

SHAPE DETECTION OF THE OBJECT

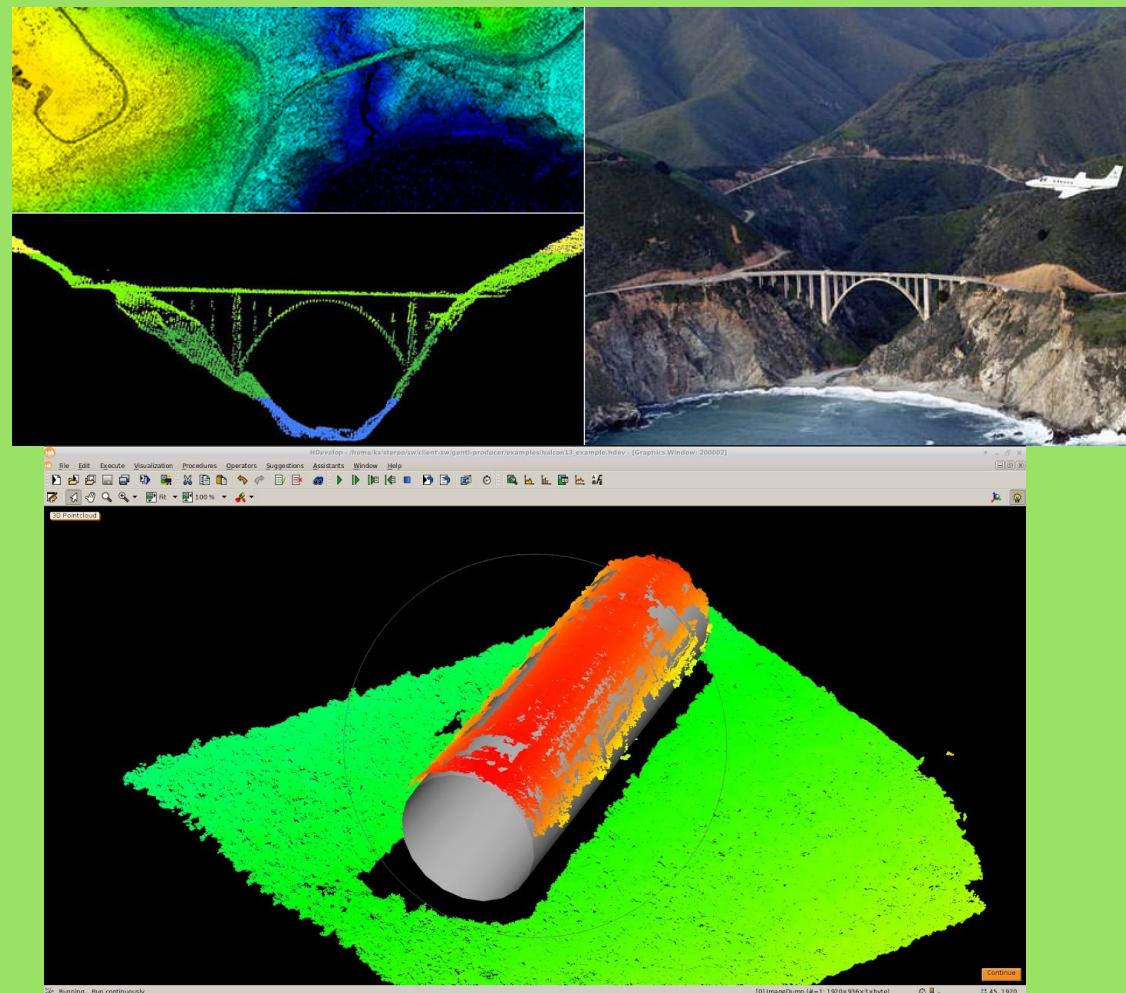
IIIT HYDERBAD

PRESENTED BY SACHIN & SUSHMAN

OBJECTIVE

**OUR OBJECTIVE FOR THIS PROJECT IS TO
CREATE A SYSTEM WHICH CAN IDENTIFY
THE SHAPE OF THE OBJECTS
EFFICIENTLY AND PRODUCE THE
OUTPUT IN MOST FEASIBLE MANNER.**

