manoeuvres
- Documenting the entire engagement

Pirate vessels are identified by their behaviours, which are observed with long-range sensors. WatchStander uses a system of proprietary algorithms based on a patented technology from the Applied Research Laboratory (ARL) at The Pennsylvania State University (PSU) to automatically evaluate the radar tracks of all the vessels within effective radar range.

Once the pirate vessel has been identified, WatchStander uses a mixed suite of countermeasures to engage the encroaching vessel. The countermeasure response is graduated, with the impact on the pirate target increasing as the range to the protected vessel closes. This entire operation is automatic.

The WatchStander system was successfully tested in June 2012 at Pennsylvania State University. Independent, impartial appraisers attended the tests. Accredited dynamic on-water testing took place in September 2012.

Description of the WatchStander Engagement Process

The WatchStander system is comprised of three subsystems:

- 1) Sensor Suite – the sensor suite detects targets and provides data in a format usable by the WatchStander Core.
- 2) WatchStander Core – evaluates the sensor data to determine which targets are likely to be pirates before engaging with them.
- 3) Countermeasure Suite – the countermeasure suite uses a mix of documentation and countermeasure systems to strip the attack of the element of surprise and to degrade a pirate's ability to conduct a successful attack. The attack is also fully documented. All countermeasures used in the WatchStander system are non-lethal.

Ranges vary by composition of the target, its aspect angles and the type of radar versions employed. The initial WatchStander system is set to begin target evaluation at 10km but will be extended in later.



Step One

Detect and Identify (Evaluation)

Our broadband radar system is optimized to detect small and low metallic content targets in the marine environment. The radar operates continuously during transits of high threat areas. All targets detected by the radar are evaluated by the [WatchStander](#) Core to determine the possibility they are pirates.

When the radar detects a target, the data is passed to the [WatchStander](#) Core, which starts a track for the target. The system then evaluates the tracks for piracy related behaviours. The initial behaviours we have selected as being indicative of pirate behaviour include:

- Shadowing
- Probe and Withdrawal
- Spawning (target launches multiple smaller targets)
- Intercepting Course

If the target is evaluated to exhibit pirate behaviour, it is tagged as a potential pirate.

Step Two

Notify and Begin Tracking/Documentation (Initial Engagement)

Once a target has been identified as likely to be a pirate the [WatchStander](#) Core notifies the bridge watch that a probable pirate has been detected. Simultaneously, the [WatchStander](#) Core initiates the countermeasure suite operation.

The [WatchStander](#) Core computes range, reciprocal bearing, and declension angle to the pirate. The [WatchStander](#) Core then directs the Countermeasure Suite to track the target and operates the documentation and engagement systems against the target.

Documentation consists of operating a low-light, long-range capable camera against the target. This will provide incontrovertible evidence of the targets behaviour and level of hostility. The data captured by the camera will initially be stored onboard, but can be transmitted to a remote ground station.

The [WatchStander](#) Core will also direct a countermeasure system such as a combat tested, 12 million candlepower white spotlight or laser to the target and will track the target with that system. The target can see the light at about 3km. The pirate will be able to see the light is tracking their moves. This will eliminate any doubt they may have that they have been detected and the victim is alert to their presence and already reacting.

This step also allows the protected vessels to begin BMP 4 alarm, evasion and escape manoeuvres far earlier.

Step Three

Track and Escalate Engagement

If the pirate vessel is undeterred by the loss of surprise and being confronted with a fully alert victim, the WatchStander Core operates the Countermeasure Suite to disrupt the ability to conduct a successful attack. The spotlight used is the type in the U.S. Navy Ship Protection Program. Its strobing mode saturates the retina causing temporary black spots in the field of vision. The duration of the spots can be from a few seconds to several minutes. Because the temporary blindness is within the retina even if the pirate looks away from the light, he will still have impaired vision. Many people also experience nausea and disorientation along with the blindness.

This countermeasure can be employed at ranges up to 800m. The spotlight is our initial countermeasure, but others can be added, sound cannons and a compressed air launcher for a projectile filled with pepper spray capsules that can currently be used at ranges of 400m. Other proven, military-grade, non-lethal countermeasures are available. Effective countermeasures can be used at ranges of up to 1km.

We are also analysing and appraising certain and other countermeasure products.

WatchStander employs 'such short of lethal' force that neither training nor fanaticism will enable the pirates to make it through the defences. By using a mix and match of countermeasures, pirates will never know what combination to expect and prepare for.

The camera will be documenting the increasing use of non-lethal force brought to bear on the pirates (before resorting to the use of lethal force, where available).

Step Four

Prioritise Targeting Data for On-Board Security Team

If a security team with lethal means is onboard the protected vessel, the WatchStander Core will provide them with prioritised targeting data to support the most effective application of lethal force to stop the attack. Video documentation will clearly demonstrate that the master of the protected vessel tried multiple means of non-lethal defence before finally resorting to the use of lethal force.

1. Radar to Core Functionality

- Core receives data from radar in a format suitable for processing
- Core accurately detects contacts based on radar input
- Range to contact
- Bearing to contact
- Contact movement (speed and heading)
- Input accurately processed closely matches ground truth

2. Core Processing and Control Command Functionality

- Core accurately processes data to generate tracks of contact movement over time
- Core accurately identifies probably hostile targets from population of non-hostile contacts
- Core accurately tags probably hostile targets using a confidence threshold
- Where more than one hostile is identified, system prioritises targets
- Core generates screen display of tactical situation within pre-selected ranges
- Core provides an "alarm" when probably hostile targets are identified
- Core accurately computes tracking data for the Countermeasure Suite
- Core sends accurate commands to Countermeasure Suite

3. Countermeasure Suite Functionality

- Countermeasure Suite responds to commands from the Core – Pan/Tilt unit slews to correct target
- Countermeasure Suite systems operate correctly on command – Pan/Tilt Unit tracks correct target over time



WATCHSTANDER

TECHNOLOGY'S ANSWER TO MARITIME PIRACY™

Office:

1915 SW 21st Avenue
Fort Lauderdale, FL 33312-3113

Telephone: +1 754 224 4187

Fax: +1 754 224 4182

Email: info@watchstander.com

www.watchstander.com

The information in this document is accurate to the best of the publisher's knowledge and belief but is subject to revision or modification as technical, commercial or developmental events dictate. The content describes the WatchStander product range in general terms but does not form part of any contract, actual or implied.