Light Switch
for the LogIT Microsense® system

Instructions

Overview
This sensor features a new design digital light switch which has an integral light guide to be used for counting and timing events which make or break an IR visible light sensitive path.

In Use
Because the device is a switch which can only be on or off you need to provide it with the highest 'contrast' of light/dark as possible. By facing a suitable light source opposite the light switch, a 'light gate' is formed which can detect passing objects.

Connecting the Light Switch (or a pair of Light Switches) to a Microsense® compatible data logger or interface and a computer with appropriate software (such as LogIT Lab or Data logging Insight etc) you can use the sensor to time and measure events such as speed, acceleration and velocity.

We have set its threshold at a fairly sensitive level so that it will work with a fairly small amount of visible light or infra red. However, if a Microsense® Infra Red source (which has a built in optical system) or another suitable source is used, longer range Light Gates can be made.

Additionally, remote data loggers such as Voyager, DataVision and DataMeter 1000 in their default Autolog modes can measure counts per second (frequency) from the Light Switch.

The Light Switch can be mounted easily & effectively using Microsense® mounting clips or other suitable spring clips.

Specifications

Nominal sensitivity bandwidth: 450-1050 nanometers
Peak sensor response: 850 nanometers

Care
The sensor is not waterproof and so care should be taken never to let any liquid or moisture damage it. Also prevent the sensor from shock.
Do not attempt to disassemble - there are no user serviceable parts inside.

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Examples of use.

Friction experiment using the Light Switch.

Overview:
By using the Light Switch with a source of light (or Infrared source), a large light gate can be made allowing Speed, Velocity, Acceleration etc to be obtained from a moving object. This example uses one light switch however an additional one can also be used.
When using 1 Light Switch, a known length of card is required so that the speed/time etc. can be calculated. The logger/software starts timing when the front edge of the card passes the sensor and stops timing when the back edge passes i.e. it times how long it takes the card to pass in front of the sensor. By knowing the length of the card and how long it took to pass, the speed can be calculated.

Equipment required:	LogIT Data logger.
	Light Switch. (Extension cable if required)
	Dynamics trolley, toy car or similar.
	20cm matt black card.
	Light source such as torch, lamp or infrared source.
	Test track which can be raised to form a ramp.
	Different materials to be placed on the track.

Setup:
1. Cut out a 20cm long piece of matt black card and attach it to the test vehicle.
2. Place the Light switch about three quarters of the way down the track ensuring the card passes in front of the sensor.
3. Place the light source opposite the Light Switch forming a light 'gate'.
4. Connect the data logger to the computer, start the datalogging software and select the timing function. Set up the software so that it knows you are using a single light 'gate'.
Note: Ensure that the light source shines into the Light Switch as this change in contrast between the light source and black card will allow the Light Switch to 'see' the card go past.

Method:
1. Run the vehicle down the ramp passed the Light Switch without a material on the ramp's surface. (Does the ramp's surface count?)
2. Choose a piece of material and write down its description. Place it securely onto the ramp's surface.
3. Run the vehicle down the ramp again.
4. Repeat this for each piece of material.

Note: If you obtain some strange results, this can usually be attributed to a false trigger of the light 'gate'. This can happen if a hand or other object inadvertently passes through the gate. You can also get false triggers if the ambient light changes suddenly, for example bright sunlight falling on the sensor part way through an experiment.

The photo shows a small piece of modelling clay being used to hold the light switch on a table. The optional extension cable is also being used.

Other experiment ideas. (Dependant on software used)

- Measurement of time interval, speed and velocity.
- Measurement of acceleration, momentum, kinetic energy and simple harmonic motion.
- Period counting.
- Study of propeller design (as a tacho), pendulum timing.

Please note that the use of a mains/USB power supply is recommended