Bixby Bridge in Big Sur, Calif. Here, LIDAR



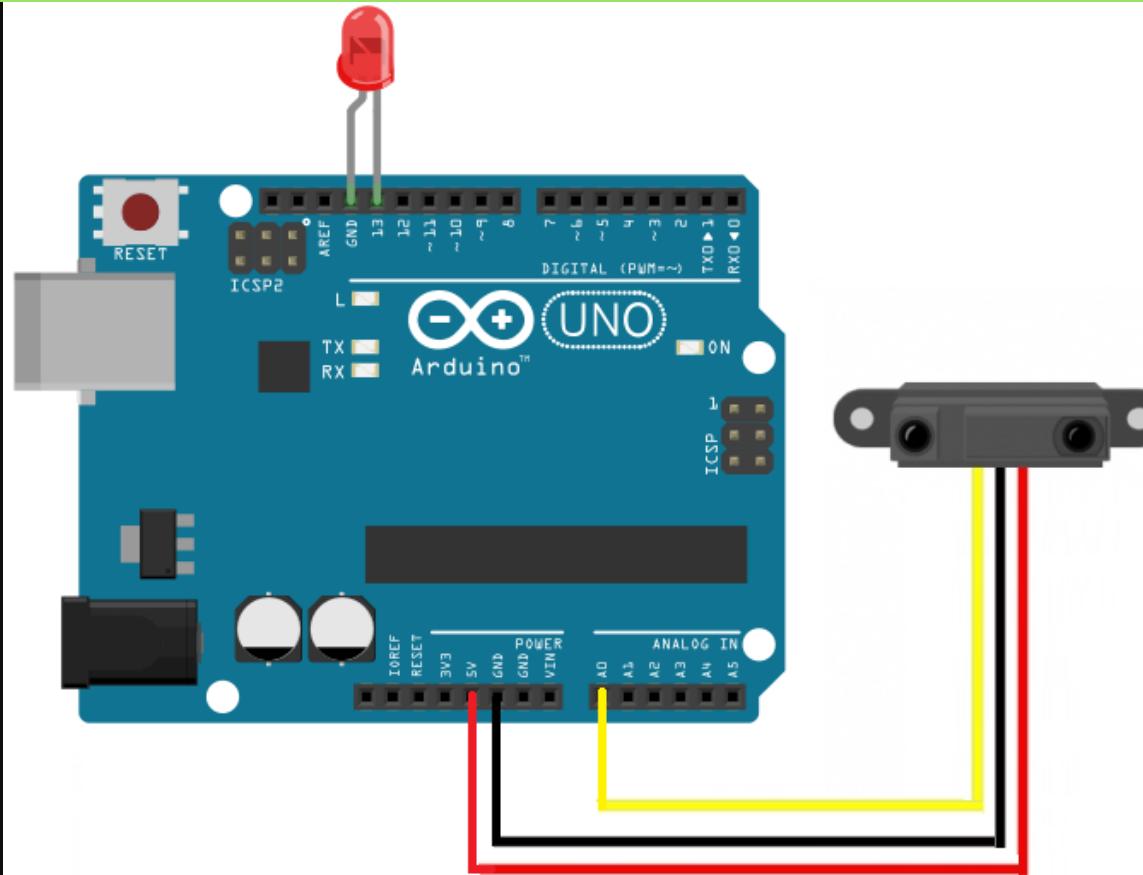
MOTIVATION: LIDAR

LIDAR, which stands for Light Detection and Ranging, is a remote sensing method that uses light in the form of a pulsed laser to measure ranges (variable distances) to the Earth.

FIRST STEP

Detecting the distance of an obstacle using IR sensor

An IR sensor and detector circuit can be used to detect the distance of different parts of an object to present a 3Dimentional image as a whole with the help of a micro controller and graph plotters.



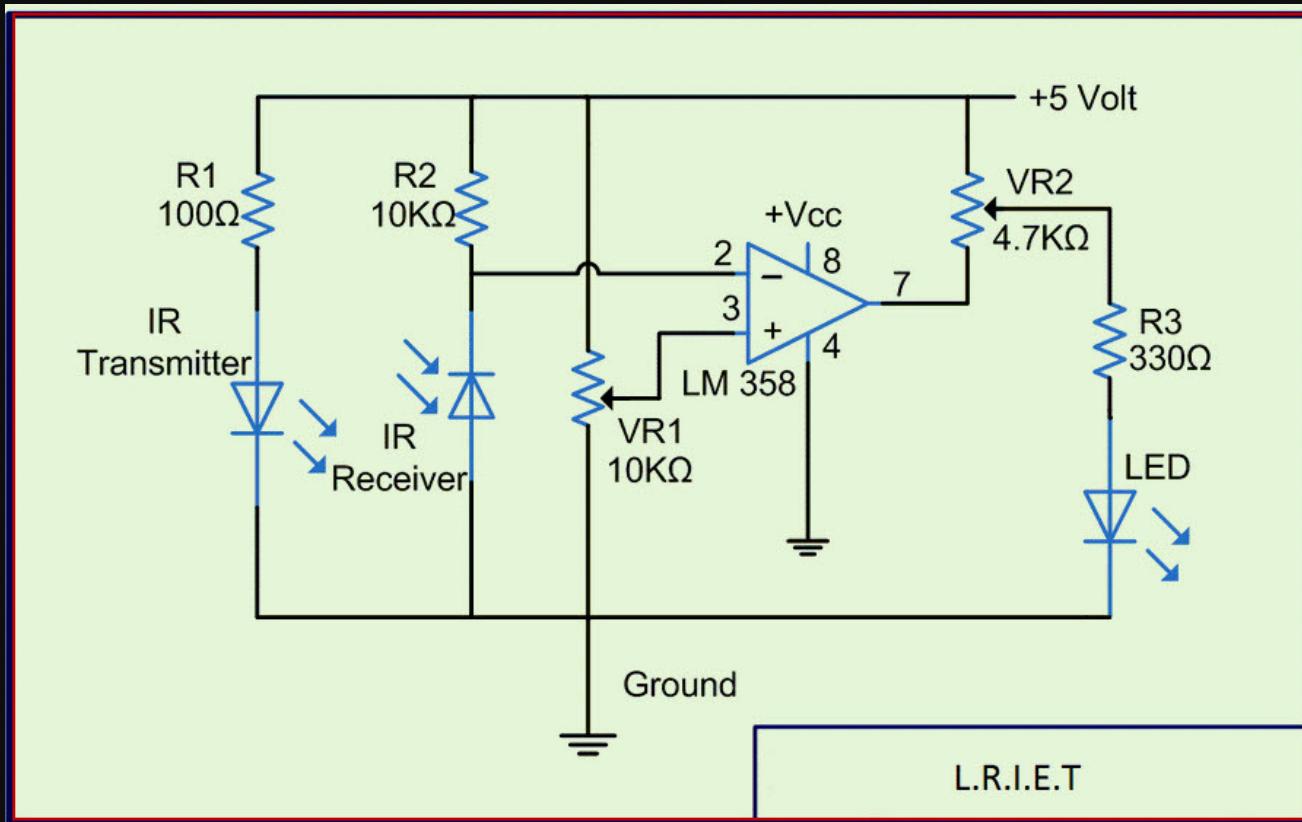
Arduino UNO with
proximity sensor and IR

