Embedded System Design with Arm
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Lecture – 27
Experiment With LDR Light Sensor (Part II)

Welcome to lecture 27. So, in the previous lecture I have discussed about LDR and I have shown you that depending on the ambient light how we can change the intensity of an LED. In this experiment we will be using LDR, again we will be doing one more experiment with LDR in which we will be counting the number of person present in this room let us see, but the assumption is somewhat like this that there is an entry point and there is a different exit point. So, the person coming from one door will come in and the person will be going out should exit from the other door. So, this is the assumption for this particular program that we will be showing you.

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So, this in this experiment basically we do some object counting using this LDR light sensor and we will demonstrate.

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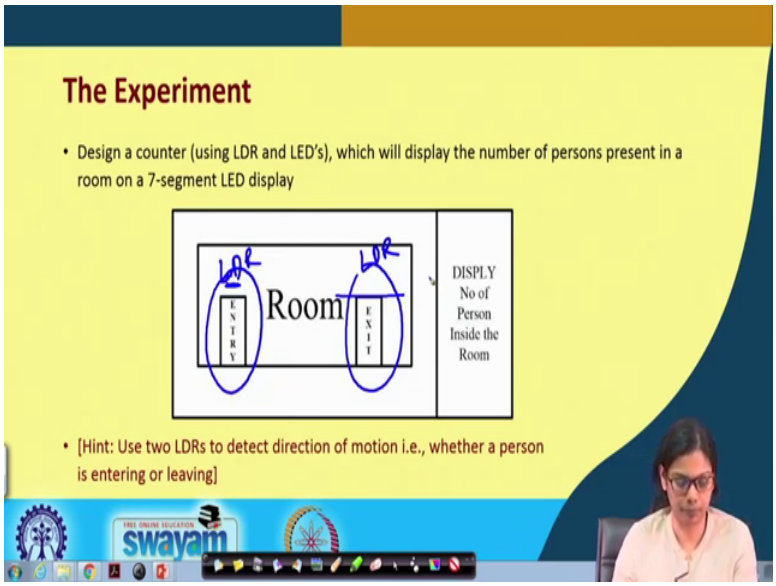

So, this is the assumption that I have told you this is the entry point this is the exit point. In this entry point there will be an LDR and in this exit point there will be another LDR, and the number of person present in a room will be displayed in the 7 segment display. So, instead of displaying it in LCD in this experiment we will be displaying it in the 7 segment display ok. So, we use 2 LDRs to detect the direction of motion that is whether a person is entering or leaving basically we have 2 LDR.

So, we do not have to take into consideration how they are entering, only thing is that if it crosses this LDR that a person has entered if it crosses this LDR; that means, the person has exited.

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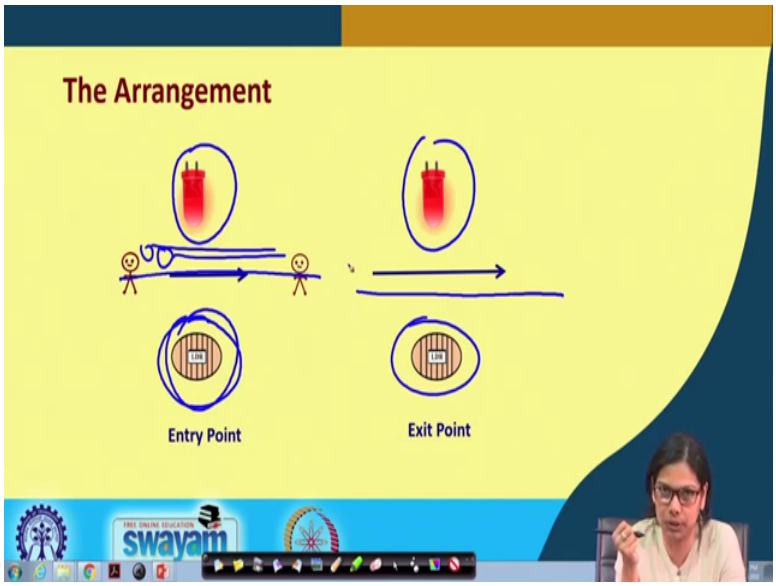

So, this is how the arrangement goes some time to make the arrangement very proper we can actually connect LED here, and we can place the LDR here ok.

So, whenever there is an interruption once from here; that means, a person has entered whenever there is an interruption from here a person has exited ok. So, these are the 2 scenarios ok, where you can use this. Again LDR could be used for many other application; you can also use it to count the number of tablets let us say you are entering into a box ok. So, in that case what you have to do similar arrangement you can do. You can keep this LDR and this in the beginning of in the front end of the tube and you can put 1 1 1 1 medicine 1 by 1 like this and each time there is an interruption the counter will get incremented you can do a variety of experiment.

