

Device to overcome sense of sight and hear



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SENSE OF SIGHT.... The eyes are sensory organs. They keep the brain updated with information about what is happening around the body. Both contain millions of tiny sensors that send messages along nerves to the brain. Sensors in the eyes respond to light and, through the brain, let us see the world. Sensors in the skin respond to touch and allow us to feel. * * * *

The seeing eye... Light enters the eye through the clear cornea. It then passes through the pupil and is focused by the lens on the retina. This thin layer covers the back of the eye and contains cells that are sensitive to light.

When light hits the cells, they send signals to the brain. There, the signals are turned into pictures so we can see. Telescope... A telescope is an instrument that aids in the observation of remote objects by collecting electromagnetic radiation (such as visible light). The first known practical telescopes were invented in the Netherlands at the beginning of the 17th century, using glass lenses. They found use in terrestrial applications and astronomy. Within a few decades, the reflecting telescope was invented, which used mirrors.

In the 20th century many new types of telescopes were invented, including radio telescopes in the 1930s and infrared telescopes in the 1960s. The word telescope now refers to a wide range of instruments detecting different regions of the electromagnetic spectrum, and in some cases other types of detectors. History... The earliest recorded working telescopes were the refracting telescopes that appeared in the Netherlands in 1608. Their development is credited to three individuals: Hans Lippershey and Zacharias Janssen, who were spectacle makers in Middelburg, and Jacob Metius of Alkmaar. 4] Galileo heard about the Dutch telescope in June 1609, built his

own within a month,[5] and greatly improved upon the design in the following year. The idea that the objective, or light-gathering element, could be a mirror instead of a lens was being investigated soon after the invention of the refracting telescope. [6] The potential advantages of using parabolic mirrors—reduction of spherical aberration and no chromatic aberration—led to many proposed designs and several attempts to build reflecting telescopes. 7] In 1668, Isaac Newton built the first practical reflecting telescope, of a design which now bears his name, the Newtonian reflector. The invention of the achromatic lens in 1733 partially corrected color aberrations present in the simple lens and enabled the construction of shorter, more functional refracting telescopes. Reflecting telescopes, though not limited by the color problems seen in refractors, were hampered by the use of fast tarnishing speculum metal mirrors employed during the 18th and early 19th century—a problem alleviated by the introduction of silver coated glass mirrors in 1857,[8] and aluminized mirrors in 1932. 9] The maximum physical size limit for refracting telescopes is about 1 meter (40 inches), dictating that the vast majority of large optical researching telescopes built since the turn of the 20th century have been reflectors. The largest reflecting telescopes currently have objectives larger than 10 m (33 feet). The 20th century also saw the development of telescopes that worked in a wide range of wavelengths from radio to gamma-rays. The first purpose built radio telescope went into operation in 1937. Since then, a tremendous variety of complex astronomical instruments have been developed.

How to use... * Find an area where the items you wish to view aren't obstructed by trees to set up your telescope so that you get a clear view of

the sky. * Look to see if your telescope has a polar axis. If it does, it will track whatever you are looking at. If you have a telescope with a polar axis, follow your manufacturer's directions on how to align the polar axis and the finder scope. * Select the eyepiece with the lowest magnification that you have. Always start with the lowest magnification eyepiece until you become more experienced in using your telescope. Locate the item in the night sky that you wish to observe and focus in on it. Move the planet or star you are viewing as close to the center of the field of view in the eyepiece as possible. * Remove the low magnification eyepiece and replace it with an eyepiece with a higher magnification. * Readjust the alignment of the telescope when the planet or star drifts out of view if you have a manual telescope mount. * Continue in this manner, observing different visible planets and stars.

Binoculars ...

Binoculars, field glasses or binocular telescopes are a pair of identical or mirror-symmetrical telescopes mounted side-by-side and aligned to point accurately in the same direction, allowing the viewer to use both eyes (binocular vision) when viewing distant objects. Most are sized to be held using both hands, although sizes vary widely from opera glasses to large pedestal mounted military models. Many different abbreviations are used for binoculars, including glasses, nocs , noculars , binos and bins. Unlike a (monocular) telescope, binoculars give users a three-dimensional image: for nearer objects the two views, presented to each of the viewer's eyes from slightly different viewpoints, produce a merged view with an impression of depth. History ... No sooner was the telescope invented in than the early 1600s than did astronomers get the idea of mounting two of them together,

effectively inventing the first binoculars. Galileo (who is often falsely credited with having invented binoculars) adapted an earlier design, using optics that combined convex and concave lenses to create a magnifying effect just like that used today in the cheapest nonprismatic glasses marketed for sports or theater viewing, or for use by children.

