International Journal of Current Research and Modern Education (IJCRME)
ISSN (Online): 2455 - 5428
(www.rdmodernresearch.com) Volume I, Issue I, 2016

HOME APPLIANCES CONTROLLED BY INFRARED REMOTE CONTROL SYSTEM

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Abstract:

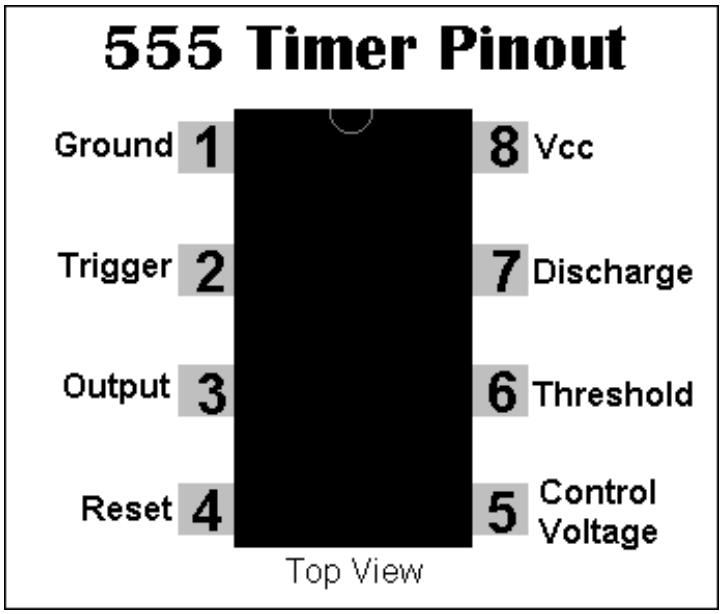
This paper explained alternative current controlled by remote system using electronics components. Transformer is used to high alternative current to low alternative current. Diode IN 4007 is used to convert alternative current to direct current. IC 7805 is used to receiving 5v from this output. Transistors are used to switching and amplifying. IN 4001 relay is used to cut off ac. IC 4017 is used for processor and IC 555 is used in timer section.

1. Introduction:

The IR remote control consists of two sections on is transmitter section and another one is Receiver section. The transmitter section consists of a power supply, an oscillator and an output stage, where as the receiver section comprises power supply, an infrared detector module and time delay circuit with noise filter, astable flip-flop and an output section. The receiver uses an infrared sensors module which commonly used in color television for sensing the IR signals from the transmitter section. Infrared remote control comprises of IC 4017, IC 7805, BC 557 PNP transistor, BC 548 NPN transistor, IN 4007 rectifier diode, IN 4148 switching diode and red LED.

2. Description of Integrated Circuits Description of 555 Timer:

The 555 timer [1] consists of two voltage comparators, astable flip-flop, discharge transistor and a resistor divider network. The resistive divider network is used to set the comparator levels. Since all three resistors are of equal value, the threshold comparator is referenced internally at 2/3 of supply voltage level and trigger comparator is referenced at 1/3 of supply voltage.

