COMPREHENSIVE PATENT PROFILE

A NEWLY PATENTED DEVICE AVAILABLE FOR LICENSING

PERSONAL SONAR SYSTEM

PATENT NO.: US 7,145,835 B2

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LICENSING OPPORTUNITY PRESENTED

The first-of-its-kind Personal Sonar System for underwater fish-finding and scuba diving has been conceived and patented and it is now available for licensing or sale. This system is a hand-held device that allows the user to read underwater topography, find distances to objects and keep track of fellow-divers. With the use of a pre-programmed database, it allows the user to identify fish and underwater animals for safety, sport fishing and scientific observation. In essence, it becomes the diver's underwater "sixth sense."

Its primary application would be a hand-held version incorporated into scuba diving suits that would include a high-resolution LCD screen, a hand grip, and a small control panel with control buttons. In this version, a battery pack could be integrated into the diver's weight belt.

Another application would be in the underside tail of a surfboard and would incorporate a warning output device on the top of the board that would alert the surfer if a shark were detected below. The same application could be used for wind-surfboards. The device also may be mounted to a boat.

The Personal Sonar System may be most of interest to divers and fire departments when scuba diving or searching in dark, murky waters. Midwest divers often practice in inland lakes or coal mining strip pits that have poor visibility. Likewise, fire department scuba divers often find themselves searching for persons in similar conditions. The Personal Sonar System would aid both.

Using a database of programmed information, the Personal Sonar System can, for the first time, make it easier to find and safer to explore diving wrecks. It can help researchers locate specific species of fish and animals. It can make dives more productive in less time and warn dive partners if they drift too far apart. Search and rescue drivers will appreciate the shortened searches made possible by the Personal Sonar System. It also can alleviate the concern of finding a boat when surfacing in stormy conditions.

Nothing on the market today resembles the Personal Sonar System. This patent has been written broadly enough to embrace GPS technology and internet and telecommunications technologies. Its patent paves the way to create the equivalent of an underwater Blackberry that not only receives information for the user, but knows where it is and what is around it.

Matthew Pope of Los Angeles, California, is the inventor and holder of the Personal Sonar System patent. He is a seasoned special effects technician for the movie industry. He first conceived the idea of a hand-held sonar system while working with explosions on the sea near the island of Kauai. When endangered monk seals surfaced in the area, the explosions had to cease and operations came to a halt. He realized that such a device could assist in the location of animals underwater for practical purposes, such as locating and counting Manatee, or for making sure areas are clear of animals when underwater construction is taking place. These practical uses expand the marketability of

the Personal Sonar System beyond the obvious uses of avoiding sharks or locating sport-fishing targets.

Once he was convinced of the practical usefulness of his invention and its marketability across at least four different niche markets, Mr. Pope then began a study of current technologies. He consulted qualified electrical engineers about the feasibility of the device. After completing his study, Mr. Pope was satisfied that the idea should be patented. He determined that it could be built and marketed successfully at a reasonable price point. Initial estimates set a potential retail cost of $700.00 or less for the Personal Sonar System where it includes a sonar transmitter and receiver and a display for outputting information. Inclusion of GPS and telecommunications features could be included in subsequent versions at an additional cost. Mr. Pope then made sure that the patent was awarded in such a form that it could encompass a broad range of features, which would protect the patent from potential competitors who might focus narrowly on one or two features.

The Personal Sonar System represents the confluence of the latest sonar and microprocessor technologies in a device that will be enthusiastically welcomed by fishermen, surfers, scuba divers and rescue divers around the world.

PRODUCT ANALYSIS

The basic components of the Personal Sonar System include a transmitter, a transducer, a receiver, a display or user-interface and a microprocessor. The microprocessor instructs the transmitter to emit sound waves that are sent through the water. When the sound wave strikes an object, it rebounds and returns to the transducer, after which time it is converted back to an electrical signal. This signal is amplified by the receiver and the detected signals are processed by the microprocessor. The display or user-interface keeps the user apprised of the current operating conditions and warns the user of large objects in the area. It also notifies the user if fellow divers are drifting further away.

In this patent, the Personal Sonar System includes a high-power transmitter, an efficient transducer, a sensitive receiver and a high resolution/contrast display. The high transmission power results in a strong signal returned to the unit. This is important in deep or murky waters. The high power output allows the detection of more distinct object detail. The receiver dampens extremely strong signals and amplifies small signals in order to get an effective readout. The Personal Sonar System has the capability to separate small targets that are close together into distinct, separate impulses for the display. At the same time, the system can distinguish between mobile and non-mobile objects to prevent confusing readings. The transducers also can be sequentially triggered to conserve energy and scan a wide area around the user.