In the mid-1850s, Ignazio Porro of Italy patented a design using two prisms constructed in a Z shape to present the viewer with an image that not only is better magnified, but has depth. The Porro prism design was followed a few decades later by the roof prism, in which the prisms are constructed in one unit. Soon, binoculars were adapted for military use, and were employed during the Civil War. Quality made a big jump around the turn of the 19th century, and continued to be refined in the early 1900s. With the advent of World War II, more manufacturers entered the binoculars market, including, in the United States, Bausch ; Lomb.

Germany continued with its production of highly regarded binoculars, with a few changes. For example, Zeiss, one of the top names in binoculars, experienced a confusing shift, with a new factory established in East Germany under Russian control with the Zeiss name while another factory named Zeiss was began exporting from West Germany, according to a history in the 1961 book *Binoculars and Scopes and Their Uses in Photography*, by Robert J. and Elsa Reichert. Japan exports binoculars via various manufacturers, and some U. S. ompanies import Japanese-made binoculars but sell them under the U. S. company name. How to use... * Put the binocular strap around your neck. Wearing the neck-strap gives you the ability to use both hands while you are using the binoculars. * Adjust the

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barrels of the binoculars — each side you look into — to the width of your face. Generally, all you need to do is move the barrels closer together or further apart as you hold the binoculars up to your eyes. If you have adjusted the binoculars correctly, you should not see a black “ border” when you look through the eyepieces. Locate the central focus wheel, usually in the middle of the two barrels of the binoculars. Turn the wheel slowly as you look at a particular object in the distance to get the best focus for your eyes. * Fine-tune your viewing even more if you have a diopter focus mechanism on your binoculars. Not all binoculars have this focus element, which helps compensate for the difference in vision that you might experience in each of your eyes. The diopter focus adjustment wheel is usually on the right-hand barrel. * Keep both eyes open as you view your target objects.

You might need to re-focus from time to time. * Clean your binoculars after using them. A soft, damp cloth is sufficient for the body of the binoculars. Treated tissue paper used to clean cameras and eye glasses is safe for wiping the lenses. Store binoculars in their carrying case when you're not using them. Microscope ... A microscope (from the Ancient Greek: ?????? , mikros, “ small” and ?????? , skopein, “ to look” or “ see”) is an instrument used to see objects that are too small for the naked eye. The science of investigating small objects using such an instrument is called microscopy .

Microscopic means invisible to the eye unless aided by a microscope. There are many types of microscopes, the most common and first to be invented is the optical microscope which uses light to image the sample. Other major types of microscopes are the electron microscope (both the transmission
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electron microscope and the scanning electron microscope) and the various types of scanning probe microscope History ... The first microscope to be developed was the optical microscope, although the original inventor is not easy to identify. An early microscope was made in 1590 in Middelburg, Netherlands. 1] Two eyeglass makers are variously given credit: Hans Lippershey (who developed an early telescope) and Zacharias Janssen. Giovanni Faber coined the name microscope for Galileo Galilei's compound microscope in 1625 [2] (Galileo had called it the "occholino" or "little eye").

How to use.... * When moving your microscope, always carry it with both hands (Figure 1, below). Grasp the arm with one hand and place the other hand under the base for support. * Turn the revolving nosepiece so that the lowest power objective lens is "clicked" into position (This is also the shortest objective lens). Your microscope slide should be prepared with a coverslip or cover glass over the specimen. This will help protect the objective lenses if they touch the slide. Place the microscope slide on the stage and fasten it with the stage clips. You can push down on the back end of the stage clip to open it. * Look at the objective lens and the stage from the side (Figure 2) and turn the coarse focus knob so that the objective lens moves downward (or the stage, if it moves, goes upward). Move it as far as it will go without touching the slide! * 5.

