Lamp dimmer circuit used in cars

Experiment no.
Date:

Aim:

To study the characteristics of transistor by designing a lamp dimmer circuit using darlington pair.

Software Required:

LTspice software

Circuit Diagram:

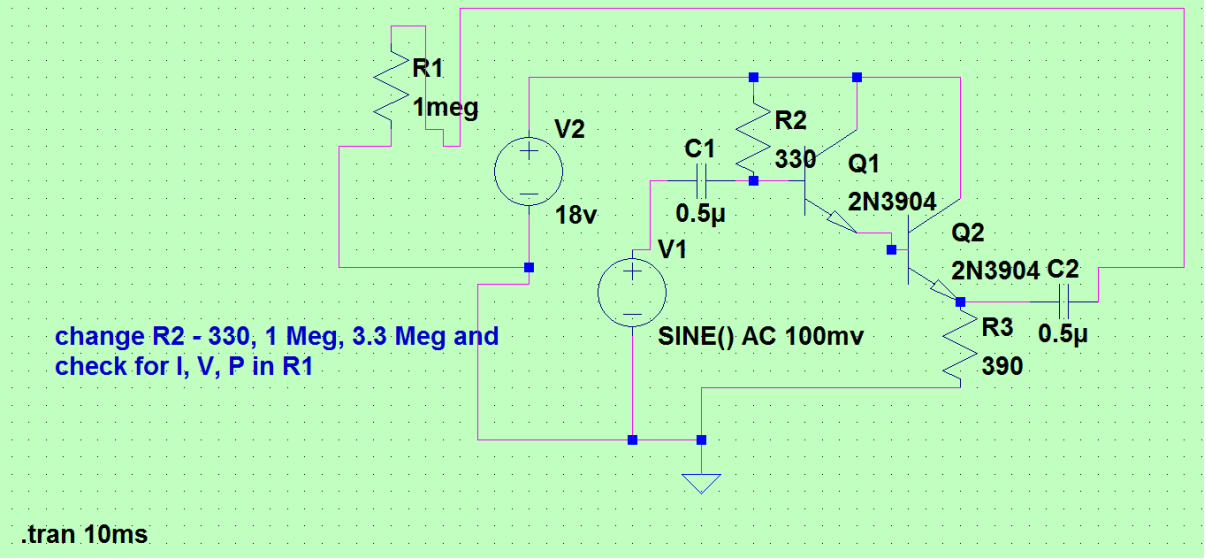


Figure 1. Light Dimmer Circuit

Theory:

Transistors are an essential component in a sensor circuit. Usually transistors are arranged as a pair, known as a '***DARLINGTON PAIR***'. It is very important that you can identify this arrangement of transistors and state clearly why they are used. A darlington pair is used to amplify weak signals so that they can be clearly detected by another circuit.

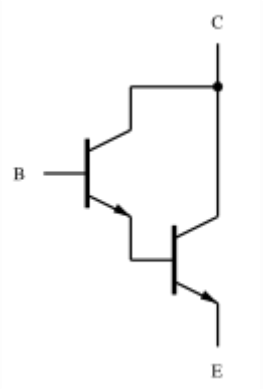


Figure 2. Darlington Pair

A Darlington pair behaves like a single transistor with a high current gain (approximately the product of the gains of the two transistors). In fact, integrated devices have three leads (B, C and E), broadly equivalent to those of a standard transistor.

A general relation between the compound current gain and the individual gains is given by:

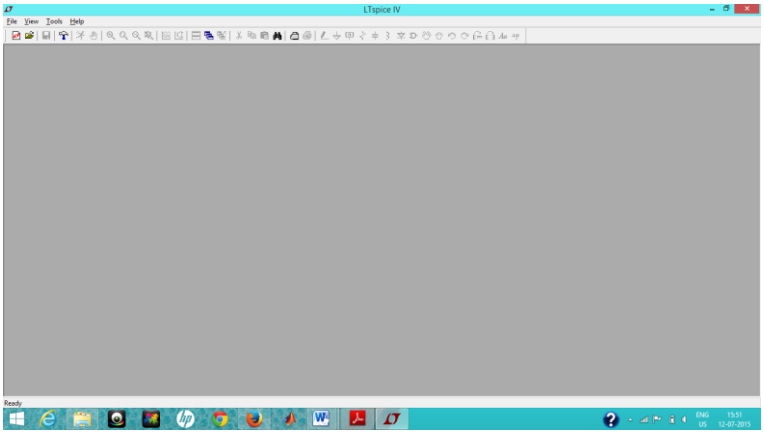
$$\beta_{Darlington} = \beta_1.\beta_2 + \beta_1 + \beta_2$$

