International Journal of Advanced Science and Research
ISSN: 2455-4227
Impact Factor: RJIF 5.12
www.allsciencejournal.com
Volume 3; Special Issue 1; March 2018; Page No. 34-38

Intelligent street light control management system using ARDUINO

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Abstract
This paper gives the detailed idea about how street lights plays an important role in our life? How it waste the electricity during night time? What is the intelligent street light control management system? Why it is important? Implementation of the system using Arduino. It also explains what is the use of different functions used in the program along with the example of every function.

Keywords: arduino, sensor, PWM, duty cycle, digital signal, GPIO

Introduction

When we are travelling by air our city looks very pretty because of lights but at the same time I like to focus on problem related to electricity waste. People often use nightlights for the safety, the sense of security, a solution against fear of the dark. Besides nightlights are also useful to the general public for showing the general layout of an area where they are travelling. Our main problem is related to street lights where lots of electricity becomes wastage when of no use. Wastage of electric power is not desirable in any system. So it is very much economic to have this arrangement, so that power is not wasted during night time. Daily we observed that the street lights remained ON even if no person travelling over there. This research is related to make the street light OFF in night hours when there is no need of light, or after switching OFF the light if someone arrived on the road street light get ON automatically. We are trying to make it automatic by using sensors. This mechanism makes the system more flexible.

System Model

System model used in the project is given below. In this model, we use four IR Sensors which are connected to General Purpose Input/Output pins (GPIO) which is present on arduino board. As per the logic given, arduino gives output on PWM pins which are connected to four LEDs. System consist of following modules.

Arduino: Arduino is an electronics platform which is easy-to-use hardware and software and available as open source. Arduino boards are clever to read inputs like brightness on a sensor, a finger on a switch etc. and turn it into an output- for ex. Turn ON LED.

PWM: Pulse Width Modulation is a method for explaining a type of digital signal. A common example where we use PWM is to control intensity of LEDs or to control the direction of a motor. We get a range of results in mentioned applications as pulse width modulation allows variation in time and intensity analog fashion. It generates a digital control which is used to create square wave. Square wave get changed depends on the input.

IR Sensor: An infrared sensor is an electronic device which is used to sense assured characteristics of the surrounds by either producing and/or discovering infrared emission. Infrared sensors are also able to detect the motion of an object and calculate the heat produce by an entity.

GPIO: General-purpose input/output is a generic pin on an integrated circuit or computer board whose behavior—including whether it is an input or output pin—is controllable by the user at run time. GPIO pins have no predefined purpose, and go unused by default.

