

Simulation Of Electrical Switch

Design a C program to simulate the operation of an electrical switch where the program takes input values either 0 or 1 representing the switch as ON or OFF respectively

Using an appropriate conditional statement the program should interpret the input values and display the corresponding condition as ON or OFF .

Additionally, the program should handle invalid input values and provide appropriate error messages.

Headlight Intensity Regulator

Research :

Headlights are a main part in any vehicle, even if you make a mind to go outside, light is needed especially at night. Since headlights are an important part in seeing things you are supposed to, there are many advanced ways people use headlights in a car for example. People today use LED headlights at night which often flash into the eyes of the other person sitting in the car, while he can see things clearly with a more flashy and bright light but the other person struggles to see what's in front of him . This could often lead to an accident which of course no one wants.

Here comes the significance of light control and the usage of it in headlights. This Headlight Intensity Regulator controls the light emitting through the headlights of a car with respect to the distance, approaching vehicle is coming. Now, distance of the approaching car can be measured by many devices and sensors such as :

1. **Cameras** : A forward- facing camera often mounted near the rear view mirror is used to detect the light signatures of oncoming and preceding vehicles. Sophisticated image-processing software uses this visual data to identify the position and distance of other road users, including pedestrians and cyclists, and determine which parts of the road need to be darkened.

2. **LiDAR (Light Detection and Ranging)** : LiDAR systems emit laser pulses and measure the time it takes for them to return after hitting an object. This creates a precise 3D map of the environment and is more accurate than cameras for measuring distance, especially in low-visibility conditions like fog. Manufacturers like Valeo and Marelli have integrated LiDAR directly into headlight assemblies to enable seamless sensor placement.

We can see there are many ways to measure the distance through many ways and sensors but it is advanced and in our c program, we just assume some distances the car is approaching and with that given distance, we control the intensity of our headlights.

Headlight Beam Control Method :

Once the distance and location of other vehicles are determined, ADB systems use sophisticated technologies to control the headlight beam :

LED Matrix Headlights : These systems use an array of individually controlled LEDs. Each LED acts like a pixel, and the system's software can brighten, dim, or turn off specific LEDs to create a dark zone around other vehicles while keeping the rest of the road illuminated with a high beam.

Benefits of Adaptive Headlights System :

Improved safety: Studies show that ADB systems can significantly increase driver visibility by providing high-beam illumination for longer periods, reducing the risk of accidents with pedestrians and other vehicles.

Reduced Glare: By creating precise dark zones, ADB technology eliminates the dangerous glare that can temporarily blind other drivers when high beams are used.

Enhanced Driver Comfort : The system removes the need for manual switching between high and low beams, reducing driver fatigue.

Research Credits :

1. International Journal of Engineering Research and Technology (IJERT)
2. Slide Share

Analyse:

Now, since we have all the research and the positives, we will propose a program based on the above research,

I will make a C program which will be capable of running the Headlight Intensity Regulator, for making a C program, we need the input value so that it can give us the output value according to our needs

Input :

1. For headlight at maximum intensity, a distance of 100 metres or above is required.
2. For headlight at medium intensity, distance should be between 100 and 10m is required.
3. For headlights to be off, distance should be less than 10 meters.

Output :

Since we have discussed the input, the following is the output for a given input .

1. Distance of 100 m and above, Intensity is Maximum i.e 100% intensity .
2. Distance ($100 > x > 10$), Intensity should be the percentage distance is .
3. Distance of less than 10m , Intensity should be zero i.e 0% intensity .

