

A Practical activity Report submitted for
Engineering Design Project-II (UTA-024)

by

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Submitted to

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NOTE: Select an appropriate objective only from the following list of
experiments while making a softcopy of your report.

TABLE OF CONTENT

Sr. No.	Experiment no.	Objective
1	1 (a)	To draw a schematic diagram of receiver to receive specified pulse width IR signals from gantries using CAD tool (Eagle).
2	1 (b)	To design a printed circuit board layout of receiver circuit using CAD tool (Eagle).
3	2 (a)	To draw a schematic diagram of IR sensor module circuit (required to move Buggy module on a predefined the path) using CAD tool (Eagle).
4	2(b)	To design a printed circuit board layout of IR sensor module circuit using CAD tool (Eagle).
5	3 (a)	To draw a schematic diagram of pulse width modulation (PWM) based transmitter for generating specified pulse width waveforms for gantries placed at different locations on the path using CAD tool (Eagle).
6	3 (b)	To design a printed circuit board layout of pulse width modulation (PWM) based transmitter circuit using CAD tool (Eagle).
7	4	To solder and test a pulse width modulation (PWM) based transmitter circuit (for gantries placed at different locations on the path to be followed by Buggy robot) on a printed circuit board (PCB).
8	5	To solder and test pulse width modulation (PWM) based receiver circuit (to receive IR signals from gantries connected to transmitter circuit) on a printed circuit board (PCB).
9	6	To solder and test an IR sensor module circuit (which helps Buggy robot to move on a predefined path) on a printed circuit board (PCB).

III

Experiment: 3

Objective:

- (a) To draw a schematic diagram of pulse width modulation (PWM) based transmitter for generating specified pulse width waveforms for gantries placed at different locations on the path using CAD tool (Eagle).
- (b) To design a printed circuit board layout of pulse width modulation (PWM) based transmitter circuit using CAD tool.


Software Used: Eagle Software

Component Used:

Sr. No	Name of Components	Value	Specifications
1.	Resistor	330 ohm	Carbon Resistor with 5% Tolerance
2.	Capacitor	10pf	Ceramic Capacitor
3.	Capacitor	10nf	Ceramic Capacitor
4.	DCJ0202		DC Power Jack
5.	IC1-7805TV		Voltage Regulator
6.	ATTINY85-20P		Microcontroller Pinout
7.	22-23-2031		PCB Header

Theory :

1. **Resistor:** It is an electrical component that limits or regulates the flow of electrical current in an electronic circuit. Resistors can also be used to provide a specific voltage for an active device such as a transistor.



ElectronicsHub.Org

The standard resistor color code table:

Color	Digit 1	Digit 2	Digit 3*	Multiplier	Tolerance	Temp. Coef.	Fail Rate
Black	0	0	0	$\times 10^0$			
Brown	1	1	1	$\times 10^1$	$\pm 1\%$ (F)	100 ppm/K	1%
Red	2	2	2	$\times 10^2$	$\pm 2\%$ (G)	50 ppm/K	0.1%
Orange	3	3	3	$\times 10^3$		15 ppm/K	0.01%
Yellow	4	4	4	$\times 10^4$		25 ppm/K	0.001%
Green	5	5	5	$\times 10^5$	$\pm 0.5\%$ (D)		
Blue	6	6	6	$\times 10^6$	$\pm 0.25\%$ (C)		
Violet	7	7	7	$\times 10^7$	$\pm 0.1\%$ (B)		
Gray	8	8	8	$\times 10^8$	$\pm 0.05\%$ (A)		
White	9	9	9	$\times 10^9$			
Gold				$\times 0.1$	$\pm 5\%$ (J)		
Silver				$\times 0.01$	$\pm 10\%$ (K)		
None					$\pm 20\%$ (M)		

* 3rd digit - only for 5-band resistors

Fig. 3.1 Various types of resistors

2. **Capacitor:** It is a device that stores electrical energy in an electric field by virtue of accumulating electric charges on two close surfaces insulated from each other. It is a passive electronic component with two terminals. The effect of a capacitor is known as capacitance. It is made up of two close conductors and is separated by the dielectric material. If the plates are connected to the power, then the plates accumulate the electric charge. One plate accumulates the positive charge, and another plate accumulates the negative charge.

