

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ



**Faculty of Engineering**

**Electrical Engineering Department**

**Electronic Circuits I – EE 233**

**“Automatic Light Controller”**

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## **Abstract:**

## **Objective:**

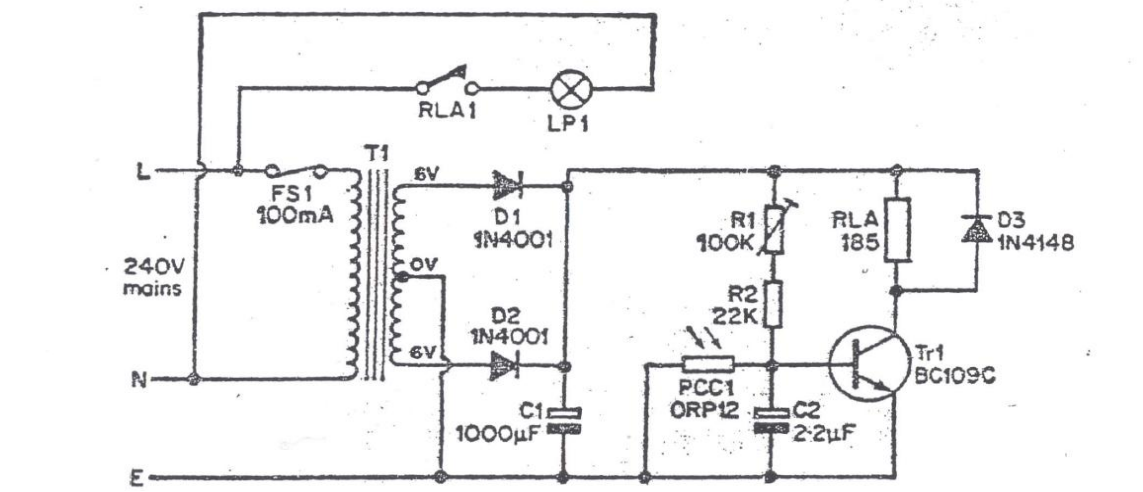
This project is the application of electronic circuits that we learn. Its aim is to identify electronic devices such as: " transistor ,diode."And also learn how to control the operation of lighting automatically.

## **Equipment Required:**

1. Relay
2. sensor
3. Relay
4. Resistor
5. Transistor
6. Transformer
7. Lamp
8. AC Voltage
9. Capacitor
10. Diode and zenor diode.

## **The projects circuit:**

Automatic Light Controller



## Theory & Description of the project:

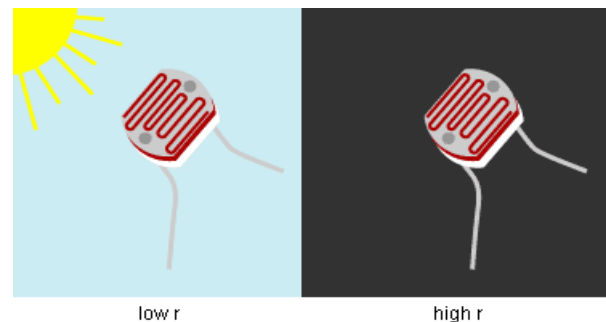
The first component in our project is the **DC power supply** .its use to giving DC power from AC source It consists of four stages: "transformer, rectifier, filter and regulator" .but in our project we not use the regulator because the load is not largely affected by the voltage ripple.

1. Transformer" center-tapped transformer full-wave rectifier" : used to increase or decrease the amplitude of AC the line voltage . The transformer steps down The AC voltage from ( $240_{rms}$  to 6V).
2. Rectifier: used to cover the AC voltage (Zero Average Value ) into positive or negative pulsating DC "two rectifier diode".
3. Filter: used to smooth out the pulsating DC by the rectifier by removing its AC ripple and passing its DC component.

The second part of the project is the other component in last figure "resistor , sensor ,variable resistor, sensor , transistor, zenor diode, and relay":

1. Photo cell (light sensor):A photocell is a type of resistor. When light strikes the cell, it allows current to flow more freely. When dark, its resistance increases dramatically.