**DISTANCE OF AN OBJECT USING
IR/PROXIMITY SENSOR AND A
MICROCONTROLLER**

STEP 1:

The input from will IR detector will be provided to analog pin of micro-controller (Arduino UNO) and micro-controller will have pre-processed code which will convert the input data into to voltage then mapping it to distance.

CIRCUIT DIAGRAM



STEP 2:

The input from detector to Arduino UNO return a number bw 0-1023 which can be mapped to voltage 0-5V using

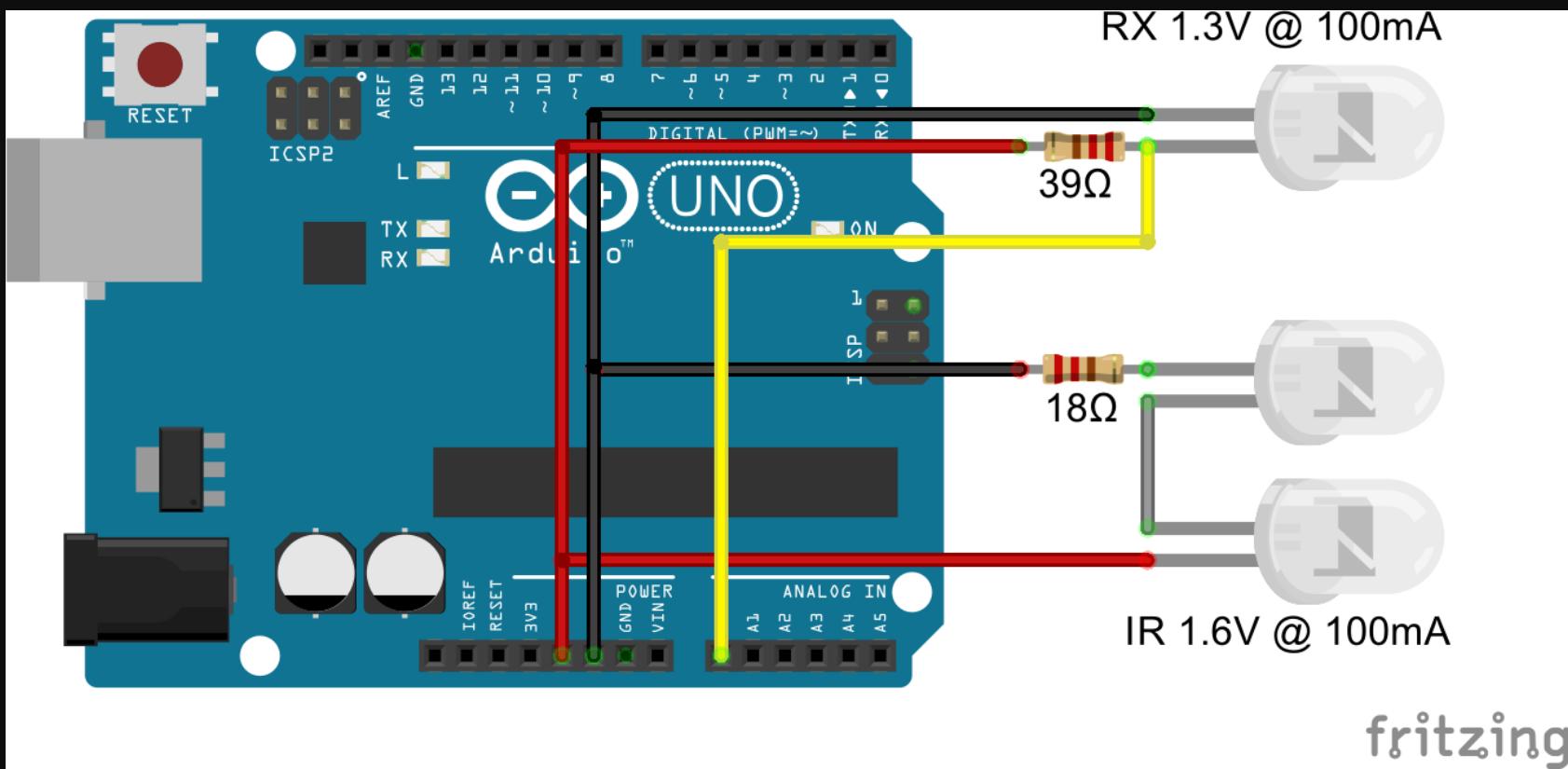
$$\text{Voltage} = (5 * \text{number}) / 1024;$$

This voltage can be mapped to distance

$$\text{distance} = \text{map}(\text{voltage}, 0, 5, 0, 300);$$

where 300 is assumed to be max distance here.

