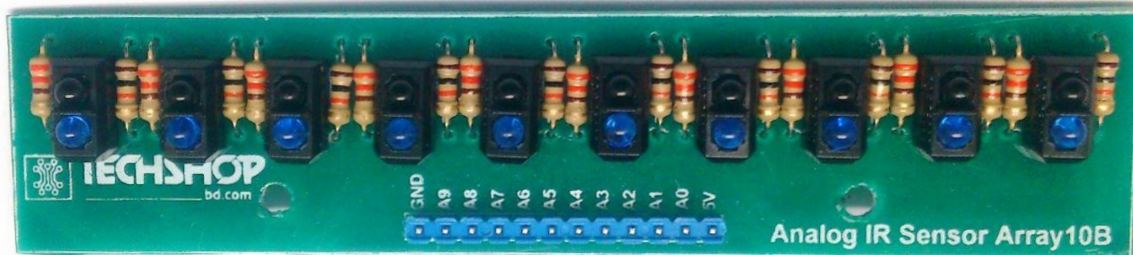


# USER MANUAL

## Analog IR Sensor Array10



### Description:

Infrared sensor based line follower robot sensor. Gives analog output.

### Specifications:

- Features **TCRT500** that has effective plastic packaging and built-in sunlight effect compensation.
- **1 cm spacing** between two adjacent sensors, covering 9cm distance by the entire sensor array.
- Recommended operational height from ground **3mm-15mm**. (height of IR sensors tip, not the PCB).
- Generates high voltage for white surface and low voltage for black surface on signal pins.
- Large value difference for white and black surface at recommended operational height from ground (more than 3volts).
- Recommended to use with arduino mega and other MCUs having at least 10 ADC pins.

### How to connect to arduino mega:

Using male to female jumper wires (find it [here](#)), connect the 5v and GND pin to the corresponding pin of your arduino mega. Connect pin A0-A9 to the Analog pins of your arduino mega similarly (A0 to A0, A1 to A1, ..... A9 to A9).

## Sample test code for arduino mega:

```
int value[10];
void setup()
{
  Serial.begin(9600);
}
void loop(){
  for(int i=0;i<=9;i++)
  {
    value[i]=analogRead(i);
    Serial.print(value[i]);
    Serial.print("  ");
  }
  Serial.println(" ");
}
```

## Sample Output:

Open serial monitor and you'll see the ADC values of each sensors like below.

```
129 211 155 754 916 815 597 170 175 231
126 211 155 763 917 815 597 170 175 231
127 211 155 763 917 815 597 170 175 231
127 211 156 763 917 815 597 171 175 231
```

## Calibration:

1. Place the sensor array over a white surface and run the previous code. From serial monitor, note the readings of all 10 sensors (values on white).
2. Now, place the sensor array over a black surface and note the readings of all 10 sensors (values on black) from Serial monitor. 3.
3. Now calculate 10 threshold values using the formula:

$$\text{Threshold value} = (\text{value on white} + \text{value on black})/2$$

## Sample line detection code for white paper (as background) and Black electrical tape (as line):

```
/*
Suppose you have the following calibration values:
Values on white: 1000 900 800 700 950 850 750 650 1000 900
Values on black: 100 200 100 300 250 350 150 50 200 400
Then your threshold values should be: 550 550 450 500 600 600 450 350 600 650
*/
int threshold[10] = {550, 550, 450, 500, 600, 600, 450, 350, 600, 650};
int digital_value[10];

void setup()
{
  Serial.begin(9600);
}
void loop()
{
  for (int i = 0; i <= 9; i++)
  {
    if (analogRead(i) < threshold[i]) digital_value[i] = 1;
    else digital_value[i] = 0;
    Serial.print(digital_value[i]);
    Serial.print(" ");
  }
}
```

### Sample Output:

0000111000