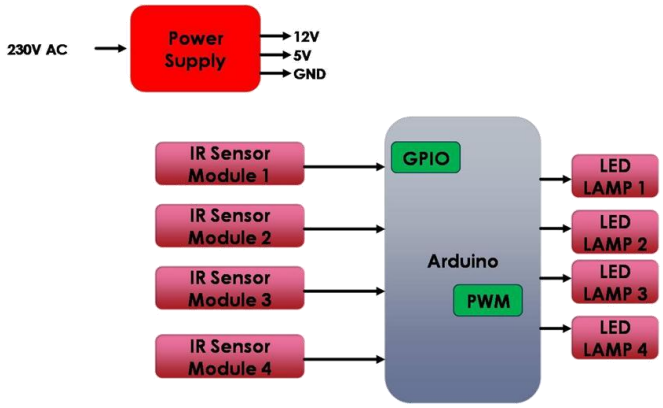


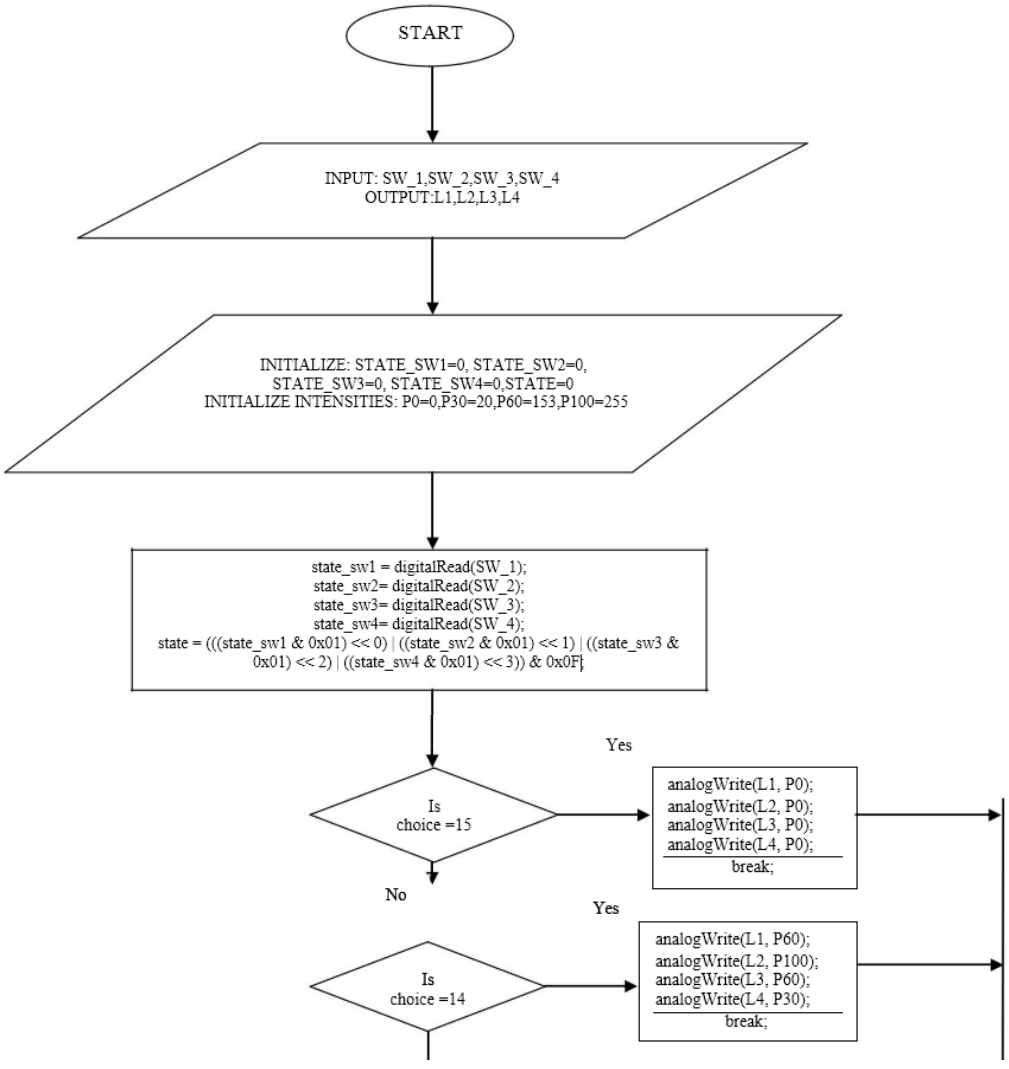
Fig 1: System Model

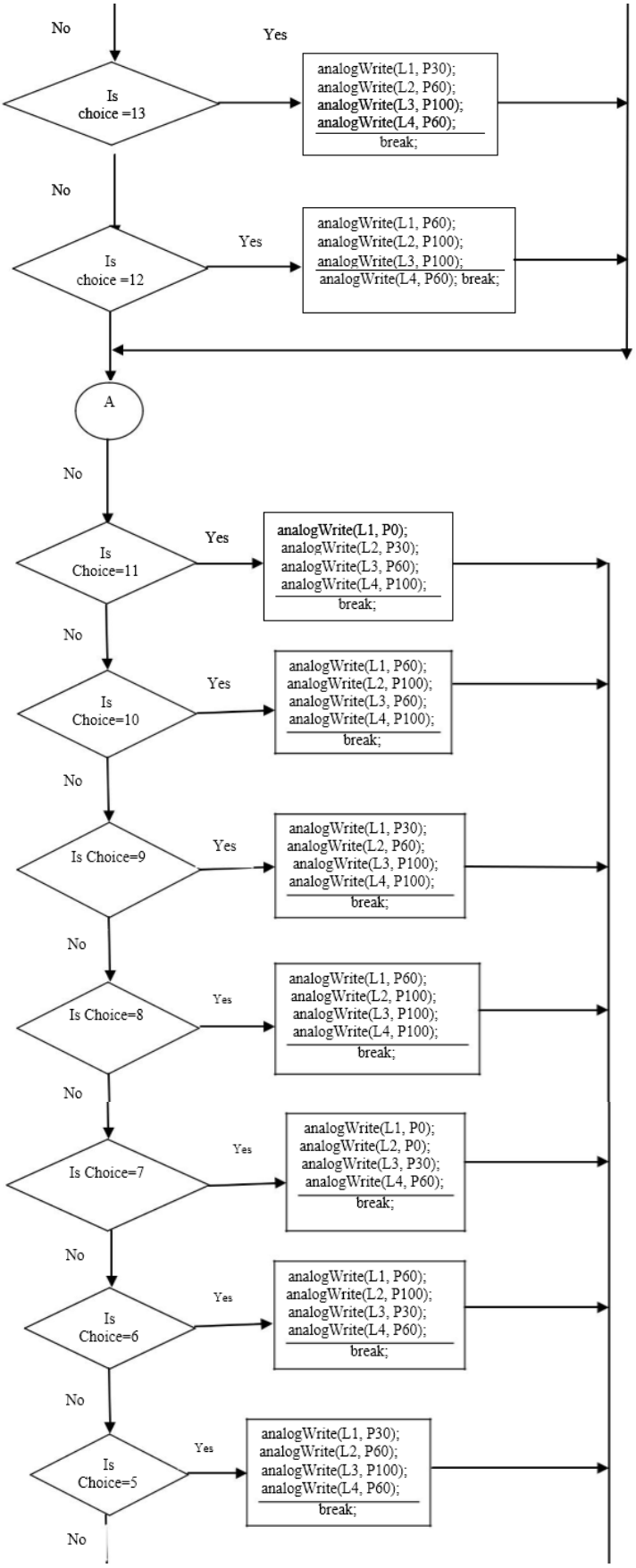
Code Analysis

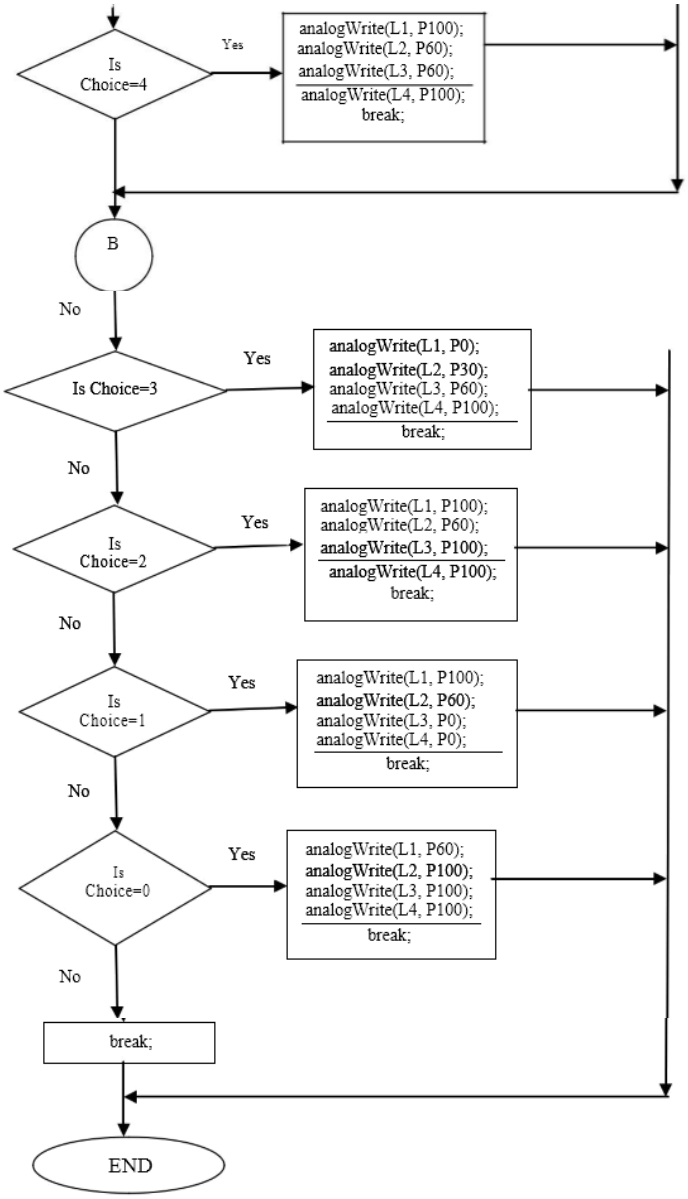
Table 1

Sr. No.	L1	L2	L3	L4	Respective Case to Execute
0	0	0	0	0	Case 0
1	0	0	0	1	Case 3
2	0	0	1	0	Case 5
3	0	0	1	1	Case 9
4	0	1	0	0	Case 6
5	0	1	0	1	Case 10
6	0	1	1	0	Case 12
7	0	1	1	1	Case 8
8	1	0	0	0	Case 1
9	1	0	0	1	Case 4
10	1	0	1	0	Case 2
11	1	0	1	1	Case 14
12	1	1	0	0	Case 7
13	1	1	0	1	Case 13
14	1	1	1	0	Case 11
15	1	1	1	1	Case 15

Implementation




No
Yes
Is choice =13
