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IR (Infra red) –Sensors

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Abstract: ***Infrared sensors have been extensively used in indoor and outdoor applications as they are low cost, easy to use and widely available. Infrared sensors are widely used as a presence trigger, but the analog output of IR sensors.IR sensors depends on several other aspects including the distance of the body from IR sensors, the direction and speed of movement, the body shape and gait. I also used a passive Infra red (PIR) sensors which are sensitive to a person s skin temperature through emitted black body radiation at mind-Infra red wavelength in contrast to background objects at room temperature .No energy is emitted from the sensors, thus the name " Passive Infra red(PIR)".***

The amplitude response of Infra red (IR) sensors depends on the reflectance properties of the target. Therefore in order to use IR sensors for measuring distance accurately.IR sensors can be used additionally to improve the overall vision system.IR sensors show that these sensors are capable to detect any changes in distance measurement and image from the object can be reconstructed.IR sensors also be used to detect brightness. Sensors works by looking for reflected light, it is possible to have a sensor that can return the value of the reflected light.
Keywords: Detect brightness, Distance measurement, Infrared sensors, and Passive measurement.

I. INTRODUCTION

Infrared radiation was first discovered by the astronomer Willium Herschel. He conducted an experiment in which he used a prism to reflect light from the Sun. Herschel was able to detect the presence of Infrared radiation beyond the red part of the visible spectrum using a thermometer to measure an increase in temperature .In 1800 Herschel published his findings to the Royal society of London. An Infrared sensor is an electronic device that emits in order to sense some aspect of the surroundings.IR sensors can measure the heat of an object as well as detect the motion. These type of sensors measures only infrared radiation, rather than emitting it that is called as a passive IR sensors. Usually in the Infrared spectrum, the entire object radiates some form of all thermal radiations. These types of radiations are invisible to our eyes, that can be detected by Infrared sensors. The emitter is simply an IR LED (Light Diode) and the detector is simply an IR photodiode which is sensitive to IR light of the same wavelength, as that emitted by the IR LED. When the IR light falls on the photodiode, the resistance and these output voltages, change in proportion to the magnitude of the IR light received. When IR sensors used to object detection that time the accuracy of object, detection is very important, and every researcher wants an accurate result in their study, sensor that can give accurate data is considering as a good sensors and can be used for other application.IR sensor that has the capability to measure a short distance with accuracy up to 0.5 cm, which is better compared to other sensors. There are two types of Infrared sensor based on it,s function.

1. **Thermal Infra red sensors**
2. **Quantum Infra red sensors**

There are the types of Infrared sensors based on the working mechanism.

3. **Active Infrared sensors**
4. **Passive Infrared sensors**

In Infrared sensors, Infrared energy is emitted or absorbed by molecules when they change their rotational –vibrational movements .Infrared energy excites vibrational modes in a molecules through a change in the dipole moments, making it a useful frequency range for study of these energy states for molecules of the proper symmetry. Infra red waves are not visible to the human eye. In the electromagnetic spectrum, Infrared radiation can be found between the visible and microwave regions. The Infrared waves typically between 0.75 and 1000 ɯm. Infrared sensors technology is using in many every products. Television use an Infrared detector to interpret the signals sent from a remote control. The key benefits of Infrared sensors include their low power requirement, their simple circuitry and their portable features. The IR sensors works with light in the mid-Infrared band of the electromagnetic spectrum. This part of the spectrum is used for most remote controls, night-vision and other application. The sensors consists two layers of metal with an insulator sandwiched in between. Using a fabrication technique called atomic layer deposition, researchers created a device with gaps less than five nanometres (A human hair is roughly 75000 nanometres in size).A new light- trapping sensors makes Infrared absorption more sensitive, inexpensive and versatile. It may improve scientists' ability use to sleuth out performance –enhancing drug blood sample, tiny particles of explosive in the air and more.

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II. MATERIALS AND METHODS

- ✓ IRCON^R IR pyrometer save energy and improve yield. IRCON infrared thermometers have been utilised successfully in non contact temperature measurement for over 50 years.
- ✓ NEMA 4, IP 65 rated IR temperature sensors, suitable for harsh industrial environments.
- ✓ EDINBURG sensors are used for system integration or an air quality monitor. This instrument have an established 30 year reputation for high value, high quality gas sensitivity.
- ✓ IR LED$_s$ help, they are typically used with sensing high contrast such as black or white, no reflection.
- ✓ NXP semiconductor, part number KTY 83120-153 is used as temperature sensors.
- ✓ Honeywell solid state electronics, part number 19CXXXPA1K is used as pressure sensors.
- ✓ Maruta shock sensors are used for vibration detection.

"Agni controls" IR sensors is a professionally managed manufacture of flame detectors and special application fire detection products and fire suppression system in the field of fire and safety.

III. RESULTS AND DISCUSSIONS:-

TABLE- 1
Experimental reading (sensor value) for several data of IR sensors.

Distance(cm)	1	2	3	4	5	6
3.0	158	161	162	158	164	161
3.5	169	172	178	173	175	168
4.0	178	182	181	176	173	140
4.5	197	204	198	184	180	189
5.0	301	302	304	300	308	310

Table-1 shows the experimental obtained when the distance between IR sensors and object is changed. This is to select possible minimum of the distance for IR sensors. The sensors is capable to detect distance as close as 3 cm,but during the experiment data received by IR sensors is not stable. The surrounding condition is maintained in a closed room to avoid any light source during experiment. Sensors value for each distance is different, this is because as the distance increase, the sensors value will also change.

TABLE-2
Experimental of sensors for several colours

Colour selection	1	2	3	4	5	6
Black cardboard	184	183	185	184	183	185
Red cardboard	165	167	168	166	167	164
Blue cardboard	166	167	166	164	167	168
Yellow cardboard	160	162	161	161	162	162
Green cardboard	176	244	198	203	216	213
White cardboard	164	181	196	206	219	218
Orange cardboard	211	182	183	182	186	186
Purple cardboard	183	196	198	187	205	256

Table-2 shows the results obtained when different colour of cardboard paper used during data collection using IR sensors from the results, black cardboard paper produced consists output sensors value compared to other colours. Distance between IR sensors and cardboard paper is set to 5 cm based on the result obtained in Table-1.Even though yellow cardboard gives slightly stable sensors output, but the results is not exact distance when it is converted into cm. For the whole experiment black cardboard paper will be used to wrap the object shape during data collection. The entire object used through the experiment is wrapped with a black cardboard to avoid the existence of noise and reflectance of the signal transmit is fully reflected to the receiver of the IR sensors. During the experiment ,few factors that need to remain the same to make sure less noise occur. The factors are, all the experiment is run in a dark room to avoid any light source and position of the object located at the centre of sensor is maintained by neglecting this factors. Infrared sensors are used in night vision equipment if there is not enough visible light available to see unaided. Night vision devices convert ambient photons of light into electrons and then amplify them using a chemical and electrical process, before finally converting them back visible light. Infra red reflectography is used by art historians in order to reveal hidden layers in paintings. This technique is useful in order to decide whether a painting is an original version or a copy and whether it has been altered by restoration work.

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