Now, look through the eyepiece and adjust the illuminator (or mirror) and diaphragm (Figure 3) for the greatest amount of light. ||| * Slowly turn the coarse adjustment so that the objective lens goes up (away from the slide). Continue until the image comes into focus. Use the fine adjustment, if available, for fine focusing. If you have a microscope with a moving stage,

then turn the coarse knob so the stage moves downward or away from the objective lens. * Move the microscope slide around so that the image is in the center of the field of view and readjust the mirror, illuminator or diaphragm for the clearest image. Now, you should be able to change to the next objective lenses with only minimal use of the focusing adjustment. Use the fine adjustment, if available. If you cannot focus on your specimen, repeat steps 4 through 7 with the higher power objective lens in place. Do not allow the objective lens to touch the slide! * The proper way to use a monocular microscope is to look through the eyepiece with one eye and keep the other eye open (this helps avoid eye strain). If you have to close one eye when looking into the microscope, it's ok. Remember, everything is upside down and backwards.

When you move the slide to the right, the image goes to the left! * Do not touch the glass part of the lenses with your fingers. Use only special lens paper to clean the lenses. * When finished, raise the tube (or lower the stage), click the low power lens into position and remove the slide. * Always keep your microscope covered when not in use. Submarine... A submarine is a watercraft capable of independent operation underwater. It differs from a submersible, which has more limited underwater capability. The term submarine most commonly refers to a large crewed autonomous vessel.

However, historically or colloquially, submarine can also refer to medium-sized or smaller vessels (midget submarines, wet subs), remotely operated vehicles or robots. The adjective submarine, in terms such as submarine cable, means "under the sea". The noun submarine evolved as a shortened form of submarine boat (and is often further shortened to sub). [1] For <https://assignbuster.com/device-to-overcome-sense-of-sight-and-hear/>

reasons of naval traditions submarines are usually referred to as “boats” rather than as “ships”, regardless of their size. Although experimental submarines had been built before, submarine design took off during the 19th century, and they were adopted by several navies.

Submarines were first widely used during World War I (1914–1918) and now figure in many large navies. Military usage includes attacking enemy surface ships or submarines, aircraft carrier protection, blockaderunning, ballistic missile submarines as part of a nuclear strike force, reconnaissance, conventional land attack (for example using a cruise missile), and covert insertion of special forces. Civilian uses for submarines include marine science, salvage, exploration and facility inspection/maintenance.

Submarines can also be modified to perform more specialized functions such as search-and-rescue missions or undersea cable repair.

Submarines are also used in tourism, and for undersea archaeology. Most large submarines consist of a cylindrical body with hemispherical (and/or conical) ends and a vertical structure, usually located amidships, which houses communications and sensing devices as well as periscopes. In modern submarines this structure is the “sail” in American usage, and “fin” in European usage. A “conning tower” was a feature of earlier designs: a separate pressure hull above the main body of the boat that allowed the use of shorter periscopes.

There is a propeller (or pump jet) at the rear and various hydrodynamic control fins as well as ballast tanks. Smaller, deep diving and specialty submarines may deviate significantly from this traditional layout.

Submarines have one of the largest ranges of capabilities in any vessel, ranging from small autonomous examples to one- or two-person vessels operating for a few hours, to vessels which can remain submerged for 6 months such as the Russian Typhoon class - the biggest submarines ever built and in use. Submarines can work at greater depths than are survivable or practical for human divers.

Modern deep diving submarines are derived from the bathyscaphe, which in turn was an evolution of the diving bell. History... The first submersible of which we have reliable information on its construction was built in 1620 by Cornelius Drebbel, a Dutchman in the service of James I of England. It was created to the standards of the design outlined by English mathematician William Bourne. It was propelled by means of oars. The precise nature of the submarine type is a matter of some controversy; some claim that it was merely a bell towed by a boat. Two improved types were tested in the Thames between 1620 and 1624.

In 2002 a two-person version of Bourne's design was built for the BBC TV programme Building the Impossible by Mark Edwards, and successfully rowed under water at Dorney Lake, Eton. Though the first submersible vehicles were tools for exploring under water, it did not take long for inventors to recognize their military potential. The strategic advantages of submarines were set out by Bishop John Wilkins of Chester, England, in *Mathematicall Magick* in 1648: 1. This private: a man may thus go to any coast in the world invisibly, without discovery or prevented in his journey. 2.