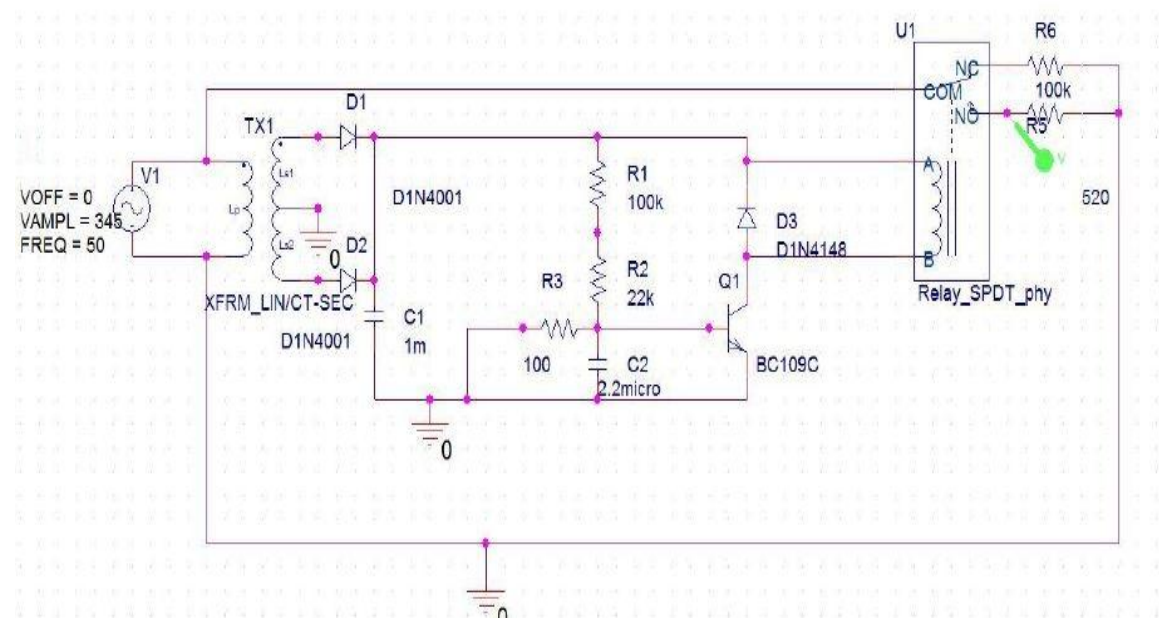
in the daytime the sensor resistance is small.  
In contrast its resistance is large in the dark.



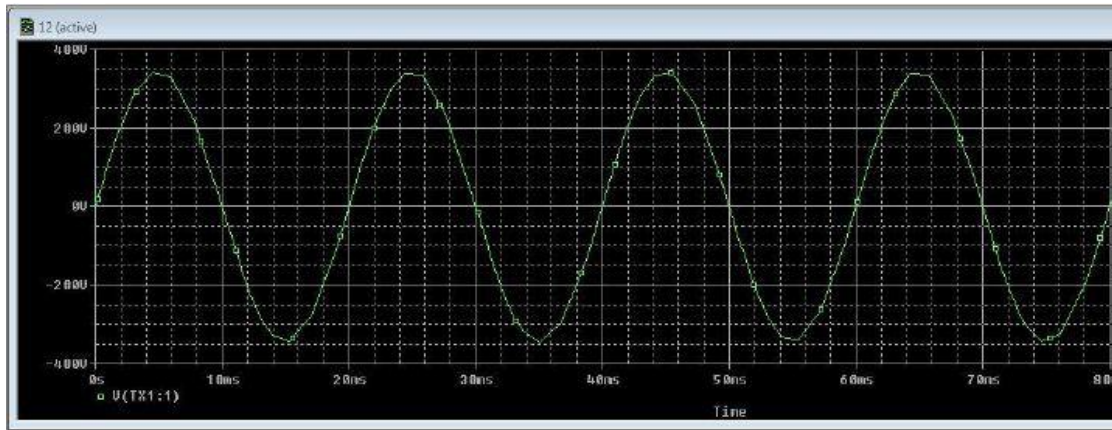
2. Transistor: the transistor in the project use as switch. in the daytime the sensor resistance is small and ( $V_{BE} \leq 0.7V$ ) then the transistor in the cutoff region so no current flow and the relay is deenergized and the lamp is off.  
In the dark the sensor resistance is large so ( $V_{BE} \geq 0.7V$ ) then the transistor in saturation region and the relay flow current and the lamp is on.

