

REQUIREMENTS

Scenario 1: Car park entrances for malls (You place your hand on the proximity sensor and it gives you a ticket so that you enter the car park)

- The sensor should work starting from a distance of 5 cm and below. When you place your hand on the sensor, it should work when your hand is 5 cm (or less) from the sensor.
- A LED should switch on to indicate that your hand was detected by the sensor.
- More LED lights should switch on when you bring your hand closer to the sensor to avoid touching. No one should touch the sensor to avoid spreading things like covid 19 by contact.

Scenario 2: Taps in toilets. The proximity sensor detects your hands and water comes out of the tap so that you can wash your dirty hands without making contact with the tap. This will be more hygienic.

- The sensor should work starting from a distance of 5 cm and below. When you place your hand on the sensor, it should work when your hand is 5 cm (or less) from the sensor.
- A small sound or beep should be played when the tap user brings his/her hands too close to the tap. This will be done to avoid contact.
- The sensor should be able to work even if the external surface of the sensor has small droplets of water from the splashing effect when someone was washing hands.

Scenario 3: Car parking in car parks. More LED lights switch on as you get closer to the walls on the parking area you are parking on.

- More LED lights should switch on when the car gets closer to the walls where the sensor is.
- When all the LED lights switch on, a sound or alarm should be played to indicate a possible collision with the walls.

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- A sound should be played when the sensor senses a distance where it can say you have moved the longest possible distance which is safe before you can hit the walls while parking.

SPECIFICATIONS

Mechanical Specifications

Requirement	Specifications	Acceptance Test Criteria
It is easily carried by the average student or adult.	Weight limited to 10 kg	Weight of final design is within limits
It is easy to install on areas where it is going to be used	Standard circuit symbols for the circuit components were used for the user manuals.	Final design satisfies the requirement.

Electrical Specifications

Requirement	Specifications	Acceptance Test Criteria
Sensor should require low power or low voltages	Input voltage for the sensor is 5V	Final design is within limits
Output signal should be 0 – 3.3 V	A non-inverting opamp converts the 5V signal to a 3.3 V signal	Final design is within limits
Sensor is capable of operating for more than a day even when there is hot weather	Operating temperature range is -10 to 50 degrees celsius	Final design is within limits

Functional Specifications

Requirement	Specifications	Acceptance Test Criteria
LED lights used to show an object has been detected by the proximity sensor	More LED lights switch on when the object comes closer to proximity sensor. Voltage is controlled by 3 opamps (one for each LED) so that more Led lights switch on as object comes closer to proximity sensor	Final design is within limits

<p>Sensor plays a sound when there is contact between the object and the sensors (example, a car hits the wall when trying to park, a sound is played)</p>	<p>A buzzer is used when all the LED lights switch on. It plays a sound.</p>	<p>Final design is within limits</p>
<p>Sensor should be on always for at least one day without problems.</p>	<p>Switching power regulator provides continuous power to the sensor circuit.</p>	<p>Final design works as required by the requirement.</p>