If β_1 and β_2 are high enough (hundreds), this relation can be approximated with:

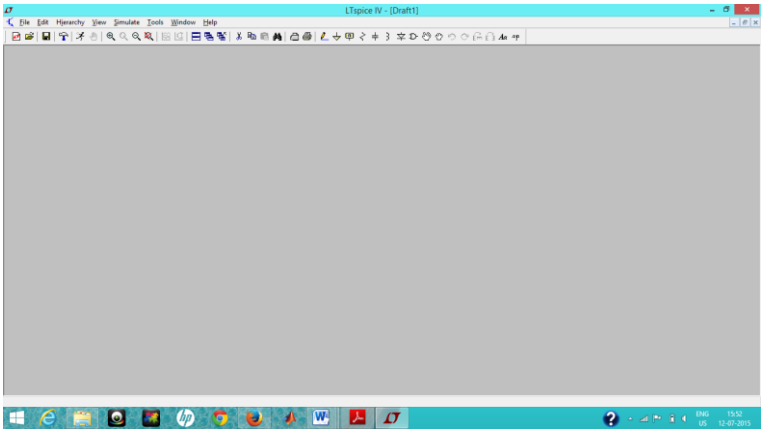
$$\beta_{Darlington} \approx \beta_1.\beta_2$$

Procedure :

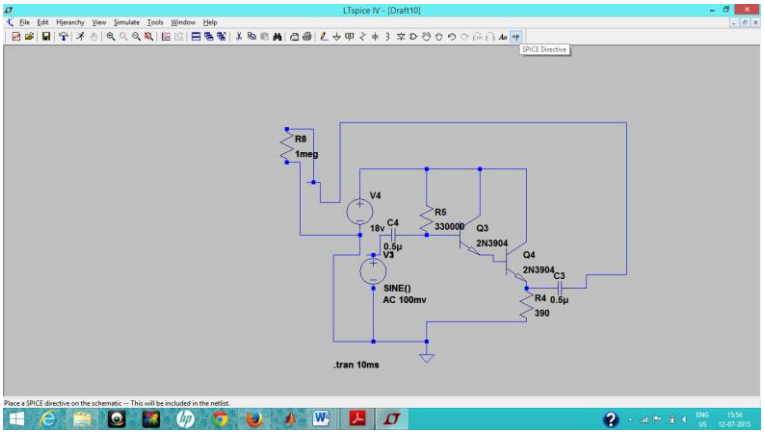
1. Open LTspice.



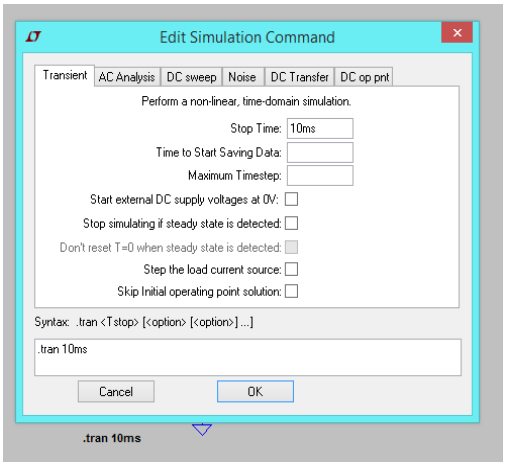
2. Open a new file – **File**, **New Schematic.**