Strength, Shape and Type of Sonar Beams.

Many configurations of sonar transducers may be used in the application of this patent. For instance, in one use, a single strong, narrow cone angle may be needed to detect the bottom in deep waters. This beam, however, would not detect many fish due to its narrow beam. Likewise, a wider cone angle would be more effective in shallower waters. This patent encompasses the use of one, two or three transducers of varying widths that may be configured one within the other or in a series of columns. They would be controlled by the user through buttons on a small control panel.

All of these reflected signals, as well as other signals in the target frequency range, are converted by the transducer from acoustic signals into electrical signals that are forwarded to a signal processor. The signal processor filters the transducer signals so that signals from the target objects are detected while the ambient non-target objects do not produce false detection readings. This filtering device used may be one of several types: frequency/amplitude, algorithm, an adaptive neural network which analyzes a number of input signals or any other filter that can remove ambient signals.

Signals Are Filtered for Information Desired.

This patent provides for an electronic filter that removes ambient noise from the electrical signals. This electronic filter includes a computer program that records an ambient signal while the sonar device is in a body of water. It also is capable of recording ambient signals from a second body of water and storing the information. An adaptive filter detects changes in the input signals and adapts to these changes. By adapting to changes in ambient sonar signals, the inventive system will remain accurate as the diver travels from shallow to deep water to wreckage areas. By filtering out these ambient and benign signals, the system can leave a specific frequency range open to detect potentially threatening fish or moving objects.

In another version of the Personal Sonar System that incorporates a neural network, the system may utilize additional input information such as temperature, depth, GPS location and other telecommunicated information, in addition to the sonar signals. This additional information allows the system to more accurately filter transducer signals and provide additional information to the user.

Broadband sonar transmission also can be incorporated into the Personal Sonar System. Broadband echoes contain more information because they encompass frequencies that provide greater backscatter within one fish species relative to others. By using the proper frequency and identifying the reflected signal pattern, the inventive sonar device can be tuned to detect the bladder of specific types of fish. Broadband sonar techniques are able to identify frequency-dependent fish bladder resonance for several species of fish. This can be particularly useful for identifying hazardous fish such as great white sharks and filtering out all other reflected signals, for example.

The patent allows for a comparison process that incorporates data to measure specific characteristics of the echo. The system may use feature information in the fuzzy neural network to determine the type of object being detected. This version may include a data acquisition processor (DAP), an analog-to-digital (A/D) converter with an onboard micro-processor that permits the PC-based system to handle the massive amount of data generated by sonar transmissions. If the system detects a matching signal, a warning signal is set to an output device.

The Output Device.

Output devices include: a visual display, an acoustic device, a vibration device or any other device that emits a signal the user can detect. The visual display may simply be a blinking high-visibility LED, or in another version a LCD screen that shows proximity and movement of the object relative to the user. Increased resolution allows small targets like fish and other fine detail to be accurately shown on the display. The screen may illustrate all objects that are in the presence of the transducer's cone angle. The user can look at the screen and determine where the objects are in relation to the individual as well as the size of the objects.

The Power Source.

The power to the Personal Sonar System may be supplied several ways. It may be supplied by rechargeable DC batteries that are carried in the scuba diver's weight belt, or by disposable batteries. The battery pack may be a separate unit connected to the system with a waterproof cable, or it may be integrated into the system. The system may also incorporate solar sells, for instance, when used in a surf board or when used by snorklers who are in shallow waters in sunny conditions. When the system is used as a fish-finder mounted to a boat, it uses a 12-volt battery.

MARKET ANALYSIS

Three broad markets comprise the population whose lives and enjoyment would be enhanced by the commercial launch of the Personal Sonar System. During 2006, manufacturers of scuba equipment sold over $375 million worth of products at wholesale, according to the Sporting Goods Manufacturer's Association. That means roughly $600 million worth was paid by consumers at the retail level for scuba equipment and clothing last year. That same year, 11 million Americans considered themselves regular scuba divers and snorklers. Among outdoor activities, fishing is one of the most popular, according to a Topline Participation Study published by the Sporting Goods Manufacturer's Association. It stated that 44 million people consider themselves regular freshwater fishermen and 12 million consider themselves regular saltwater sport fishermen. Law enforcement agencies across the United States are equipped with scuba diving teams.

