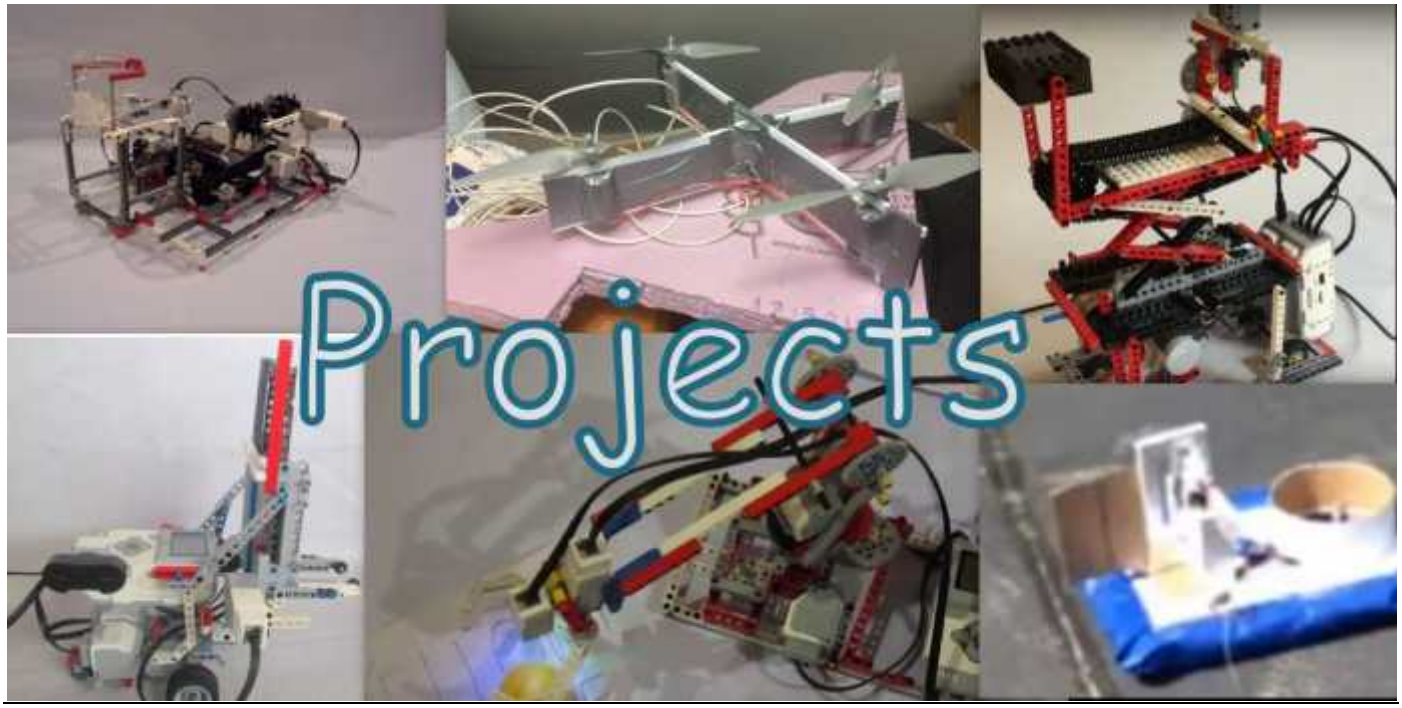


#1. Project done on- ***CONTROL AND TRACKING SYSTEMS***.

This project deals with basic functionalities of the control systems. In this project, I clearly learnt about the scope and idea of a Control System. This project consists of an IR LED which constantly changes its position with a moving object. The applications are: Rocket position Tracking, Destroying of enemy planes and so on. However, these techniques were available- I proactively concentrated on how this technology works.

Key role: Design of IR SENSOR

#2. An idea on ***Domestic Power Line Carrier Communication*** was structured during my 2nd year of B.Tech. This project deals with the aspect of combining both power and data signals in to one conductor. This process was done with series of filters which are available at multiplexing & de-multiplexing stages. However, this is not implemented practically due to financial reasons.

Applications: This project is intended to connect every part of the world to the information database. Since it would be difficult to place wire/wireless routers- it is better we transmit internet through electricity wires.