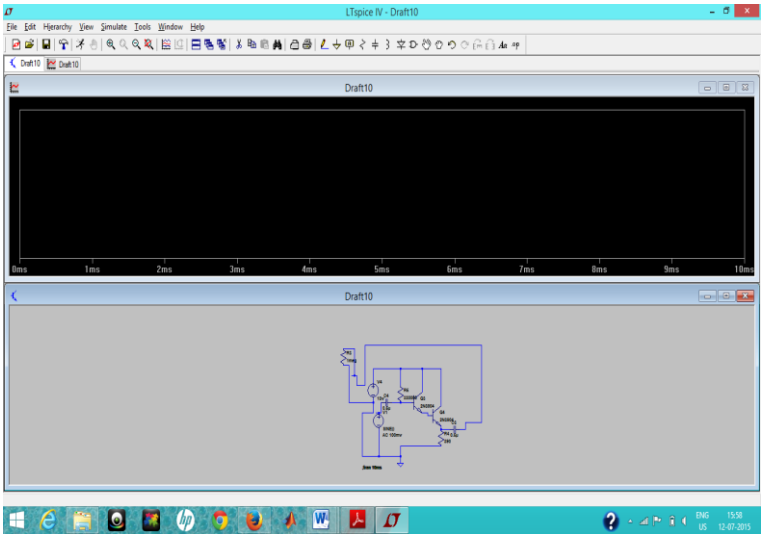
3. Place the components in the new schematic and connect all the components through wires.



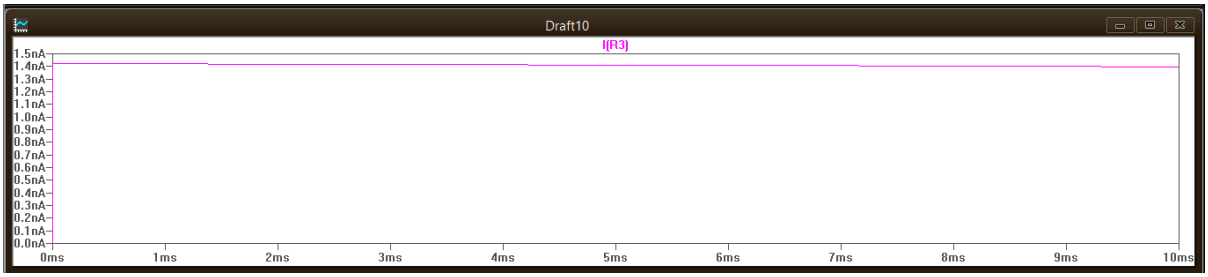
4. Then click simulate, “edit simulation command”, Click transient, set the stop time as 10ms. Then click ok.



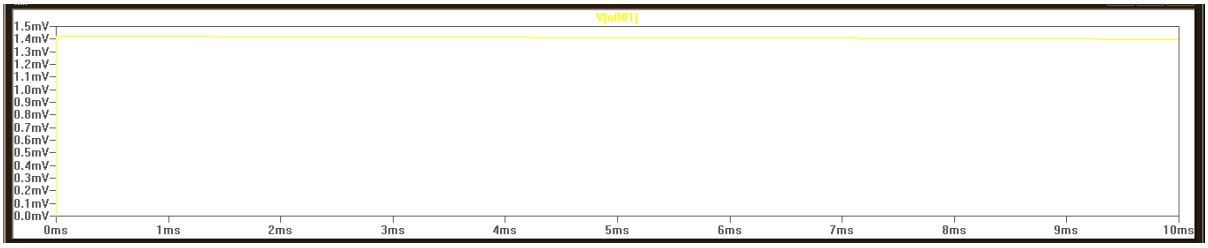
5. Click simulate and then run



6. Move the mouse on R_1 to get the current probe to measure the current through the resistor R_1.



7. place the mouse at the node near R_1 to get the voltage probe to measure the voltage across the resistor R_1



8. Change the value of R_2 to get the variation in R_1. R_1 is used as light. R_2 is used as LDR. This process is repeated to get various response of R_1.

Observation:

Table :

S.NO	R_2	R_1		
		Voltage (V)	Current (A)	Power (W)
1.				
2.				
3.				

Results:

Thus, the characteristics of transistor have been studied by designing a lamp dimmer circuit using darlington pair.