So, here we are doing as a person counter ok. So, this is a kind of arrangement basically you can make for that LDR, this is one kind of arrangement that I am talking about.

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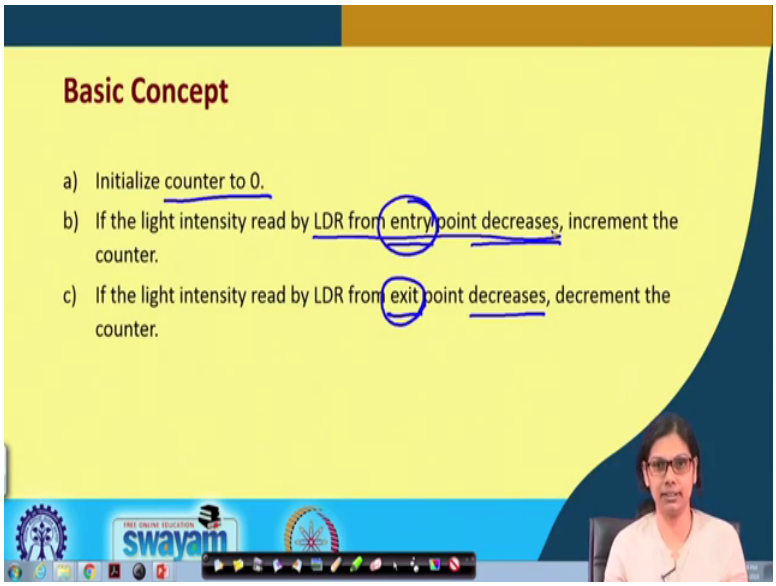

What is the basic concept here? So, we initialize the counter to 0 initially if the light intensity that is read by LDR from the entry point decreases. So, whenever there is an interruption then that resistance decreases increment the counter. If there is an change or change in the LDR value from the entry point; each time this happens we increment the counter. If the light intensity read by the LDR from the exit point decreases again we have another point that is the exit point; if it goes from the entry point it increases; if it goes from the exit point it decreases ok, then decrement the counter.

Basically both the points that we will be considering here we have kept 2 2 1 1 LDR there and all we need to do is now we have to count whether there is an interruption or not. When there will be an interruption; interruption will be there when there is a change in the resistance in that LDR that we have to catch that is what I am trying to mean when I say if the light intensity read by LDR from the entry point decreases ok, that particular thing we need to take into consideration while we do the experiment.

So, we have understood there initially the counter will be 0, each time from the entry point there is an interruption the count value will get incremented, and whenever there is an interruption in the exit point the count value will get decremented, this is the whole concept.

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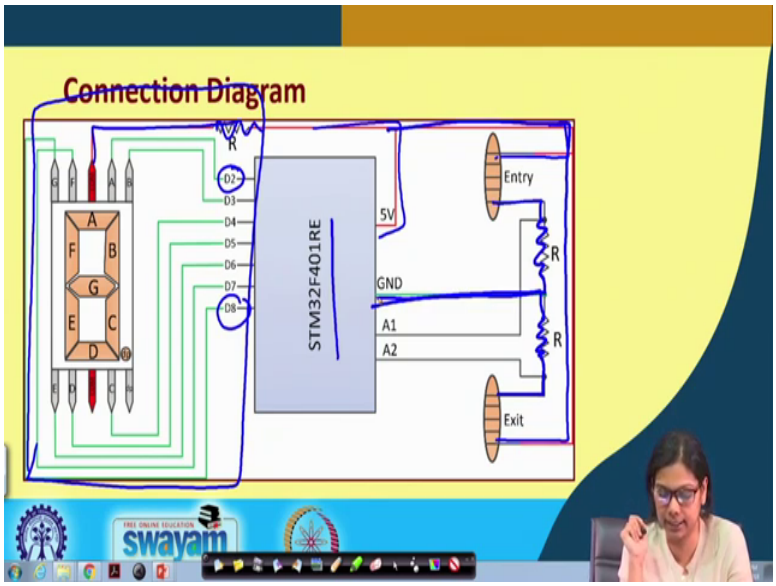

Now, this is the connection diagram the connection diagram is fairly straightforward this part of the connection diagram we have already discussed where, the same way all the segments of this 7 segment is connected from pin number D 2 to D 8 of this STM ok. So, we have connected all the pins of the 7 segment here this is again a common anode 7 segment. So, from the common port through a resistance it is connected to 5 volt and what we have to display here? Whenever there is an interruption this display should display the number of person present in a particular room ok.