Distance measurement using Arduino

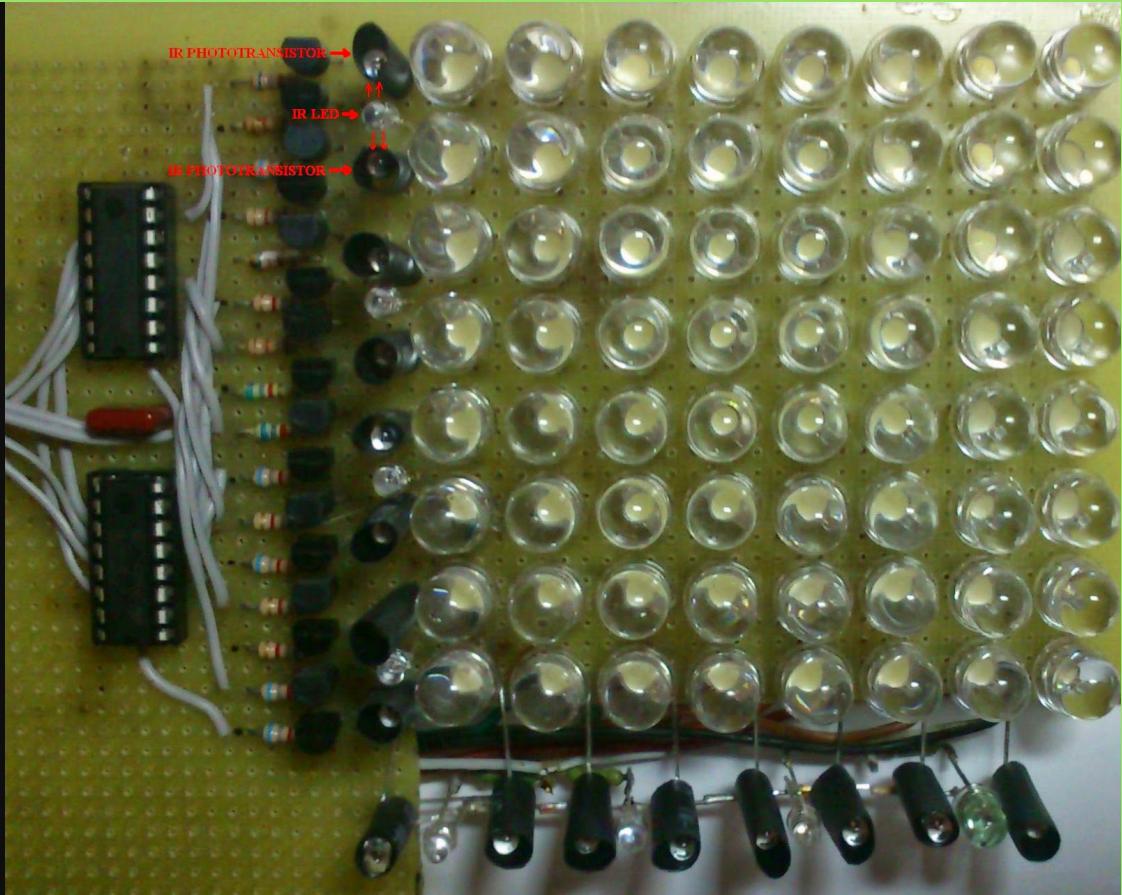


STEP 3:PROCESSING THE CODE IN ARDUINO

```
float number=0;
void loop() {
    // put your main code here, to run repeatedly:
    number=analogRead(1); // input from pin 1
    delay(100);
    float voltage=(5*number)/1024;
    // considering the volatage to be 5 volts, converting the input from detector(which is
    // a number bw 0-1023)
    Serial.println(voltage);
    int dist=0;
    dist=map(voltage,0,5,0,300); // mapping the voltage 0-5 into 0-300 cm distance.
    Serial.println(dist);
}
```