analogWrite(L1, P30);
analogWrite(L2, P60);
analogWrite(L3, P100);
analogWrite(L4, P60);
break;
No
Yes
Is choice =12
analogWrite(L1, P60);
analogWrite(L2, P100);
analogWrite(L3, P100);
analogWrite(L4, P60); break;
A
No
Yes
Is Choice=11
analogWrite(L1, P0);
analogWrite(L2, P30);
analogWrite(L3, P60);
analogWrite(L4, P100);
break;
No
Yes
Is Choice=10
analogWrite(L1, P60);
analogWrite(L2, P100);
analogWrite(L3, P60);
analogWrite(L4, P100);
break;
No
Yes
Is Choice=9
analogWrite(L1, P30);
analogWrite(L2, P60);
analogWrite(L3, P100);
analogWrite(L4, P100);
break;
No
Yes
Is Choice=8
analogWrite(L1, P60);
analogWrite(L2, P100);
analogWrite(L3, P100);
analogWrite(L4, P100);
break;
No
Yes
Is Choice=7
analogWrite(L1, P0);
analogWrite(L2, P0);
analogWrite(L3, P30);
analogWrite(L4, P60);
break;
No
Yes
Is Choice=6
analogWrite(L1, P60);
analogWrite(L2, P100);
analogWrite(L3, P30);
analogWrite(L4, P60);
break;
No
Yes
Is Choice=5
analogWrite(L1, P30);
analogWrite(L2, P60);
analogWrite(L3, P100);
analogWrite(L4, P60);
break;
No



Actual Work

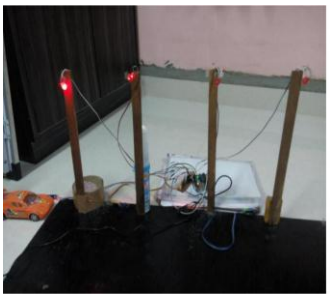


Fig 1

Fig 2

Fig 3

Fig 4

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