This safe, from the uncertainty of Tides, and the violence of Tempests, which do never move the sea above five or six paces deep. From Pirates and Robbers which do so infest other voyages; from ice and great frost, which do so much endanger the passages towards the Poles. 3. It may be of great advantages against a Navy of enemies, who by this may be undermined in the water and blown up. 4. It may be of special use for the relief of any place besieged by water, to convey unto them invisible supplies; and so likewise for the surprisal of any place that is accessible by water. 5.

It may be of unspeakable benefit for submarine experiment How it work... The adaptations and inventions that allow sailors to not only fight a battle, but also live for months or even years underwater are some of the most brilliant developments in military history. In this article, you will see how a submarine dives and surfaces in the water, how life support is maintained, how the submarine gets its power, how a submarine finds its way in the deep ocean and how submarines might be rescued. Ultrasound scanning device... Ultrasound is a cyclic sound pressure wave with a frequency greater than the upper limit of the human hearing range.

Ultrasound is thus not separated from “ normal” (audible) sound based on differences in physical properties, only the fact that humans cannot hear it. Although this limit varies from person to person, it is approximately 20 kilohertz (20, 000 hertz) in healthy, young adults. Ultrasound devices operate with frequencies from 20 kHz up to several gigahertz. Ultrasound is used in many different fields. Ultrasonic devices are used to detect objects and measure distances. Ultrasonic imaging (sonography) is used in human

and veterinary medicine. In non-destructive testing of products and structures, ultrasound is used to detect invisible flaws.

Industrially, ultrasound is used for cleaning and for mixing, and to accelerate chemical processes. Organisms such as bats and porpoises use ultrasound for locating prey and obstacles. Ultrasonics is the application of ultrasound. Ultrasound can be used for imaging, detection, measurement, and cleaning. At higher power levels ultrasonics are useful for changing the chemical .

History ... Acoustics, the science of sound, starts as far back as Pythagoras in the 6th century BC, who wrote on the mathematical properties of stringed instruments. Sir Francis Galton constructed a whistle producing ultrasound in 1893.

The first technological application of ultrasound was an attempt to detect icebergs by Paul Langevin in 1917. The piezoelectric effect discovered by Jacques and Pierre Curie in 1880 was useful in transducers to generate and detect ultrasonic waves in air and water. [2] Echolocation in bats was discovered by Lazzaro Spallanzani in 1794, when he demonstrated that bats hunted and navigated by inaudible sound and not vision. How it works...

There are many reasons to get an ultrasound. Perhaps you're pregnant, and your obstetrician wants you to have an ultrasound to check on the developing baby or determine the due date.

Maybe you're having problems with blood circulation in a limb or your heart, and your doctor has requested a Doppler ultrasound to look at the blood flow. Ultrasound has been a popular medical imaging technique for many years. Ultrasound or ultrasonography is a medical imaging technique that

uses high frequency sound waves and their echoes. The technique is similar to the echolocation used by bats, whales and dolphins, as well as SONAR used by submarines. In this article, we'll look at how ultrasound works, what type of ultrasound techniques are available and what each technique can be used for.

Magnifying glass... A magnifying glass (called a hand lens in laboratory contexts) is a convex lens that is used to produce a magnified image of an object. The lens is usually mounted in a frame with a handle (see image). A sheet magnifier consists of many very narrow concentric ring-shaped lenses, such that the combination acts as a single lens but is much thinner. This arrangement is known as a Fresnel lens. The magnifying glass is an icon of detective fiction, particularly that of Sherlock Holmes. History ...

The earliest evidence of " a magnifying device, a convex lens forming a magnified image" was Aristophanes's " lens", from 424 BC, a glass globe filled with water. (Seneca wrote that it could be used to read letters " no matter how small or dim"). [1] Roger Bacon described the properties of a magnifying glass in 13th-century England. Eyeglasses were developed in 13th-century Italy. How it works... The magnification of a magnifying glass depends upon where it is placed between the user's eye and the object being viewed, and the total distance between them.