Now let us see the connection of this LDR one end of the LDR is connected to this 5 volt directly. And another end is connected through a resistance to ground you see one end is connected to 5 volt directly another end is connected through the resistance to ground please make sure and understand this particular connection very nicely ill just repeat.

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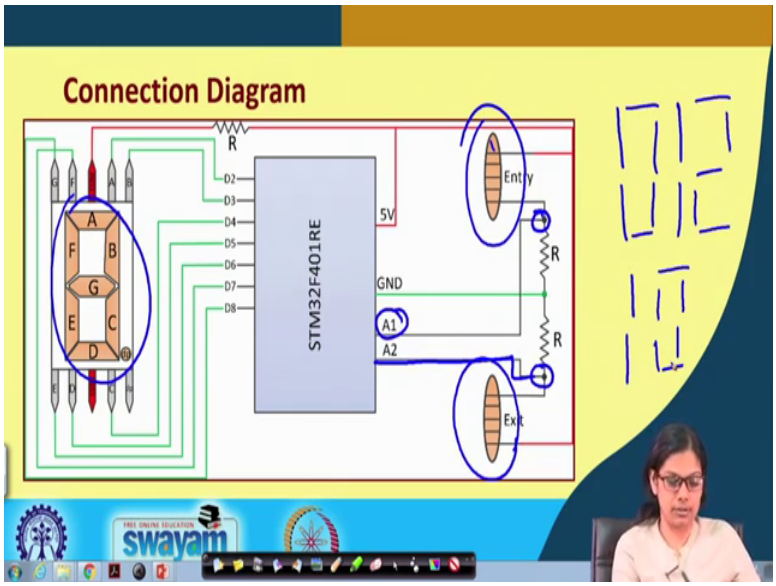

Here are two end of this LDR this is one and this is one end one end is directly connected to this 5 volt we can see. Another end through a resistance is connected to ground same way here one end is connected to this BCC another end through a resistance is connected to ground and from where we are taking both A 1 and it from this point entry point it is connected to port A 1. And from this entry by exit point it is connected to port A 2, this is all about the connection.

Now what will happen whenever there is an interruption in this particular LDR this 7 segment will get incremented let us say initially it was displaying 0 then it will display 1. When again it will get incremented it will display 2, but if now somebody exit then what it will display once somebody crosses this exit ones then again it will display 1, if again somebody exists it will display 0 and so on. Let us see how this code is written?

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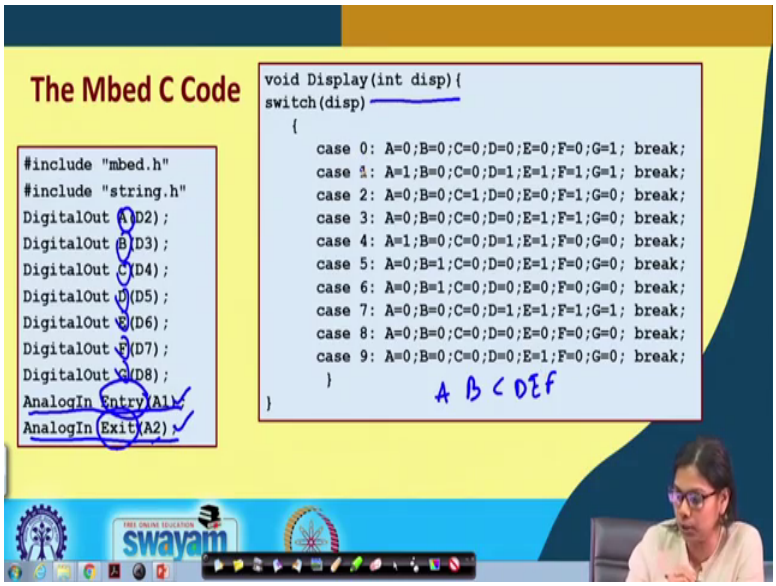

So, for the Mbed C code this part of the code is straightforward A 1 A 2 D 2 D 3 D 4 D 5 D 6 D 7 and D 8 is connected to A B C D E F G of the of the 7 segment ok, this connection we already did so, we are not discussing in detail. What is required here we have 2 analog port one is A 1 another is A 2. One, we call it entry which is connected to analog port A 1, another is called exit which is connected to A 2.