Ideate:

To write an algorithm for above program as we discussed, following steps are needed :

Step 1 : Start

Step 2 : Print, " Enter the distance of approaching vehicle (in metres) : "

 Read distance

Step 3 : If distance ≤ 0 ,

 Print , " Invalid input ! Distance must be greater than 0 "

 Stop

Step 4 : if distance > 100 ,

 intensity = 100

 Else if $10 \leq \text{distance} \leq 100$,

 intensity = distance

 Else distance < 10

 intensity = 10

Step 5 : Print " Distance ", " Intensity "

Step 6 : Stop

Build:

```
#include <stdio.h>

int main() {
    int distance; // distance of the approaching vehicle
    int intensity; // headlight intensity in percentage

    printf("== Headlight Intensity Regulator ==\n");
    printf("Enter the distance of approaching vehicle (in meters): ");
    scanf("%d", &distance);

    // Check for invalid input
    if (distance <= 0) {
        printf("Invalid input! Distance must be greater than 0.\n");
    }
    else if (distance > 100) {
        intensity = 100; // Full intensity
        printf("Distance: %d m\n", distance);
        printf("Headlight Intensity Set To: %d%%\n", intensity);
    }
    else if (distance >= 10 && distance <= 100) {
        intensity = distance; // Same as distance value (percentage)
        printf("Distance: %d m\n", distance);
        printf("Headlight Intensity Set To: %d%%\n", intensity);
    }
    else {
        intensity = 10; // Minimum intensity when vehicle is too close
        printf("Distance: %d m\n", distance);
        printf("Headlight Intensity Set To: %d%%\n", intensity);
    }

    return 0;
}
```

This is the code for Headlight Intensity Regulator .

Testing :

The screenshot shows a C Online Compiler interface. The code in main.c is as follows:

```
1 #include <stdio.h>
2
3 int main() {
4     int distance; // distance of the approaching vehicle
5     int intensity; // headlight intensity in percentage
6
7     printf("---- Headlight Intensity Regulator ---\n");
8     printf("Enter the distance of approaching vehicle (in meters): ");
9     scanf("%d", &distance);
10
11    // Check for invalid input
12    if (distance <= 0) {
13        printf("Invalid input! Distance must be greater than 0.\n");
14    }
15    else if (distance > 100) {
16        intensity = 100; // Full intensity
17        printf("Distance: %d m\n", distance);
18        printf("Headlight Intensity Set To: %d%%\n", intensity);
19    }
20    else if (distance >= 10 & distance <= 100) {
21        intensity = distance; // Same as distance value (percentage)
22        printf("Distance: %d m\n", distance);
23        printf("Headlight Intensity Set To: %d%%\n", intensity);
24    }
25    else {
26        intensity = 10; // Minimum intensity when vehicle is too close
27        printf("Distance: %d m\n", distance);
28        printf("Headlight Intensity Set To: %d%%\n", intensity);
29    }
30
31    return 0;
32 }
```

The Output window shows the following results:

```
==== Headlight Intensity Regulator ====
Enter the distance of approaching vehicle (in meters): 100
Distance: 100 m
Headlight Intensity Set To: 100%

==== Code Execution Successful ====

```

When Distance entered is 100 then intensity as we can see from above image is 100% that is maximum intensity.

C Online Compiler

The screenshot shows a C online compiler interface. On the left, the code file 'main.c' is displayed with line numbers from 1 to 33. The code implements a headlight intensity regulator based on the distance of an approaching vehicle. It includes input validation for distance (must be > 0) and calculates intensity based on distance relative to 100 meters. The output window on the right shows the program's execution. It starts with a header 'Headlight Intensity Regulator', prompts for distance, and then displays the calculated intensity as 50%. A success message follows.

```
1 #include <stdio.h>
2
3 int main() {
4     int distance; // distance of the approaching vehicle
5     int intensity; // headlight intensity in percentage
6
7     printf("== Headlight Intensity Regulator ==\n");
8     printf("Enter the distance of approaching vehicle (in meters): ");
9     scanf("%d", &distance);
10
11    // Check for invalid input
12    if (distance <= 0) {
13        printf("Invalid input! Distance must be greater than 0.\n");
14    }
15    else if (distance > 100) {
16        intensity = 100; // Full intensity
17        printf("Distance: %d m\n", distance);
18        printf("Headlight Intensity Set To: %d%%\n", intensity);
19    }
20    else if (distance >= 10 && distance <= 100) {
21        intensity = distance; // Same as distance value (percentage)
22        printf("Distance: %d m\n", distance);
23        printf("Headlight Intensity Set To: %d%%\n", intensity);
24    }
25    else {
26        intensity = 10; // Minimum intensity when vehicle is too close
27        printf("Distance: %d m\n", distance);
28        printf("Headlight Intensity Set To: %d%%\n", intensity);
29    }
30
31    return 0;
32 }
33
```