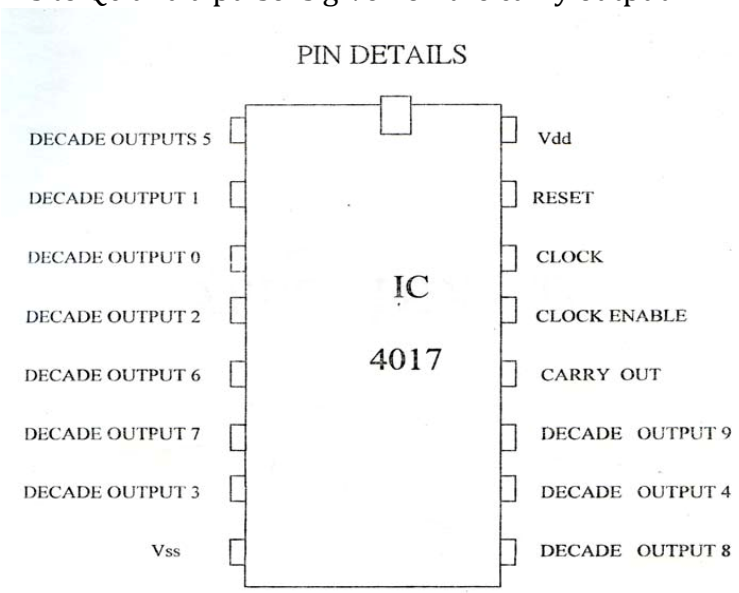


The outputs of the comparators are tied to the astable flip- flop. When the trigger voltage is moved below 1/3 of the supply, the comparator changes state and sets the Flop-flop driving output to a high state. The threshold pin normally monitors the capacitors voltage of the RC timing network.

When the capacitor resets the flip-flop, in which turn drives the output to a low state. When the output is a low state, the discharge transistor is "On", there by discharging the external timing capacitor. Once the capacitor is discharged, the timer will await another trigger pulse.

3. 4017 Decade Counter:

The 4017 decade counter [2] is implementing a variety of logic functions using complementary metal oxide semiconductor technology. The 4000 series had the advantage of much lower power consumption. This IC is called a 5 stage Johnson decade counter. This IC contain is a counter with a reset and 2 count pins as input and 11 outputs. 10 outputs area carry pin. When the reset pin is given a high pulse, the outputs Q1-Q9 are made low and Q0 is made high. When a clock pulse is given on clock input (14) while enable input (13) Is being held low, the high which was on output Q0 now moves along to Q1. Continuing to pulse the clock input (14), advances the high along the counter until 9 pulses have been sent. On the 10th pulse the counter output returns to Q0 and a pulse is given on the carry output.



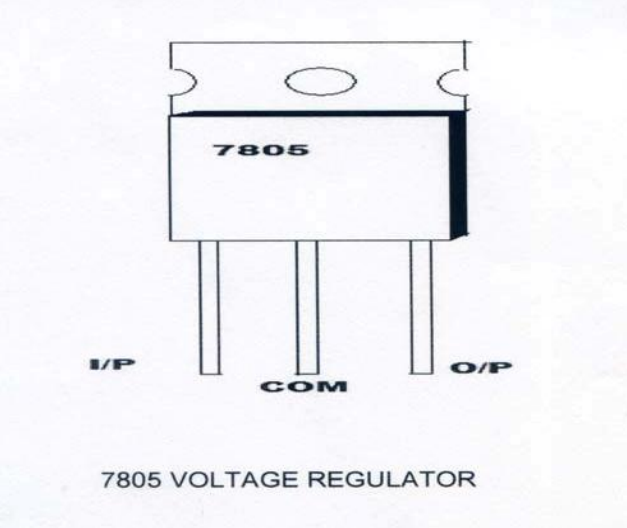
5 STAGE 10 BIT JOHNSON COUNTER

V_{dd} – 3 to 15 VOLTS

4. 7805 Voltage Regulator:

The board can use any power supply that creates a DC voltage between 6 and 12 volts. A7805- 5v voltage regulator [3] is used to ensure that no more than 5v is delivered to the Board regardless of the voltage present at the j 12 connector. The regulator functions by using a diode to clamp the output voltage at 5v DC regardless of the input voltage. Excess voltage is converted to heat and dissipated through the

body of the regulator. If a DC supply is greater than 12V is used, excessive heat will be generated and the Board may be present at the regulators output.