The magnifying power is equivalent to angular magnification (this should not be confused with optical power, which is a different quantity). The magnifying power is the ratio of the sizes of the images formed on the user's retina with and without the lens. [3] For the " without" case, it is typically assumed that the user would bring the object as close to the eye as possible

without it becoming blurry. This point, known as the near point, varies with age. In a young child it can be as close as 5 cm, while in an elderly person it may be as far as one or two metres.

Magnifiers are typically characterized using a “standard” value of 0.25 m. The highest magnifying power is obtained by putting the lens very close to the eye and moving the eye and the lens together to obtain the best focus.

The object will then typically also be close to the lens. Sense of hearing...

Hearing, auditory perception, or audition is the ability to perceive sound by detecting vibrations, changes in the pressure of the surrounding medium through time, through an organ such as the ear. Sound may be heard through solid, liquid, or gaseous matter. It is one of the traditional five senses.

The inability to hear is called deafness. In humans and other vertebrates, hearing is performed primarily by the auditory system: vibrations are detected by the ear and transduced into nerve impulses that are perceived by the brain (primarily in the temporal lobe). Like touch, audition requires sensitivity to the movement of molecules in the world outside the organism.

Both hearing and touch are types of mechanosensation. Stethoscope ...

The stethoscope is an acoustic medical device for auscultation, or listening to the internal sounds of an animal or human body.

It is often used to listen to lung and heart sounds. It is also used to listen to intestines and blood flow in arteries and veins. In combination with a sphygmomanometer, it is commonly used for measurements of blood pressure. Less commonly, “mechanic’s stethoscopes” are used to listen to

internal sounds made by machines, such as diagnosing a malfunctioning automobile engine by listening to the sounds of its internal parts.

Stethoscopes can also be used to check scientific vacuum chambers for leaks, and for various other small-scale acoustic monitoring tasks.

A stethoscope that intensifies auscultatory sounds is called phonendoscope.

History... The stethoscope was invented in France in 1816 by Rene Laennec at the Necker-Enfants Malades Hospital in Paris. [1] It consisted of a wooden tube and was monaural. His device was similar to the common ear trumpet, a historical form of hearing aid; indeed, his invention was almost indistinguishable in structure and function from the trumpet, which was commonly called a "microphone". The first flexible stethoscope of any sort may have been a binaural instrument with articulated joints not very clearly described in 1829. 2] In 1840, Golding Bird described a stethoscope he had been using with a flexible tube. Bird was the first to publish a description of such a stethoscope but he noted in his paper the prior existence of an earlier design (which he thought was of little utility) which he described as the snake ear trumpet. Bird's stethoscope had a single earpiece. [3] In 1851, Irish physician Arthur Leared invented a binaural stethoscope, and in 1852 George Cammann perfected the design of the instrument for commercial production, which has become the standard ever since.

Cammann also wrote a major treatise on diagnosis by auscultation, which the refined binaural stethoscope made possible. By 1873, there were descriptions of a differential stethoscope that could connect to slightly different locations to create a slight stereo effect, though this did not become a standard tool in clinical practice. The medical historian Jacalyn

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Duffin has argued that the invention of the stethoscope marked a major step in the redefinition of disease from being a bundle of symptoms, to the current sense of a disease as a problem with an anatomical system even if there are no noticeable symptoms.

This re-conceptualization occurred in part, Duffin argues, because prior to the stethoscopes, there were no non-lethal instruments for exploring internal anatomy. [4] Rappaport and Sprague designed a new stethoscope in the 1940s, which became the standard by which other stethoscopes are measured, consisting of two sides, one of which is used for the respiratory system, the other for the cardiovascular system. The Rappaport-Sprague was later made by Hewlett-Packard. HP's medical products division was spun off as part of Agilent Technologies, Inc. , where it became Agilent Healthcare.

Agilent Healthcare was purchased by Philips which became Philips Medical Systems, before the walnut-boxed, \$300, original Rappaport-Sprague stethoscope was finally abandoned ca. 2004, along with Philips' brand (manufactured by Andromed, of Montreal, Canada) electronic stethoscope model. The Rappaport-Sprague model stethoscope was heavy and short (18-24 in (46-61 cm)) with an antiquated appearance recognizable by their two large independent latex rubber tubes connecting an exposed-leaf-spring-joined-pair of opposing "f"-shaped chrome-plated brass binaural ear tubes with a dual-head chest piece.