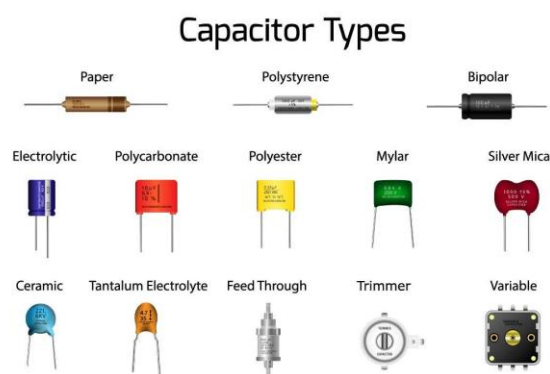


Fig. 3.2 Various types of capacitors [2]

3. **Capacitor:** It is a device that stores electrical energy in an electric field by virtue of accumulating electric charges on two close surfaces insulated from each other. It is a passive electronic component with two terminals. The effect of a capacitor is known as capacitance. It is made up of two close conductors and is separated by the dielectric material. If the plates are connected to the power, then the plates accumulate the electric charge. One plate accumulates the positive charge, and another plate accumulates the negative charge.

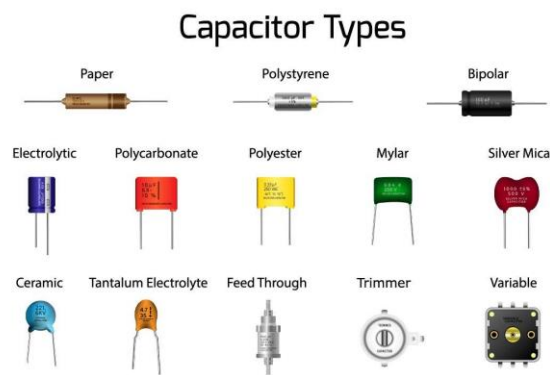


Fig. 3.2 Various types of capacitors [2]

4. **DCJ0202:** This is a common a DC power jack/connector barrel-type for DC wallsupplies. These are compatible with our DC wall supplies and have a 5.5mm jack with a 2.1mm center pole diameter.



Fig. 3.3 DCJ0202 [3]

5. **IC1-7805TV**: Voltage sources in a circuit may have fluctuations resulting in not providing fixed voltage outputs. A voltage regulator IC maintains the output voltage at a constant value. 7805 Voltage Regulator, a member of the 78xx series of fixed linear voltage regulators used to maintain such fluctuation, is a popular voltage regulator IC.



Fig. 3.4 IC1-7805TV [4]

6. **ATTINY85-20P**: The ATtiny25/45/85 is a low-power CMOS 8-bit microcontroller based on the AVR enhanced RISC architecture. By executing powerful instructions in a single clock cycle, the ATtiny25/45/85 achieves throughputs approaching 1 MIPS per MHz allowing the system designer to optimize power consumption versus processing speed. The ATtiny25/45/85 provides the following features: 2/4/8K bytes of In-System Programmable Flash, 128/256/512 bytes EEPROM, 128/256/256 bytes SRAM, 6 general purpose I/O lines, 32 general purpose working registers, one 8-bit Timer/Counter with compare modes, one 8-bit high speed Timer/Counter, Universal Serial Interface, Internal and External Interrupts, a 4-channel, 10-bit ADC, a programmable Watchdog Timer with internal Oscillator, and three software selectable power saving modes.

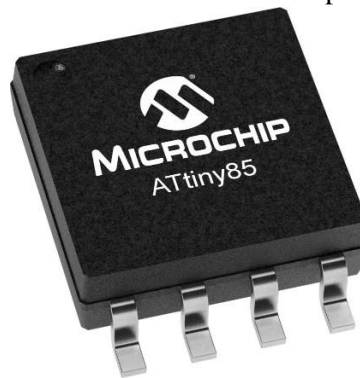


Fig. 3.5 ATTINY85-20P [5]

7. 22-23-2031: 22-23-2031 is a 3-circuit KK 254 solid header with friction lock.