7805 VOLTAGE REGULATOR

5. Printed Circuit Board Design Printed Circuit Board:

A printed circuit board or PCB is used to mechanically support and electrically connect electronic components using conductive pathways or traces etched from copper sheets laminated into a non conductive substrate. Alternative printed circuit assembly (PCA), also known as a printed circuit board assembly (PCBA). PCB's are rugged, inexpensive and can be highly reliable. They require much more layout effort and higher initial cost than either wire wrapped or point-to-point constructed circuits. The PCB design contains some steps. They are as follows,

1. Patterning
2. Lamination
3. Drilling
4. Exposed conductor plating and coating
5. Solder resist
6. Screen printing
7. Populating
8. Protection and packaging

6. Infrared Remote Control System:

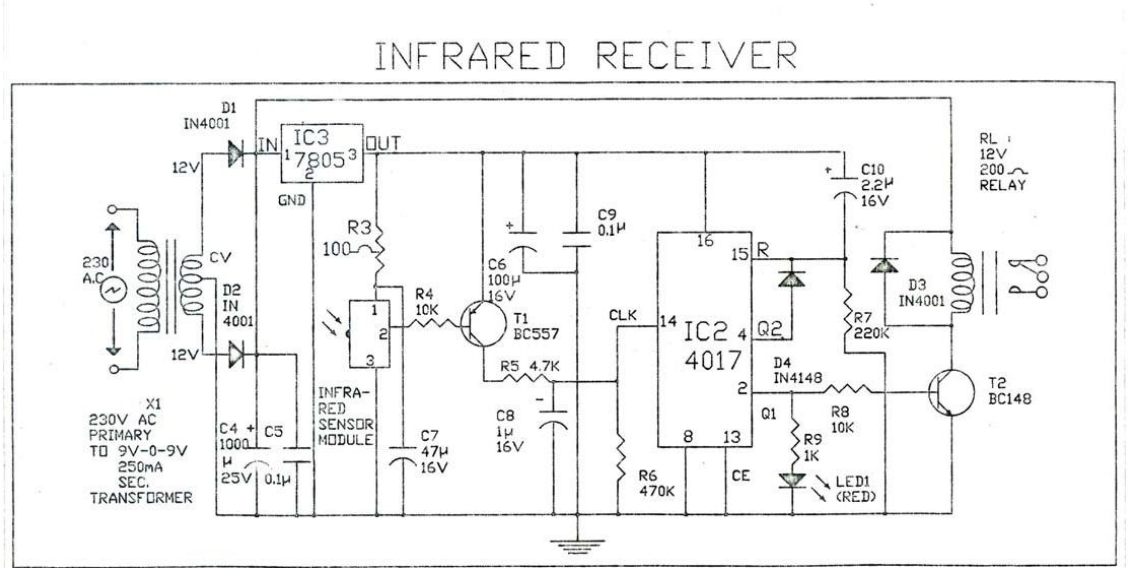
6.1. Transmitter Section:

The transmitter section consists of a power supply, an oscillator and an output stage. In the transmitter section IC1 (555) is wired as an astable multivibrator with A center frequency of about 36 kHz. When switch S1 is pressed, the circuit gets energized. Output of IC1 is a square wave. The two infrared LED's connected at its output transmit IR beams modulated at the same frequency (36 KHz). The oscillator frequency can be shifted slightly by adjusting preset VR1.

6.2. Receiver Section:

The receiver section comprises power supply, an infrared detector module, time delay circuit with noise filter, bistable Flip flop and an output section. The receiver uses an infrared sensor module which commonly used in color television for sensing the IR signals from the transmitter section. The sensor module incorporates a detector diode and SMD IC which consists of a band-pass filter an amplifier and a

demodulator on a small PCB placed inside a small tube enclosure to get rid of unwanted electro- magnetic interference.



Infrared Receiver Circuit

7. Conclusion:

This kit is used for simple on-off functions such as controlling a lamp or fan. The IR remote circuit using sensor suffers from major drawback of being affected by ambient light and a very low range. The advantage is that this circuit is absolutely free from ambient light interference and provides control range of about 10 meters without the use of any focusing lens.

8. References:

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3. Mohammad Shah, Alamgir and Sumit Dev, Design and Implementation of an Automatic Voltage Regulator with a Great Precision and Proper Hysteresis International Journal of Advanced Science and Technology, Vol.7. 5, pp.21-32, 2015.