What is a Sensor?

“Sensor. Noun. A device that detects or measures a physical property and records, indicates, or otherwise responds to it.” – Google

A sensor detects physical variations in the world, e.g. light, temperature, radiowaves, sound, magnetic fields, vibration, particles (e.g. pollution, radiation) or objects (e.g. water droplets).

Humans contain Sensors

Humans and other creatures contain sensors: eyes, ears, nose, tongue, skin. Humans are very good general-purpose sensors:

- They detect noise over a wide set of frequencies, both with their ears and with the rest of their bodies (e.g. the deaf percussionist Evelyn Glennie accurately tunes her drums by 'hearing' with different parts of her body)
- Their visual systems see the world in high resolution at roughly 60 images per second (which is why films, games and light fittings are updated at the rates that they are), in stereo that gives decent depth and motion detection (although optical illusions mess with these beautifully)
- And similarly for smells, tastes and skin.

These sensors are sometimes used in sensor journalism, but so too are manmade sensors like cameras, motion detectors and thermometers.

In many situations, manmade sensors are more appropriate: humans tend to fail the "dull, dirty, dangerous" test: their attention wanders on boring tasks, and it's not fair to put them into dirty or dangerous situations where a manmade sensor would be more appropriate; they also can't detect much of the physical world -e.g. radiowaves - without help, and their outputs aren't always accurate enough for the task in hand.

Manmade Sensors are Old News

Manmade sensors convert common physical quantities (light, temperature etc) into measurements, actions or stimuli (sounds, light etc). Manmade sensors have been designed and used for centuries, including:

- Seismometers for motion (Heng, 132AD),
- Thermometers for temperature (Galileo, 1593),
- Barometers for air pressure (Torricelli 1643),
- Gyroscopes for orientation (Serson, 1743),
- Cameras for light (Niepce, 1816),

- Microphones for sound (Wheatstone, 1827)
- Geiger counters for radiation (Geiger and Muller 1928)

Low-Tech Still Works

One area of journalism where sensors are commonly used is weather reporting. At the low-tech end of modern weather recording is a Stevenson screen with manually-read instruments. A Stevenson screen is a wooden box designed in 1864 to shelter a thermometer from direct weather (rain, snow, wind) and other objects (leaves, animals) that might damage the instruments inside it or bias readings from them. Stevenson screens are used for weather reporting worldwide, and contain instruments like:

- a dry-bulb thermometer (for temperature),
- hygrometer (for air humidity),
- wet-bulb thermometer (also for air humidity, when combined with dry-bulb thermometer readings; also available as a combined wet- and dry-bulb thermometer known as a psychrometer [Kilby 1993]),
- dewcell (for dew point),
- barometer (for atmospheric pressure),

Stevenson Screens are a good example of the care needed to obtain minimally-biased sensor readings. The box and its positioning is standardized by the World Meteorological Organisation, to minimize instrument bias, e.g. all boxes are mounted 1.25m high to minimize ground temperature effects, louvred to minimize the effects of still air (e.g. overheating), and with doors opening North, to minimize reading errors from direct sunlight.

But Electronics can be Convenient

Each of the instruments above has an electronic equivalent, e.g. a sensor that can provide data remotely without a person needing to visit the Stevenson screen. Digital sensors (sensors that convert physical quantities into electrical signals) are more recent, including digital cameras (Sasson 1975) and other sensors whose outputs can be sent to electronic storage, over wifi links or directly to computer processors. We'll talk more about these later.