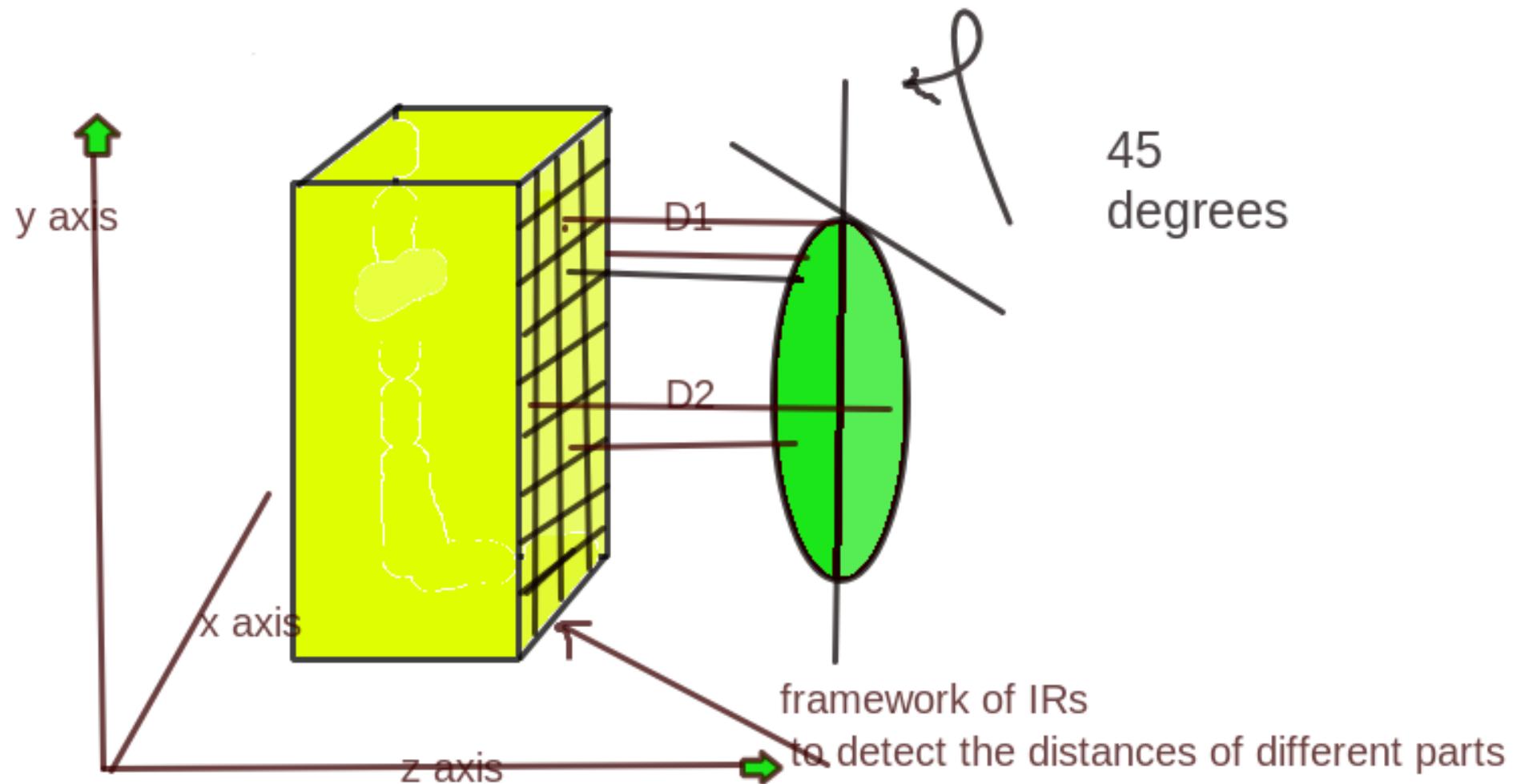
INCREMENTING THE SCALE OF DEVELOPMENT

Since the distance of different parts of any objects can be measured using a number of IRs, and simultaneously 6 pins can be operated in Arduino so using a switching mechanism on a physical framework will lead to