3. The relay is simply an inductor with a wire inside the coil, when a current flow through the coil, a magnetic field is produced inside it which attracts the wires and conducts the current to the lamp and causes it to light on. When there is no current the relay, there will be no magnetic field, then the switch remains open and the lamp is off.
4. The zenor diode is connected in parallel with the relay to protect the transistor.
5. The aim of variable resistor is to control the degree of darkness that lamp should be give light.
6. the aim of small capacitor is to not let circuit give light directly, for example when someone make darkness for short time on photo cell.

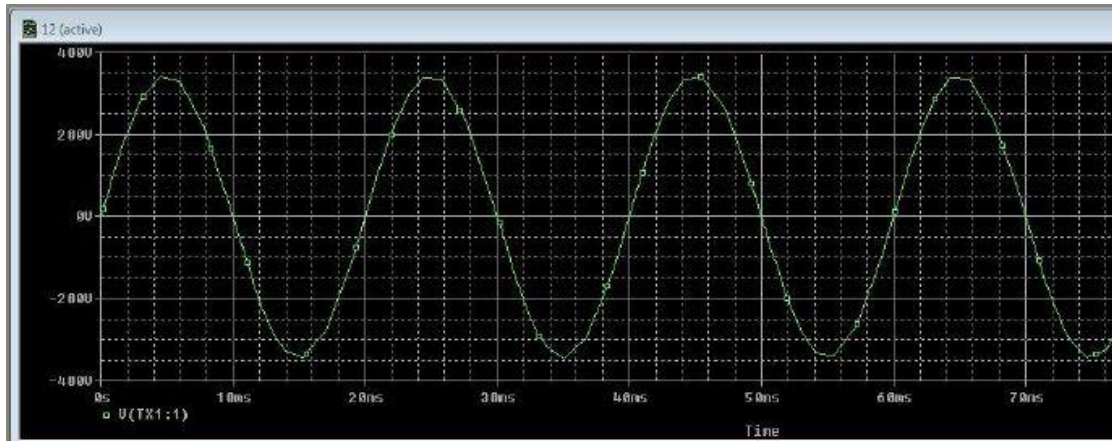
### Simulation:



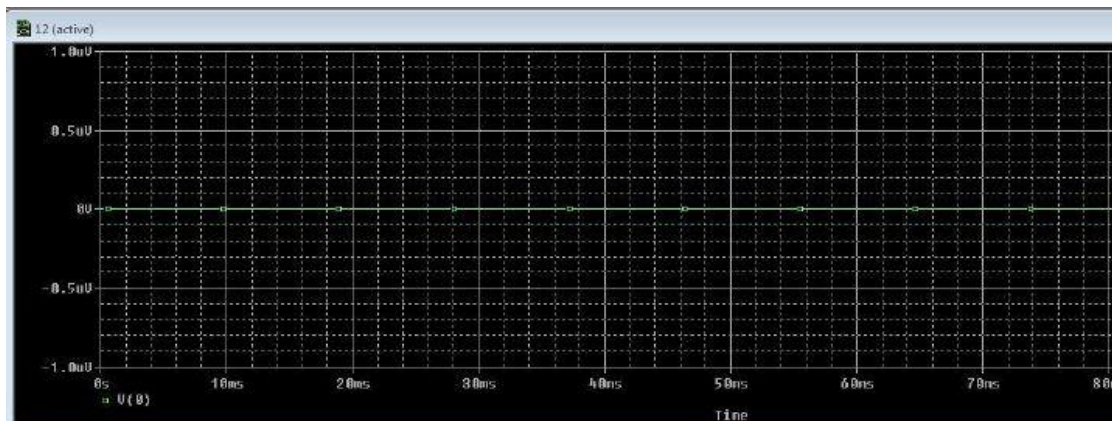
### At 5K $\Omega$



### At 18K $\Omega$



### At 32K $\Omega$



## **Conclusion and impressions**

This project was a useful and an interesting experience for us, in which we have learned many practical principles such as using the breadboard in connecting circuits, and how to look for faults in circuit connection and fix them.

Moreover we have recognized new electrical elements with their applications, such as the relay, which was used as a switch  
And sensor.