SPARK

Module 1:

Vehicle Speed measurement:

Situation:

These days mostly on highways vehicles are moving at a high speed, only when they observe a traffic police they slowdown. Else they will be moving at a speed more than the speed limit. This results in many fatal accidents in which other innocent people may also be injured.

So, it will be fascinating if we make a device which when placed on the left side of the road measures the speed of the vehicle and takes a snapshot of the vehicle.

Design:

You are asked to design a device which measures the speed of the vehicle.

Design Specifications:

The device must be fixed on the left side of the road

It must trigger a buzzer if the vehicle crosses the speed limit.

Evaluation Criteria:

1. The accuracy to the speed of the vehicle, time taken by your device to compute the speed.
2. The cost effectiveness of the device.

Design Improvement:

(Making this improvement is completely to your wish it is not compulsory but extra points will be awarded)Make the device portable such that police can use them in their hands and measure the velocity of vehicle at any angle or distance from him.

Module 2:

Secret knock detector

Situation:

Suppose in a situation that you lost your keys to the door(it may be a car or house door) and has nothing to do for opening the door and in such cases if we provide the door with a secret key in additional to the normal key then it would be better in handling such situations easily.

Design:

Design a circuit in such a way that it detects a special knock on its surface (wooden block) and responds to it accordingly.

The knock should be in a rhythmic way and it shouldn’t sound odd.

If the exact knock is given to it that we designed then a green led should glow, else a red led should glow.

Evaluation Criteria:

1) Time taken to respond for the knock.

2) Type of knock designed.

3) Cost effectiveness.

Module 3:

Acoustic pulse detection

Situation:

In factories there arises a situation of surrounded by large number of machines working accordingly and producing some sounds. A machine in that collection is not working properly and producing crackling sound that is odd and louder.

Hence we design a device that detects the peculiar sound and moves in that direction so that required repairs can be done.

Using such device there won't be any waste of time in identifying faulty machine.

Design:

Design the device that points and moves in the direction of higher sound intensity i.e. it must point as well as move to source point where the louder sound is heard.

Don't use more than two microphones.

Arena:

Your device will be placed in an arena which consists of four buzzers around the device and your device must point and move to the vicinity of the buzzer producing the sound.

Evaluation Criteria:

More points are awarded if it moves in the direction of sound and partial points are awarded to the position of the device.

1) Your device will be evaluated based on the response time to the sound.
2) Accuracy of the direction that your device points.