And this is the display function basically where we are displaying 0 to 9 same way here also we have done 0 to 9, but of course you can go beyond 9 you can also display A b C D E and F that is for your homework you can do it ok. So, here we have displayed from 0 to 9. So, this is the code which we have already discussed.

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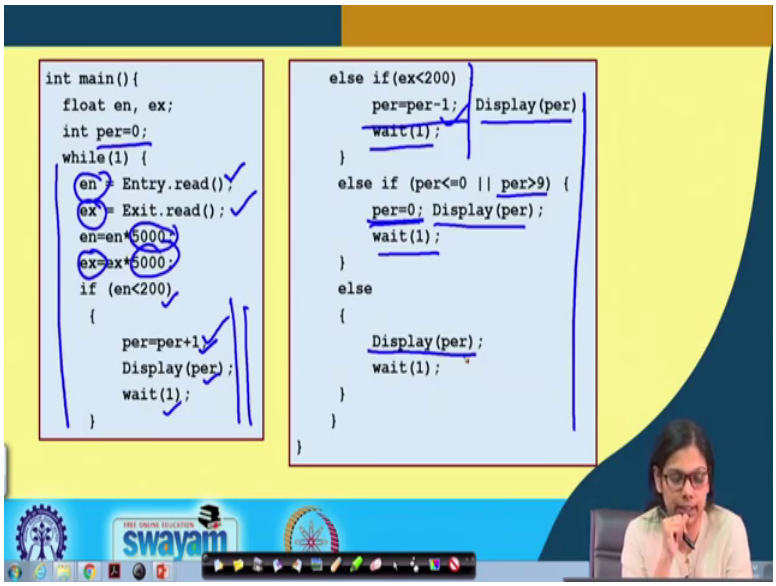

Now, let us see the further code the main program; The main program goes like this number of person initially we have sorry; the number of person what we have made initially is 0 ok, while 1 in the while loop what we are doing let us see we are doing the following. Entry dot read will give some value for the entry point exit ex exit dot read will give the value from the exit point, both the values we are multiplying with 5000 we are and we will be getting certain values.

If entry is less than 200 so, the value decreases basically then person number of person is incremented by 1 ok. If there is a change in resistance value that is the resistance decreases beyond this 200 then there is an interruption, and we have incremented it we send it to display function we wait for 1 second. Else if we have to also check from the exit point; exit point value is ex. If ex is less than 200 then person will be person minus 1 and then we will display the person and wait for 1 second ok.

So, this is if somebody enters you increment if somebody leaves you decrement. Else if there is one more condition that we have to do if it is less than equals to 0 or it is greater than 9, then well initialize it if person equals to 0 because, it is a 7 segment display we know there is a limitation we cannot display any number of characters ok. But if it is an LCD this would not have been there, you could have displayed any character. So, the number of person will be made 0, if it becomes less than 0 it will never become less than 0 basically and if it is greater than 9.

So, here we display and we leave for 1 second else display what is there in person and wait for 1 second this is all about the entire code that we have for your entry and exit point. So, LDR sensor is used in many places many it has got many practical application. So, these are some examples that we have shown here it we will see later that later in some experiments that it also used to calculate the speed of motor. So, there also inside that particular LDR is there which will count the number of interruption that is moving on. After this we will be showing you the demonstration of the same code that I have discussed just now let us see that.

Welcome back. So, today I will be showing you the experiment using LDR we already know how an LDR works and using LDR what all we can do ok. Now what I will do first is that I will show you that using LDR how you can count the number of person present in a particular place. Let us say in a particular room provided you have two point; one is your entry point and another is your exit point.

So, what you have to essentially do here is that you can have 2 LDR put up in one in entry point and another in exit point. Whenever there is an interruption then the counter will get increased if somebody is crossing the entry point and if somebody is crossing the exit point that particular number will get decremented. So, basically the entry point when there is an interruption we see that a person is entering and from the exit point when there is an interruption we say that a person has already left the room. And at a particular time the number of person that that are present in a room will be displayed anywhere it could be displayed in an LCD it could be displayed in a 7 segment ok.

So, in today's experiment we will be interfacing in the similar fashion will be interfacing 2 LDR and one will considered as entry point another will considered as exit point and then will be displaying the number of person present in a 7 segment ok. So, let us see the experiment.