The holder of this patent can market to each of these industries efficiently through traditional display advertising and direct mail media. Scuba diving and snorkeling are high-end activities whose participants regularly subscribe to industry magazines for the latest information about products, equipment and dive sites. Likewise, certified search and rescue divers may be reached through tight-knit certifying organizations and through law enforcement and fire department associations. Serious sport fishermen likewise scour publications and network among themselves to learn about the latest fishing equipment that can make their outings more successful and enjoyable. Trade shows abound that make it easy to meet sportsmen and divers face-to-face. Science and technology magazines will want to report on the device when it is in its prototype stages and while under development. Publicity opportunities will abound when it is ready to be launched on the market.

PATENT ANALYSIS

Matthew Pope of Los Angeles, Calif. was awarded a patent for the Personal Sonar System on December 5, 2006. The number issued to the patent is US 7,145,835 B2. The primary examiner for the patent was Ian J. Lobo. The attorney filing the patent was Paul K Tomita, Esq. of Dergosits & Noah LLP. There are 10 claims in the patent along with amendments dated October 10, 2006. The amendments were allowed and the patent was issued.

U.S. Patent Documents Sited in this patent includes the following:

3,800,273 A	3/1974	Rolle
5,463,597 A	10/1995	Harlev
6,226,227 B1	5/2001	Lent et al.
6,335,905 B1	1/2002	Kabel
6,678,209 B1	1/2004	Peng et al.
6,798,715 B1	9/2004	Harmon et al.
2005/0064774 A1	3/2005	Grune et al.

The abstract for this patent reads as follows:

"The sonar device includes a sonar transducer, a noise filter, a microprocessor and an output device. The system warns the user when a hazardous object is detected or when signals from companions decrease. The portable sonar device can be built into various water sport devices including scuba diving equipment, surfboards and wind surfboards."

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(12) **United States Patent**
Pope

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(45) **Date of Patent: Dec. 5, 2006**

(54) **PERSONAL SONAR SYSTEM**

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(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

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(51) **Int. Cl.**
H04B 11/00 (2006.01)
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(52) **U.S. Cl.** **367/131**; 367/910

(58) **Field of Classification Search** 367/910, 367/131

See application file for complete search history.

(56) **References Cited**

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3,800,273	A *	3/1974	Rolle	367/910
5,463,597	A *	10/1995	Harlev	367/910
6,226,227	B1 *	5/2001	Lent et al.	367/104
6,335,905	B1 *	1/2002	Kabel	367/98
6,678,209	B1 *	1/2004	Peng et al.	367/95
6,798,715	B1 *	9/2004	Harmon et al.	367/99
2005/0064774	A1 *	3/2005	Grune et al.	441/74

* cited by examiner

Primary Examiner—Ian J. Lobo
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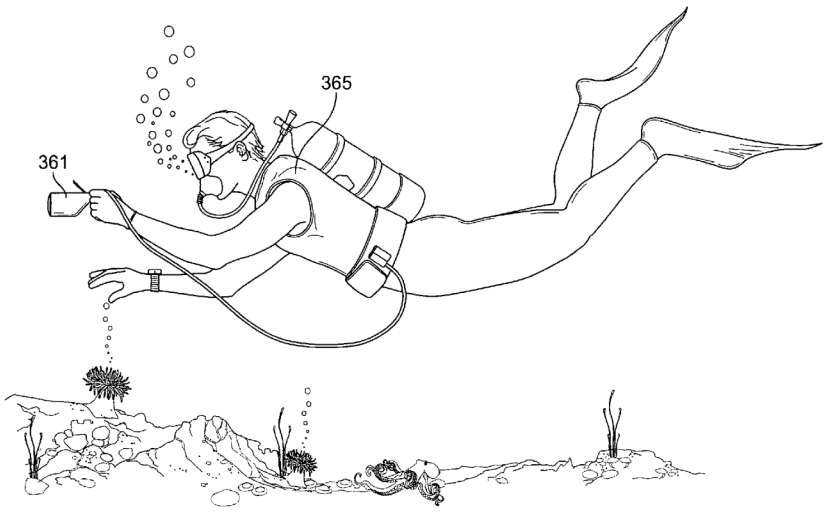
(57) **ABSTRACT**

The sonar device includes a sonar transducer, a noise filter, a microprocessor and an output device. The system warns the user when a hazardous objects is detected or when signals from companions decrease. The portable sonar device can be built into various watersport devices including scuba diving equipment, surfboards and windsurfboards.