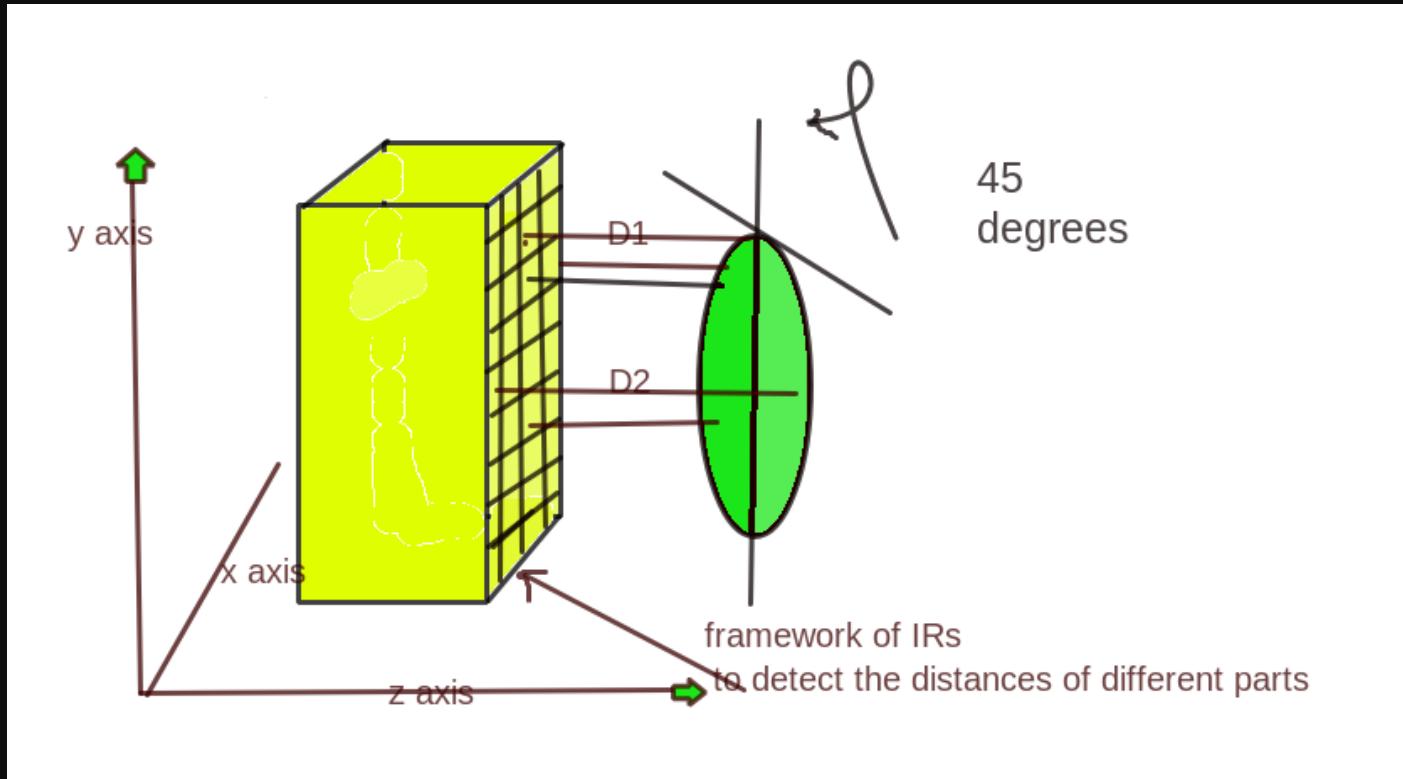


almost similar framework
with alternative LEDs replaced
with
IR detectors

Physical Model

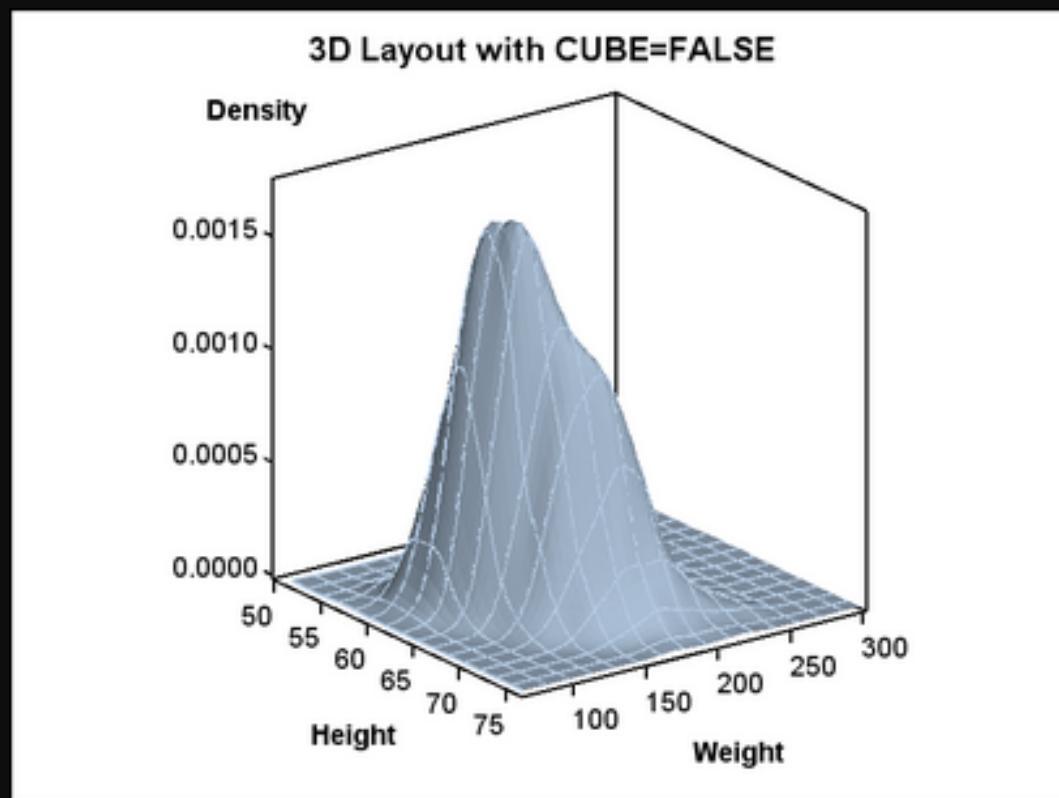


EXPLANATION



Each IR sensor will be located at certain coordinate $(x_i, y_i, 0)$ in XY plain which will lead to a corresponding z coordinate(the distance of obstacle's parts).

DATA PROCESSING



The data collected from different IRs will be pushed into a plotter as coordinates(x_i, y_i, z_i) and a 3D image of the object will be obtained

