Lt Sensors for Human Physiology Collection

23 MODULE COLLECTION - Modules include: Tutorial(s), Pre-Lab Prep, Lab.

Below is a description of each sensor and which labs require it. All Lt Sensors connect to a computer by USB, and require a Windows 10 operating system.

Lt Sensor	Description	Labs using the Sensor
Biopotential	Galvanically isolated, high-performance differential biological amplifiers optimized for measuring a wide variety of biological signals including ECG/EKG, EMG, EOG, and EEG.	• Autonomic Nervous System • Cardiovascular Effects of Exercise • EEG • EOG • Heart and ECG • Heart Sounds • Muscle and EMG • Reflexes and Reaction Times • Spinal Reflexes
Finger Pulse	The Finger Pulse Sensor uses a piezo-electric element to convert force applied to the active surface of the transducer into an electrical analog signal. It is used to study pulse and heart rate.	• Autonomic Nervous System • Blood Pressure • Breathing • Cardiovascular Effects of Exercise • Diving Response • Getting Started with Lt • Heart and ECG • Heart and Peripheral Circulation • Heart Sounds
Blood Pressure	Demonstrate blood pressure measurements with these Sphygmomanometers, each of which is coupled to a pressure transducer.	• Blood Pressure
Tendon Hammer	Tendon hammers can be used to stimulate muscle spindles which elicit muscle contractions. They also provide triggering, timer or marker signals.	• Autonomic Nervous System • Reflexes and Reaction Times • Spinal Reflexes
Grip Force	A pre-calibrated ready-to-use strain gauge based isometric dynamometer with a linear response in the 0-800N range. When force is applied to the metal bars an output calibrated in units of Newtons can be recorded in Lt. Use this to measure grip strength and muscle fatigue.	• Muscle and EMG
Skin Temperature	Probes for measuring skin surface temperature. Skin Temperature Sensors are specifically designed for continuous temperature monitoring using the skin as an indicator of body temperature.	• Body Temperature
Respiratory Belt	The Respiratory Belt Sensor is designed to measure changes in chest diameter resulting from breathing and deriving respiratory rate.	• Breathing • Diving Response
Cardio Microphone	Accurately converts heart sounds (mechanical vibrations) into electrical signals via an electric (condenser) microphone device.	• Blood Pressure • Heart Sounds

For more information: www.adi.to/ltsensors

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Please note that there are different versions of the Human Physiology Collection in Lt that have been developed to work with Lt Sensors or PowerLab. The descriptions below relate to the Lt Sensor version of the Human Physiology Collection.

Autonomic Nervous System
Examine skin potential changes, heart rate variability, the Valsalva maneuver, rapid postural change, and pupillary exercises.

Blood Clotting ●
Assess bleeding and coagulation time, and use a hemocytometer to perform a platelet count and calculate the number of platelets per µL of blood.

Blood Counting ●
Prepare a blood smear and identify different blood cells under a microscope. Determine the hemoglobin concentration using a spectrophotometer and perform a hematocrit test. Determine blood type using Eldon cards.

Blood Pressure
Measure blood pressure in the arm and assess the effect of cuff location, cuff size, and arm position. Examine how leg position affects leg blood pressure.

Body Temperature
Measure body temperature and explore the differences between conductive and convective heat loss.

Breathing
Use a respiratory belt to investigate the ability to hold the breath and the relationship between breathing and heart rate.

Cardiovascular Effects of Exercise
Record and compare ECG and the finger pulse at rest and immediately after exercise.

Diving Response
Investigate the effects of simulated dives and breath holding on heart rate and peripheral circulation.

Electro-oculography (EOG)
Record EOGs to examine angular displacement, saccades, smooth tracking, gaze-holding, gaze-shifting, and nystagmus.

Electroencephalography (EEG)
Record EEGs to examine interfering signals, changes with eyes open and shut, and the effects of mental and auditory activity.

Getting Started with Lt
An introduction to data sampling in Lt where students practice recording and analyzing some finger pulse data, and become familiar with features of Lt.

Glucose Absorption ●
Measure blood glucose using a glucolet and glucometer and compare results from live protocols. Take urine samples to measure glucose levels.

Heart and ECG
Measure and analyze ECG and pulse.

Heart and Peripheral Circulation
Practice palpation techniques on arm and leg arterial pulses, record the radial pulse and examine arterial anastomoses in the hand.

Heart Sounds
Listen to heart sounds via a stethoscope and record a phonocardiogram (PCG), record an ECG and pulse to investigate the relationship of ECG events and heart sounds.

Kidney and Urine ●
Estimate bladder capacity, view an abdominal CT scan, and perform urine testing and observation on “patient” urine samples.

Muscle and EMG
Record EMG during voluntary muscle contractions to investigate coactivation, muscle fatigue, and how visual and verbal feedback impact the ability to sustain muscle contractions.

Reflexes and Reaction Times
Examine simple reflexes, and then explore reaction times to stimuli under different conditions.

Sensory Illusions ●
Investigate mechanics of sensory perception and discover techniques that send conflicting information to the central nervous system.

Sensory Physiology ●
Familiarize students with their senses as they observe a range of sensory illusions.

Spinal Reflexes
The Spinal Reflexes lab investigates simple and complex reflexes used clinically in neurological examination.

Stroop Test
Investigate the interference of conflicting messages, and examine the effects of the Stroop test as an experimental stressor.

Water Balance ●
Learners drink a variety of solutions, then collect and measure the volume and specific gravity of their urine over two hours.

Key: ● *(No Sensor Required)*

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