Echoscopy - seeing by (not) hearing

Echoscopy, also known as ultrasound imaging, has gained an important position within medical diagnostics. Ultrasound - sound just beyond what can be heard by the human ear - is used to see what is inside the body. A gynaecologist uses echoscopy to see how an unborn baby develops in a womb, and a cardiologist uses this technique to detect a leaking heart valve or to determine the flow velocity in blood vessels. Echoscopy normally uses a small, handy-size device that is being moved over the human skin to see what is inside the body, so this non-invasive technique is painless and easy to use.

The echoscopic device sends sound waves with a frequency in the megahertz range to a part of the body that has to be investigated. This ultrasound has the ability to penetrate liquids and soft body tissues. At the interface between soft and hard tissue, for example the edge of an organ, these ultrasound waves are being reflected to some extent, giving spatial information about the internal body parts. This reflection or 'echo' is then caught by the device and visualised on a monitor using imaging software. The time span between emitting and receiving the sound waves is characteristic for the distance to the reflecting body tissue, as the speed of sound in the human body is known. Since the difference between the properties of body tissue is often small, the receiving part of the device has to be very sensitive.

Within the echoscopic device, piezoelectric transducers produce the ultrasound waves by transforming high frequent AC voltage into sound. Sensors receive the returning sound waves and transform them into an electrical signal for further processing into an image. In practice within the compact echoscopic devices, sending and receiving occurs with the same component, where the returning sound waves are received in the 'breaks' between the emitted sound waves.