How to use... * Clean off the earpieces before placing the stethoscope into your ears, especially if others share it or you seldom use it. In the hospital, earpieces are wiped with alcohol prep swabs. * Hold the chest piece between

your palms to warm it before placing it on a person's chest. Thirty seconds is usually long enough to remove the chill. * Place the stethoscope into your ears. * Hold the chest piece in your hand. With the other hand, tap a finger against the chest piece and listen. Many stethoscopes have reversible heads, which can be incompletely swiveled and block sound. Grip the chest piece between your middle and index fingers to provide firm contact with the skin. * To minimize extraneous noises, avoid touching or rubbing the tubing or chest piece against clothing, bedcovers or hair. * Place the chest piece onto the part of the body you want to listen to. For the heart, this is a few inches above the left nipple. You should hear a steady " lub dub. " This is known as the apical pulse. * Store your stethoscope so that the tubing isn't kinked when you put it away. In hospitals, when stethoscopes are not being used, they're generally hung by their earpieces so that the tubing can dangle freely.

Loudhailer... A megaphone, speaking-trumpet, bullhorn, blowhorn, or loud hailer is a portable, usually hand-held, cone-shaped acoustic horn used to amplify a person's voice or other sounds and direct it in a given direction. The sound is introduced into the narrow end of the megaphone, by holding it up to the face and speaking into it, and the sound waves radiate out the wide end. The megaphone increases the volume of sound by increasing the acoustic impedance seen by the vocal cords, matching the impedance of the vocal cords to the air, so that more sound power is radiated.

It also serves to direct the sound waves in the direction the horn is pointing. It somewhat distorts the sound of the voice because the frequency response of the megaphone is greater at higher sound frequencies. Since the

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1970s the voice-powered acoustic megaphone described above has been replaced by the electric megaphone, which uses electric power to amplify the voice. History... The initial inventor of the speaking trumpet is a subject of historical controversy, as both Samuel Morland and Athanasius Kircher lay claim to the device.

Morland, in a work published in 1655, wrote about his experimentation with different horns and his most successful variant. This loudest horn was made of over 20 feet of copper and could supposedly project vocalizations as far as a mile and a half. [1] Twenty years earlier, Kircher described a device that could be used for both broadcasting on one end and “overhearing” on the other. His coiled horn would be wedged into the side of a building, connecting a speaker or listener inside with the surrounding environment.

Morland favored a straight, tube-shaped speaking device, where an initial sound would reverberate in waves through the instrument and gradually become louder. Kircher’s horn, on the other hand, utilized a “cochleate” design, where the horn was twisted and coiled, unlike Morland’s design. A later, papier-mache trumpet of special design was the Sengerphone. [2] The term ‘megaphone’ was first associated with Thomas Edison’s instrument 200 years later. In 1878, Edison developed a device similar to the speaking trumpet in hopes of benefiting the deaf and hard of hearing.

His variation included three separate funnels lined up in a row. The two outer funnels, which were six feet and eight inches long, were made of paper and connected to a tube inserted in each ear. The middle funnel was similar to Morland’s speaking trumpet, but had a larger slot to insert a user’s mouth.

[3] With Edison's megaphone, a low whisper could be heard a thousand feet away, while a normal tone of voice could be heard roughly two miles away. On the listening end, the receiver could hear a low whisper at a thousand feet away. However the apparatus was much too large to be portable, limiting its use.

George Prescott wrote: " The principal drawback at present is the large size of the apparatus. " Since the 1960s acoustic megaphones have generally been replaced by electric versions (below), although the cheap, light, rugged acoustic megaphone is still used in a few venues, like cheering at sporting events, cheerleading, and by lifeguards at pools and beaches where the moisture could damage the electronics of electric megaphones. How to use...