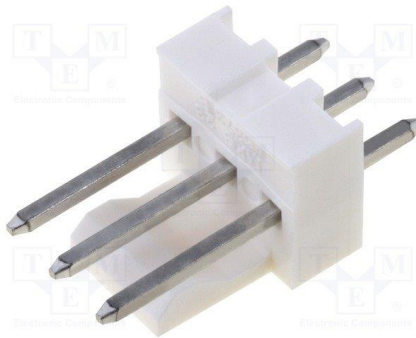
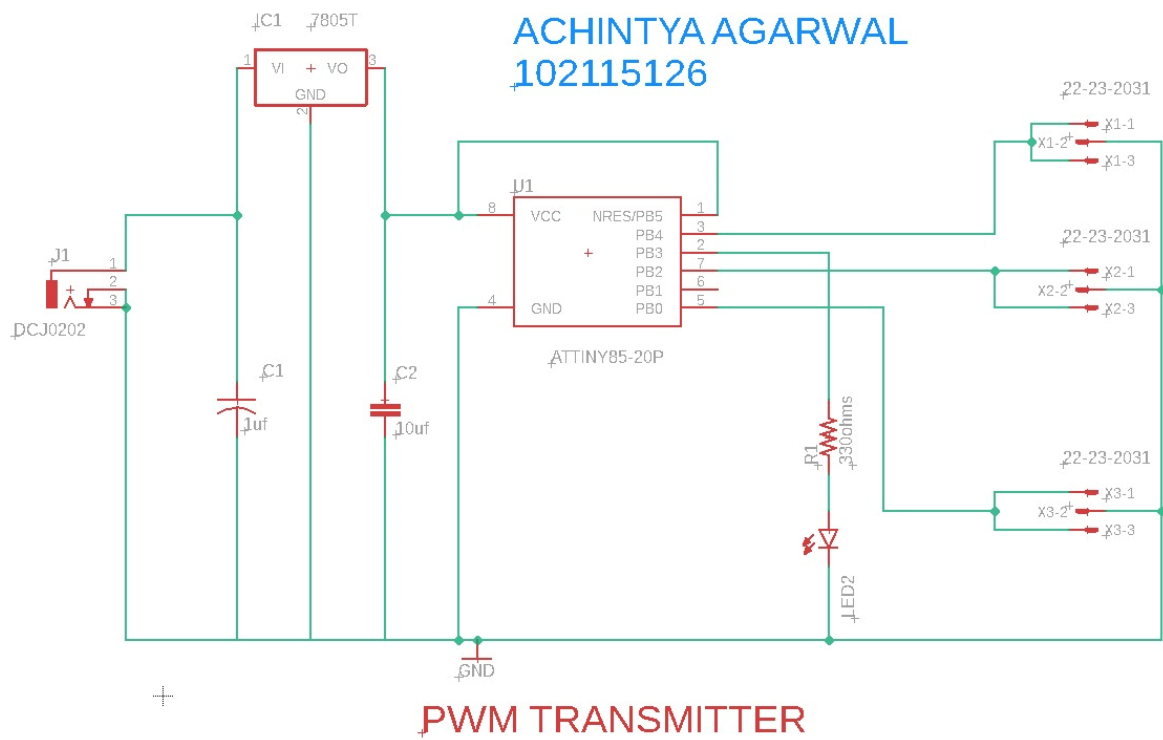


Fig. 3.6 22-23-2031 [6]

Schematic diagram:



Printed Circuit Board layout:

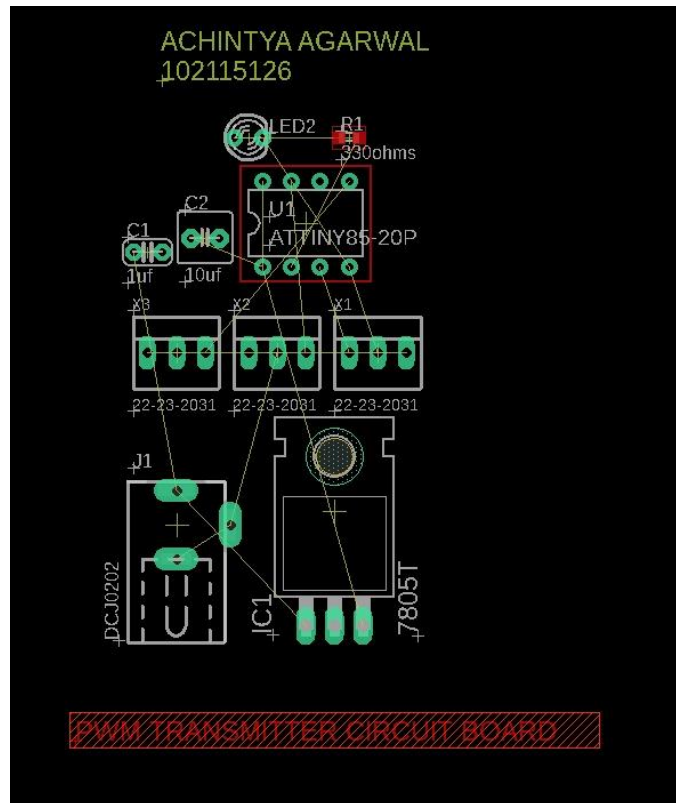


Fig. 3.8 PCB layout of Transmitter [8]

Discussion:

In this experiment, we have learnt how to design the PWM transmitter circuit on PCB layout by taking reference from the schematic drawing made on CAD tool (Eagle).