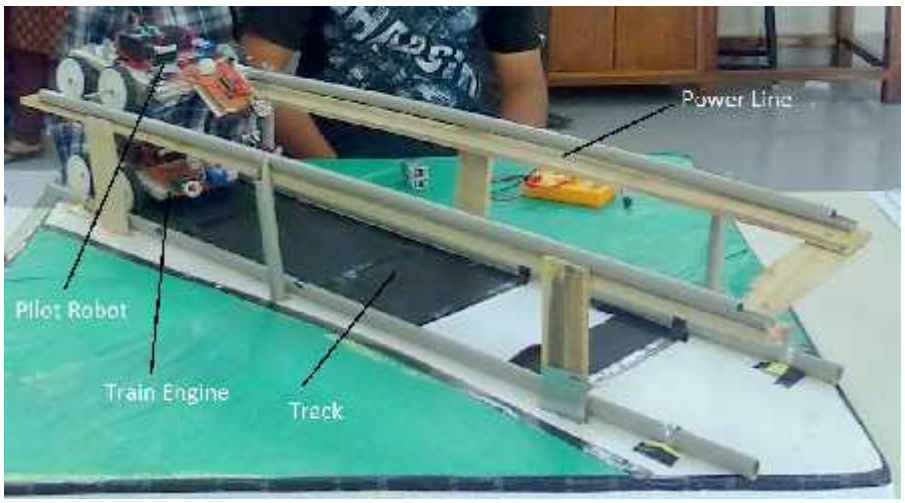
Key role: Design of Notch Filter

#3. A practical model - ***Semi-Automated Hovercraft*** was developed during 3rd year of my B.Tech. This project deals with the open-closed loop system of a control system. The system here is being a HOVERCRAFT. The main areas of problem I addressed were Mechanical Stability and Program Control. As I am a greenhorn in these aspects, I was initially difficult to address each problem I made exactly Ten Model and my Eleventh was successful. This was presented at IIT-Madras on their Technical Festival-SHAASTRA 2k11. Please refer to the pictures below:

Key role: Design of IR and Distance Sensor and Interfacing Programming

#4. A project was done in association with Robotics to address the Train Accidents. Here I fabricated a small model on how I can address the problem. The Idea- Here I used a pilot robot which traverses on the power lines above the rail track. This pilot robot performs a stringent surveillance on the track and other parameters of the track. Once it observes any glitch in the parameters- it sends the data to train and the station, thus eradicating the calamity. Please refer to the picture below:

The model is in air: http://www.youtube.com/watch?v=9aXCThfTKrU&feature=youtu.be

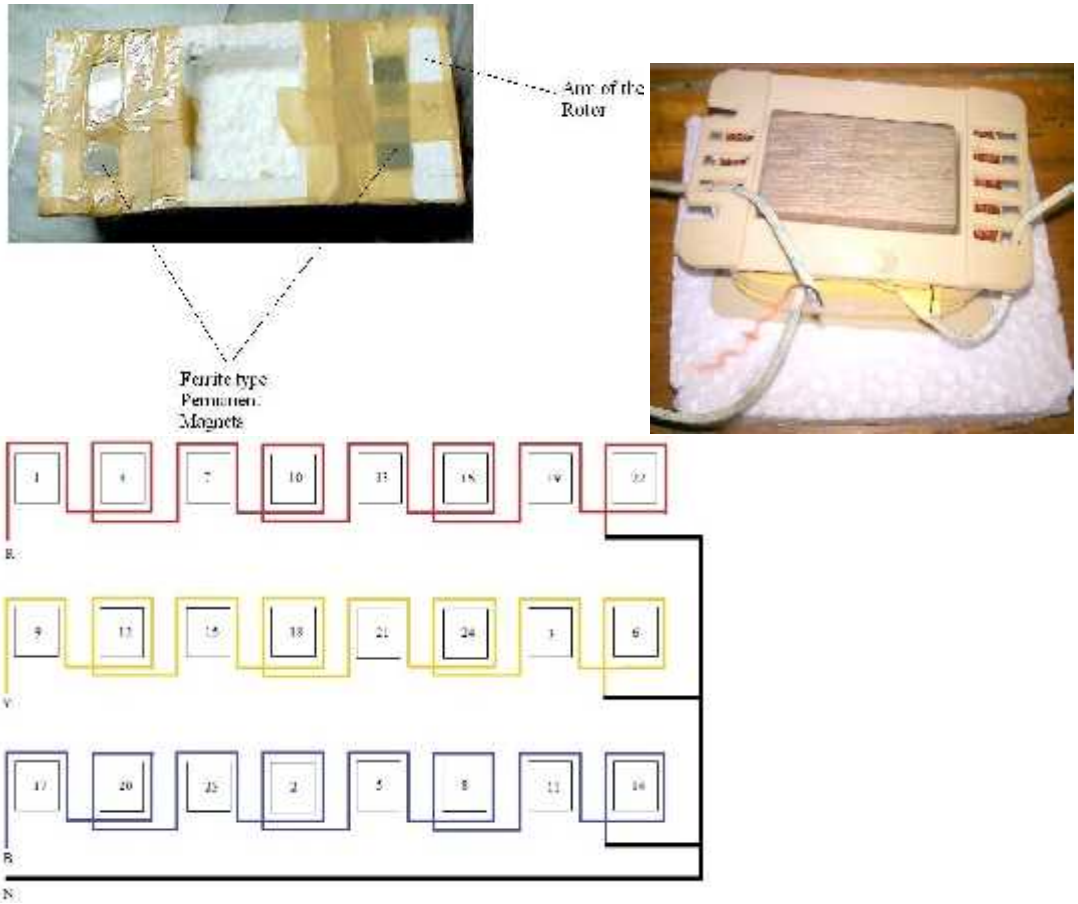


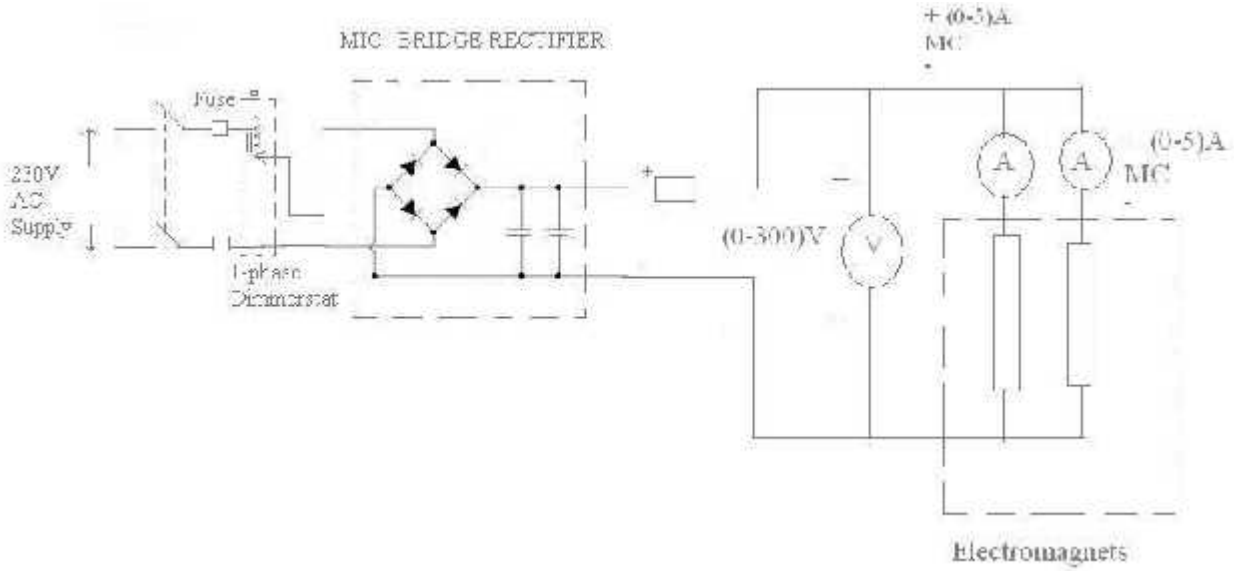
Key role: RF Transmission and Reception Module and Relay Mechanisms