==== Headlight Intensity Regulator ====
Enter the distance of approaching vehicle (in meters): 50
Distance: 50 m
Headlight Intensity Set To: 50%
==== Code Execution Successful ===

When distance entered is 50 then intensity is 50%

The screenshot shows a web-based C compiler interface. The code in 'main.c' is as follows:

```
1 #include <stdio.h>
2
3 int main() {
4     int distance; // distance of the approaching vehicle
5     int intensity; // headlight intensity in percentage
6
7     printf("== Headlight Intensity Regulator ==\n");
8     printf("Enter the distance of approaching vehicle (in meters): ");
9     scanf("%d", &distance);
10
11    // Check for invalid input
12    if (distance <= 0) {
13        printf("Invalid input! Distance must be greater than 0.\n");
14    }
15    else if (distance > 100) {
16        intensity = 100; // Full intensity
17        printf("Distance: %d m\n", distance);
18        printf("Headlight Intensity Set To: %d%%\n", intensity);
19    }
20    else if (distance >= 10 && distance <= 100) {
21        intensity = distance; // Same as distance value (percentage)
22        printf("Distance: %d m\n", distance);
23        printf("Headlight Intensity Set To: %d%%\n", intensity);
24    }
25    else {
26        intensity = 10; // Minimum intensity when vehicle is too close
27        printf("Distance: %d m\n", distance);
28        printf("Headlight Intensity Set To: %d%%\n", intensity);
29    }
30
31    return 0;
32 }
```

The output window shows the results of running the program with an input of 10 meters:

```
== Headlight Intensity Regulator ==
Enter the distance of approaching vehicle (in meters): 10
Distance: 10 m
Headlight Intensity Set To: 10%
--- Code Execution Successful ---
```

When distance entered is 10 then intensity is 10% as the vehicle is closer .

The screenshot shows a C program named 'main.c' being run on the Programiz C Online Compiler. The code calculates headlight intensity based on the distance of an approaching vehicle. It includes validation for distances less than or equal to 0, greater than 100, between 10 and 100, and distances less than 10. The output window shows an invalid input error for a distance of -25 meters.

```
main.c
1 #include <stdio.h>
2
3 int main() {
4     int distance; // distance of the approaching vehicle
5     int intensity; // headlight intensity in percentage
6
7     printf("== Headlight Intensity Regulator ==\n");
8     printf("Enter the distance of approaching vehicle (in meters): ");
9     scanf("%d", &distance);
10
11    // Check for invalid input
12    if (distance <= 0) {
13        printf("Invalid input! Distance must be greater than 0.\n");
14    }
15    else if (distance > 100) {
16        intensity = 100; // Full intensity
17        printf("Distance: %d m\n", distance);
18        printf("Headlight Intensity Set To: %d%%\n", intensity);
19    }
20    else if (distance >= 10 && distance <= 100) {
21        intensity = distance; // Same as distance value (percentage)
22        printf("Distance: %d m\n", distance);
23        printf("Headlight Intensity Set To: %d%%\n", intensity);
24    }
25    else {
26        intensity = 10; // Minimum intensity when vehicle is too close
27        printf("Distance: %d m\n", distance);
28        printf("Headlight Intensity Set To: %d%%\n", intensity);
29    }
30
31    return 0;
32 }
33
```

Output

```
== Headlight Intensity Regulator ==
Enter the distance of approaching vehicle (in meters): -25
Invalid input! Distance must be greater than 0.

== Code Execution Successful ==
```

When the distance entered is less than 0 which is not possible for any distance , as we can see from above image, invalid input has occurred .

Implement :

<https://github.com/vedmuley536/Ved-Muley.git>