10 Claims, 3 Drawing Sheets



COMPETITIVE PRODUCTS ANALYSIS

Nothing on the market resembles the high-tech problem-solving design of the Personal Sonar System. No previous patents embody the features of the Personal Sonar System and none sited in the Personal Sonar System patent are commercially successful. Certain patents sited do embody one or another feature of the Personal Sonar System but none contain them all.

US Patent No. 6,335,905 B1, "Method for Elimination of Passive Noise Interference in Sonar" was referenced in the Matthew Pope patent. In that patent, "A sonar depth sounder device and method for processing echo signals, reflected from objects within a body of water, utilizes a processor, a memory, a display, and a keypad connected to the processor. The receiver receives sonar signals indicative of ambient noise in an underwater environment. The processor receives an electrical signal representative of the ambient noise, and calculates a detection threshold." This device, however, must be mounted to a boat and is designed for use as a depth finder.

US Patent No. 6,226,227 B1, "Manual Scan Imaging Sonar" integrates multiple technologies into a compact single beam sonar having the ability to scan underwater objects and display information on a screen. It may be hand-held or used topside. It does not, however, record ambient noise in the water, nor does it have filtering capabilities. It cannot store data about fish and underwater objects such as wrecks.

US Patent No. 5,463,597, "Fish Locator" is a system for communicating to a fisherman information relating to fish in the vicinity of a fishing lure or hook which is connected to a conventional fishing line with a float. While helpful, the invention does not compete with the Personal Sonar System.

US Patent No. 6,798,715 B2 "Biomimetic Sonar System and Method" ensonifies submerged objects, digitizes acoustic images reflected from the ensonified objects, and classifies and stores the digitized images using electronic processing believed similar to that biologically created by the bottlenose dolphin. The invention can compare recorded images with a library of acoustic images for identification. It does not have the ability to filter signals for specific frequencies desired, nor does it record and filter ambient noise in the water.

US Patent No. 6,678,209 B1 "Apparatus and Method for Detecting Sonar Signals in a Noisy Environment" provides for the continuous maintenance of reliable measurements even in the presence of sporadic interference. It does this by monitoring environmental noise spectrum over the range of operable sonar frequencies, and automatically changing the system sonar transmission frequency and its dependent components in order to avoid the detected interference frequencies. That is the only feature of which it is capable that is found in the Personal Sonar System.

On the commercial market NorCross Marine Products, Inc has introduced the HawkEye Handheld Sonar System PX. It is a hand-held underwater depth finder, temperature gauge and fish finder. It cannot, however, cast a wide sonar beam, identify fish or store information relating to topography or underwater wrecks.

Marine Sonic Technology, LTD has marketed the Sea Scan PC. It incorporates side-scan sonar, a personal computer for control, display and recording features and can be connected to a floating antenna to receive global positioning information. It does not, however, have the capability of being tuned to filter out signals other than those desired. It cannot be programmed with information about fish and underwater objects that the diver may want to identify nor can it record and filter ambient noise.

Only the Personal Sonar System has received a patent that encompasses the latest sonar and microprocessing technologies to create a revolutionary new safety and rescue device. It truly provides the diver with an underwater "sixth sense".

FINANCIAL ANALYSIS

With an estimated 11 million active SCUBA divers in the U.S. only a small percentage are needed to be purchasers of the Personal Sonar System for this to be a profitable addition to a product line.

The inventor has estimated the initial manufacturing cost to be in the range of $250, with a sales price of around $700. Assuming a wholesale markup of approximately 40%, a manufacturer could realize a 200% profit margin on the product.

At an annual acceptance rate of $1/10^{th}$ of 1 percent of all divers, the Personal Sonar System could realize sales of 11,000 units. This would equate to revenues of over $5 million per year. One can easily see that as the product gains acceptance these numbers can grow dramatically. By adding new features and new configurations the sales numbers can also increase.

Please remember that these numbers do not address other markets such as fishing and underwater rescue, and are intended to only give you and idea of the potential of the product.

LICENSING INFORMATION

Matthew Pope, the inventor of the Personal Sonar System, has engaged the services of Tallgrass Technology Partners, LLC to represent him in the licensing and technology transfer of the patent and its associated rights. Tallgrass Technology Partners, LLC has over forty years of combined experience in the licensing of patented technologies and Angel Investment and Venture Capital financing.

Tallgrass Technology Partners, LLC is currently offering the Personal Sonar System for licensing. Attractive opportunities are available.

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