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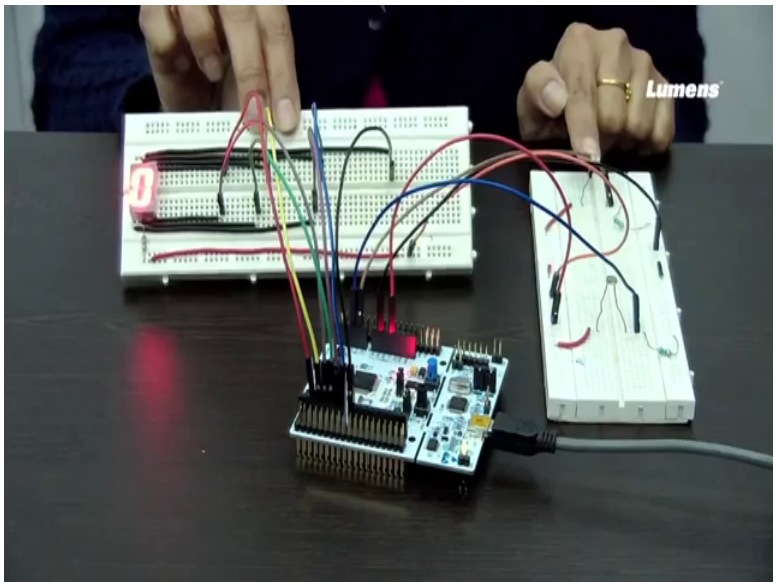

So, now this is how you have to put the 2 LDR this is the let us say this is the entry point the left one and this one is the exit one so, this is the entry this one is the exit. Now as I said will display this in a 7 segments so, we already did how you have to connect with a 7 segment that is already present.

So, now for this one let us see how the connection will be one end of this LDR will be connected to BCC. So, I have made it both the IDR you see from this common point I will be connecting it to this particular point which will be connected to BCC. And the other end through a resistor we will be connecting it to ground, and you see from which point you will be actually taking the analog input will be basically this point you see from this particular point. This is connected to BCC this using resistor connected to ground and from this middle point basically you have to take the analog input value and you have to connect it to the analog port ok.

So, let me first show you that this connection we already know with 7 segment. So, this is already present here and now I will be connecting first the common point. So, as I said from this point it is connected to BCC. So, this common point we can take and we can connect to BCC and this is the LED connection ok. In this LED connection you will be seeing the number of person that is present that will be displayed in this 7 segment and you already know how the connection works. So, from the common point I will take and

I will connect to BCC. So, my BCC common point is this particular line so, I will directly connect it here ok.

I believe the connection is clear to you this is already we did earlier ok. So, from the common point this is the common point of the 7 segment we are taking this and we are connecting it to the BCC and this is 5 volt have connected to this point. So, we can use this particular whole set of lines all are connected because see in the middle I have made this connection ok. So, from the middle it is also connected from here till here ok. So, now, I will take the next one that is ground so, this point is the ground one. So, you can see like this point is ground, so from here I will connect it to ground and now the most interesting part that is the where we will be taking the analogue board?

So, as I have already told you this is one end to BCC another end to ground and from this point you will connect it to the analog port. So, first entry I am connecting to A 1 and here will be the exit that I will be connecting to A 2 please again make sure about the connection that we did. This is the common point this whole line is the common point for BCC one end of the LDR is connected to this BCC this is the common point for ground one end of the LDR is connected to this ground ok.

Yeah one end of the LDR both in are connected to ground through this resistance. And from the middle point we are taking this analog inputs and this connection we have we already know the 7 segment connection only that you have to connect this particular point that is the common point to BCC that we are connecting. Now we will dump the code.

So, this one is my exit the sorry this one is my entry and this one is my exit ok let us see how it works let me connect it and dump the port so, initially it is displaying 0 count ok. Now as I said this LED this sorry LDR is my entry point LDR let us see if I interrupt what happens it has incremented by 1 I will make another interruption it has incremented by 2 another interruption interrupted 3. So, the person count is 3 here now this LDR is my exit LDR.

So, let me see what happens if there is an interruption here, it has become 2 it has become 1 I will again make some entry. So, I will again interrupt using this particular LDR now I will again make some we will make some interruption in the exit LDR which is this 1 5 4 3 2 1 and then 0.

So, we have seen that in a simple way how we can make a person counter if of course, if you have basically two points one your entry point, another exit point and at both the points you can keep an LDR which will actually record the interruption that are taking place. And if there are like the number of interaction interruption is going on then it will increment it and it will display in this 7 segment.

And similarly if you have some interruption from the exit point it will also take that into consideration and then it will decrement. I hope this experiment with LDR is clear to you all. And I hope that you perform this at your end using this STM board you can also do it with Arduino board at your own convenience, whichever board you feel like you can do the code is fairly straightforward, which I have already discussed ok.

Thank you.