In this first video we will introduce the chapter by showing some sensors. A **sensor** is used to convert a physical parameter into an electrical parameter. Once in electrical form, we can input the signal into the computer.

VIDEO 14.0. INTRODUCTION TO DIGITIZATION

Help

0:00 / 3:10 1.0x

DR. JONATHAN VALVANO: Professor Yerraballi,

what are we going to learn today?

DR. RAMESH YERRABALLI: Today we're going to see how computers can take stimuli

from the external analog world and store them digitally in the computer.

So take an example.

Here's an example of a volume knob in a rotational form or as a slider.

What's essentially happening here is that the position

is a variable resistance.

So if we can convert this variable resistance to say,

voltages between some range, 0 to 3 volts, 3.3

volts, then we can take that voltage and store it

inside a computer as 12-bit number using an analog-to-digital converter.

DR. JONATHAN VALVANO: That means that any signal

that we can convert into a voltage could then

be entered into the computer with the A-to-D.

DR. RAMESH YERRABALLI: That is correct.

DR. JONATHAN VALVANO: Let me show you some examples.

The first is a strain gauge.

And it could be used to measure force or pressure.

DR. RAMESH YERRABALLI: Here's a thermostat

that can be used to measure temperature.

DR. JONATHAN VALVANO: Here's another temperature sensor.

It's an integrated circuit.

Help

The video shows some sensors:

- A strain guage can measure pressure or force.
- A thermostat is the control component of a heater/AC and is capable of measuring temperature.
- The TMP102 is an electronic integrated circuit that can measure temperature,www.sparkfun.com (https://www.sparkfun.com/products/11931)
- An electret microphone is a low-cost sensor that can be used to record sound, see page 12 EE445M Lecture Notes (http://users.ece.utexas.edu/~valvano/EE345M/view08_analogMicrophone.pdf)
- The TCM8230MD is a low cost camera that creates a 2-D black and white image, Interface to a Cortex M3 microcontroller (http://users.ece.utexas.edu/~valvano/arm/Camera_811.zip)
- The HMC6352 is a compass measuring direction (not a GPS), www.sparkfun.com (https://www.sparkfun.com/products/7915) If you are interested in a GPS, see https://www.sparkfun.com/products/8975 (https://www.sparkfun.com/products/8975)
- The Sharp GP2Y0A21YK IR sensor also measures distance, www.sparkfun.com (https://www.sparkfun.com/products/242)
- The Ping))) ultrasound sensor can measure distance, www.parallax.com (http://www.parallax.com/product/28015).
- A pacemaker electrode screws into the inside of the heart and is used to sense electrical activity and to stimulate (pace) the heart. If the medical device senses the heart has stopped beating, it can automatically defibrillate the heart by injecting a current using the large metal electrode.