* Hold the megaphone several inches from your mouth with the small end toward you and the large end away from you. * Point the large end of the megaphone toward the crowd you wish to exhort. Speak loudly or shout into the small end. * Wait for the crowd's response, then repeat Step 3 as

necessary. Sonar... Sonar (originally

an acronym for Sound Navigation And Ranging) is a technique that uses sound propagation (usually underwater, as in submarine navigation) to navigate, communicate with or detect objects on or under the surface of the water, such as other vessels. Two types of technology share the name " sonar": passive sonar is essentially listening for the sound made by vessels; active sonar is emitting pulses of sounds and listening for echoes.

Sonar may be used as a means of acoustic location and of measurement of the echo characteristics of " targets" in the water. Acoustic location in air was used before the introduction of radar. Sonar may also be used in air for

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robot navigation, and SODAR (an upward looking in-air sonar) is used for atmospheric investigations. The term sonar is also used for the equipment used to generate and receive the sound. The acoustic frequencies used in sonar systems vary from very low (infrasonic) to extremely high (ultrasonic). The study of underwater sound is known as underwater acoustics or hydroacoustics.

History... Although some animals (dolphins and bats) have used sound for communication and object detection for millions of years, use by humans in the water is initially recorded by Leonardo Da Vinci in 1490: a tube inserted into the water was said to be used to detect vessels by placing an ear to the tube. [1] In the 19th century an underwater bell was used as an ancillary to lighthouses to provide warning of hazards. The use of sound to 'echo locate' underwater in the same way as bats use sound for aerial navigation seems to have been prompted by the Titanic disaster of 1912.

The world's first patent for an underwater echo ranging device was filed at the British Patent Office by English meteorologist Lewis Richardson a month after the sinking of the Titanic,[2] and a German physicist Alexander Behm obtained a patent for an echo sounder in 1913. The Canadian engineer Reginald Fessenden, while working for the Submarine Signal Company in Boston, built an experimental system beginning in 1912, a system later tested in Boston Harbor, and finally in 1914 from the U. S. Revenue (now Coast Guard) Cutter Miami on the Grand Banks off Newfoundland Canada. [3] In that test, Fessenden demonstrated depth sounding, underwater communications (Morse Code) and echo ranging (detecting an iceberg at two miles (3 km) range). [4][5] The so-

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called Fessenden oscillator, at ca. 500 Hz frequency, was unable to determine the bearing of the berg due to the 3 metre wavelength and the small dimension of the transducer's radiating face (less than 1 metre in diameter). The ten Montreal-built British H class submarines launched in 1915 were equipped with a Fessenden oscillator. [6] During World War I the need to detect submarines prompted more research into the use of sound.

The British made early use of underwater hydrophones, while the French physicist Paul Langevin, working with a Russian immigrant electrical engineer, Constantin Chilowski, worked on the development of active sound devices for detecting submarines in 1915 using quartz.

Although piezoelectric and magnetostrictive transducers later superseded the electrostatic transducers they used, this work influenced future designs. Lightweight sound-sensitive plastic film and fibre optics have been used for hydrophones (acousto-electric transducers for in-water use), while Terfenol-D and PMN (lead magnesium niobate) have been developed for projectors.

How to use... * Install the transmitter. You'll usually have a choice between mounting the transmitter beneath the boat, to a trolling motor or atop the interior hull and letting it drop into the water. * Set the fish finding sonar's sensitivity while watching the display. When the sensitivity is too high, there will be static-like patterns on the display. If the sensitivity is too low, not even the bottom of the body of the water will appear on screen. * 3 * Determine the depth of the body of water. This will be a numeric value on the fish finder sonar system's display.

This is important in helping you to determine how much fishing line to feed out from your pole. * Get accustomed to the display's representation of the body of water. The bottom will appear as a jagged, solid line near the bottom of your display. The surface of the water appears as a jumbled static-filled horizontal line at the top of your fish finder sonar system's display. * Learn to identify patterns on your display that are brush piles if you're fishing on a lake. Brush piles appear as blobs resting on the lake bottom.

Fish such as bass hide out in brush piles, so consider fishing near these echoes. * Learn how to identify fish on your fish finder sonar system display with the fish symbols turned off. With the symbols turned off, fish appear as short curved lines above the bottom of the body of water. Adjust the fish finder sonar's noise filter if there are lines in your display that look like random static. * Remember what the fish finder sonar display was indicating when you catch a fish. This will help you to learn how to use your system to catch more fish later if you keep in mind what to look for.