BLOCK DIAGRAM

Rounded re
eye icon
refresh icon

Micro-controller

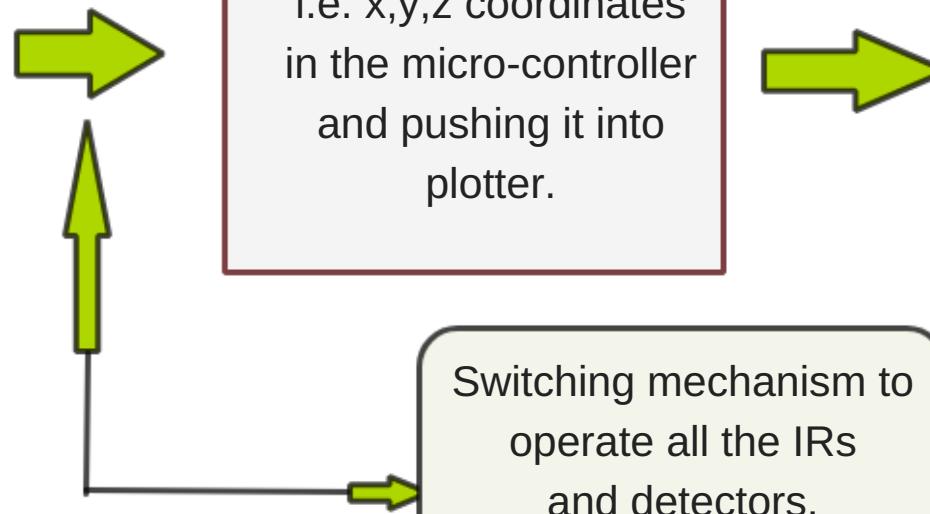
Input from the IRs
to the pins of Arduino

The collections of data
i.e. x,y,z coordinates
in the micro-controller
and pushing it into
plotter.

Plotter

Output IMAGE of
the object

Switching mechanism to
operate all the IRs
and detectors.

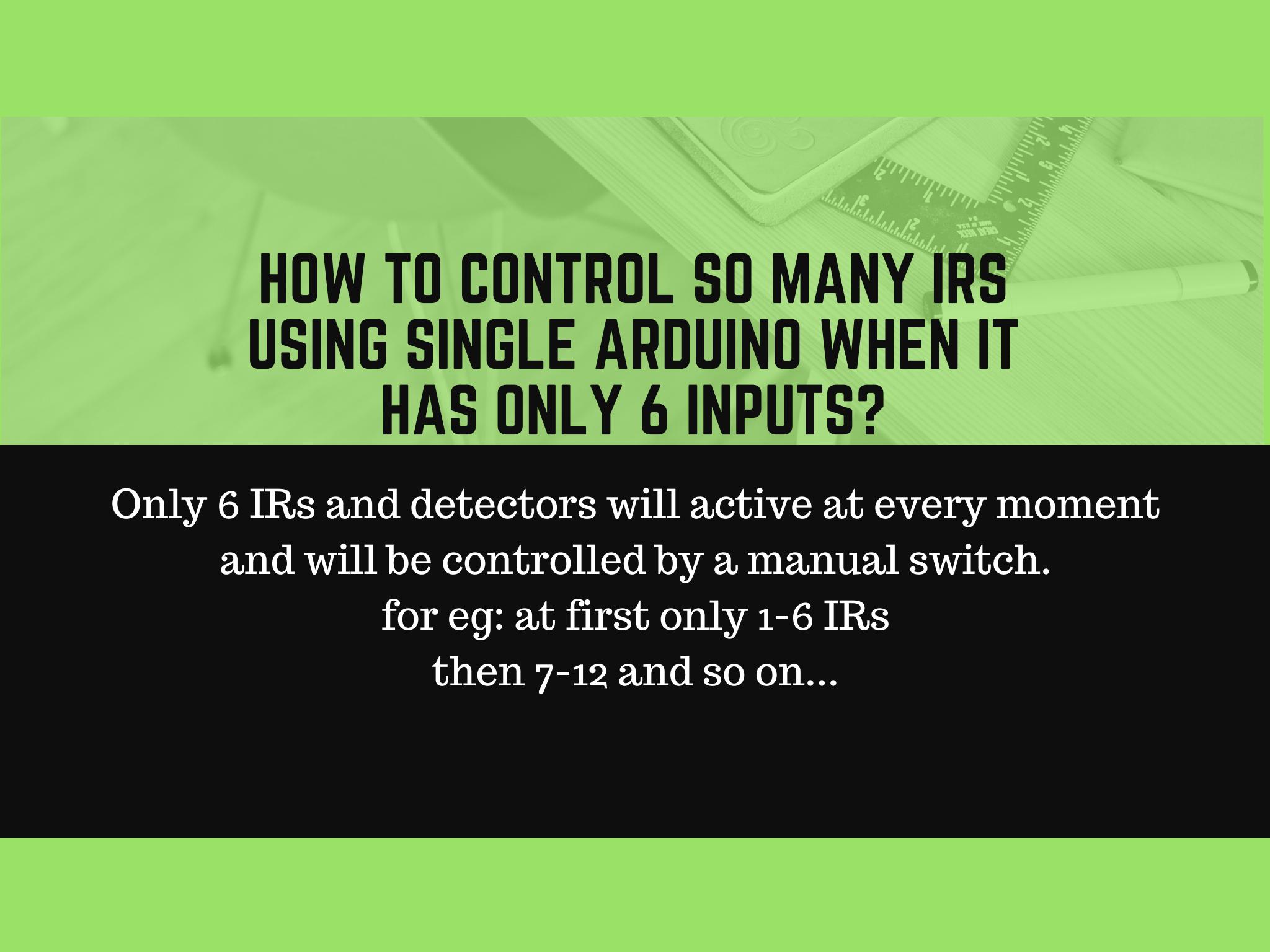


% DIVISIONS



Percentage	Details	Status
20-25%	Testing the circuit with one or two IRs to check whether it gives the feasible output distance of the object and writing a embedded code for micro-controller to operate 6 pins simultaneously .	DONE
45-50%	Develop the complete framework with 40-50 IRs and test their working. Use a single micro-controller to get output from all the sensors. The data collection of parts of objects in coordinates(xi,yi,zi).	PENDING
~90 %	The system should be able to detect certain number of fixed shapes like cube,cuboid,cylinder,sphere and disk and process them as a 3 Dimensional image.	PENDING
100%	The system should be able to process the view of few typical objects in front of it for eg: water bottle.	PENDING

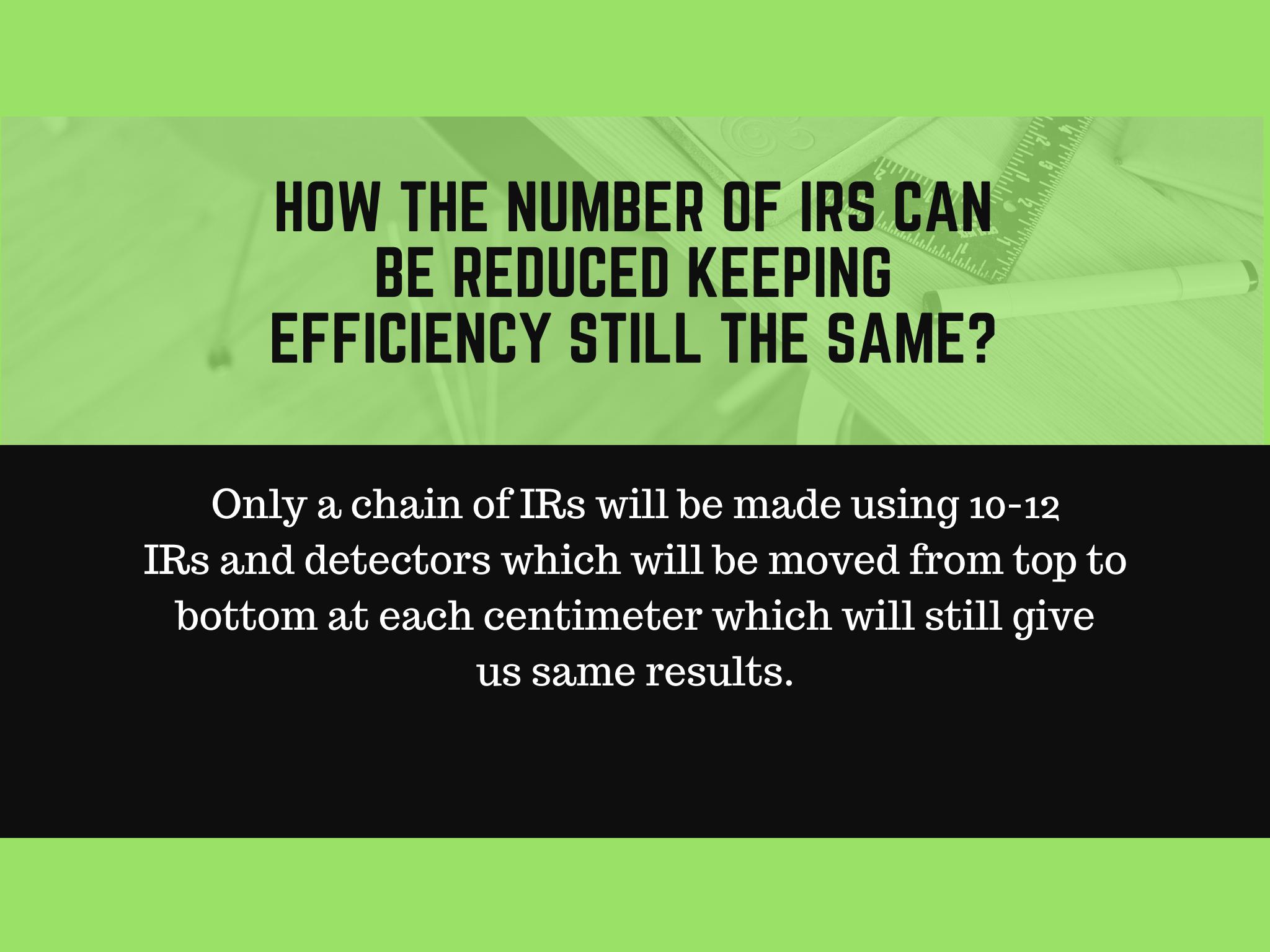
SOLUTIONS TO SOME MAJOR POTENTIAL PROBLEMS!!



HOW TO CONTROL SO MANY IRS USING SINGLE ARDUINO WHEN IT HAS ONLY 6 INPUTS?

Only 6 IRS and detectors will active at every moment and will be controlled by a manual switch.

for eg: at first only 1-6 IRS
then 7-12 and so on...



HOW THE NUMBER OF IRS CAN BE REDUCED KEEPING EFFICIENCY STILL THE SAME?

Only a chain of IRS will be made using 10-12 IRS and detectors which will be moved from top to bottom at each centimeter which will still give us same results.

The background of the image shows a stack of books and papers. A clear plastic ruler is placed diagonally across the stack, and a black pen lies horizontally next to it. The books have various titles visible on their spines, including "The Art of War" and "Leadership".

THANK YOU :)

BY SACHIN & SUSHMAN