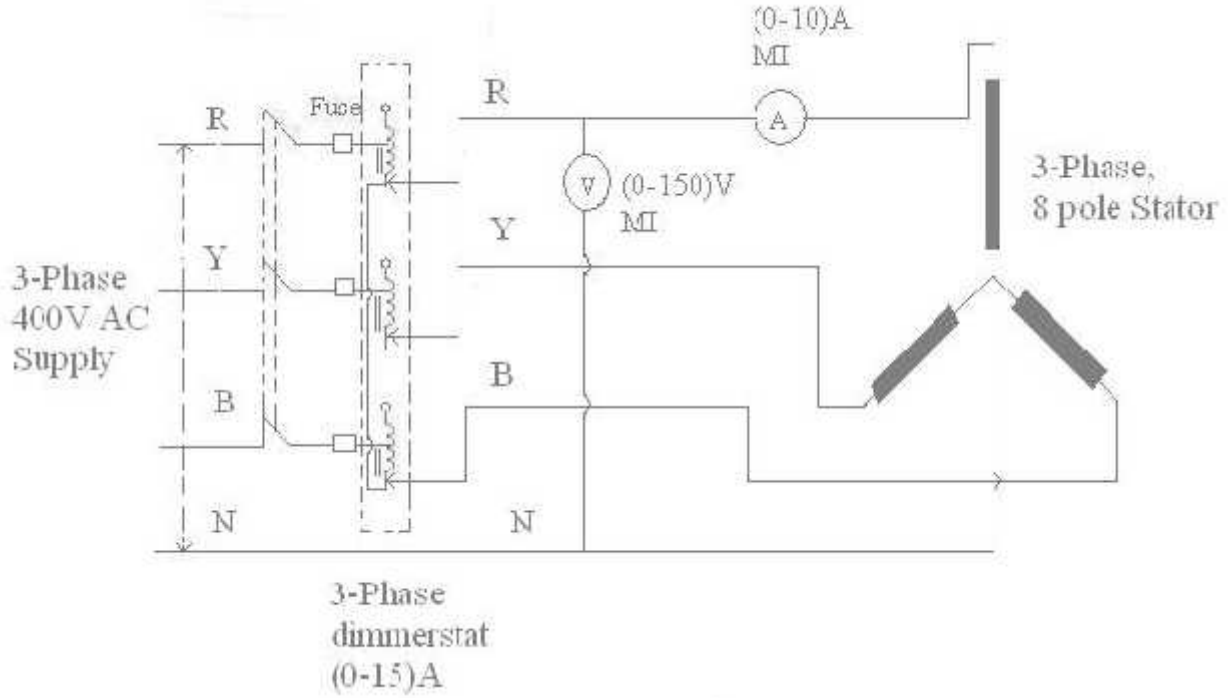
#5. A project was performed in connection to my majors- Electrical and Electronics Engineering. The name of the project is: ***Linear Induction Motor using Magnetic Levitation***. The main intention of this project is to operate a LIM using Magnetic Levitation thus increasing its Thrust and load Capacity. This was done as a Final Project of my Bachelors. But, my main intention is learn the winding and machine design techniques, as I was unaware of them before. Please refer to the following picture below:

F (repulsion) = {N² I² μA} / {2d²}

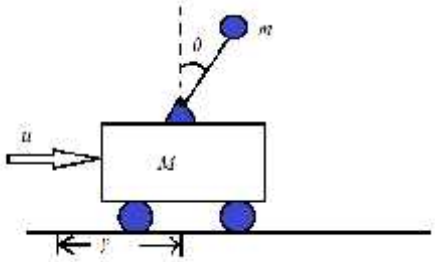
The model is in air: http://www.youtube.com/watch?v=y3I7enrE_AU



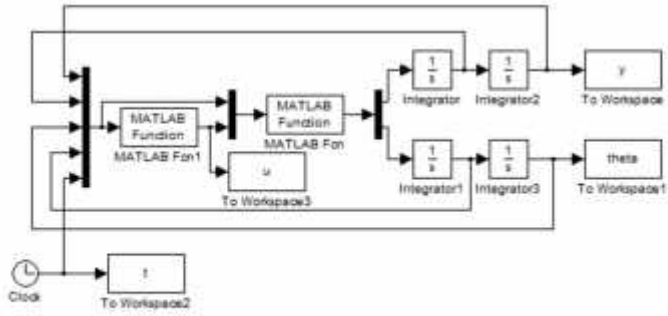

MIC BRIDGE RECTIFIER
+ (0-5)A
MC
-
Fuse
230V
AC
Supply
1-phase
Dimmerstat
+
-
(0-300)V
V
A
A
(0-5)A
MC
-
Electromagnets

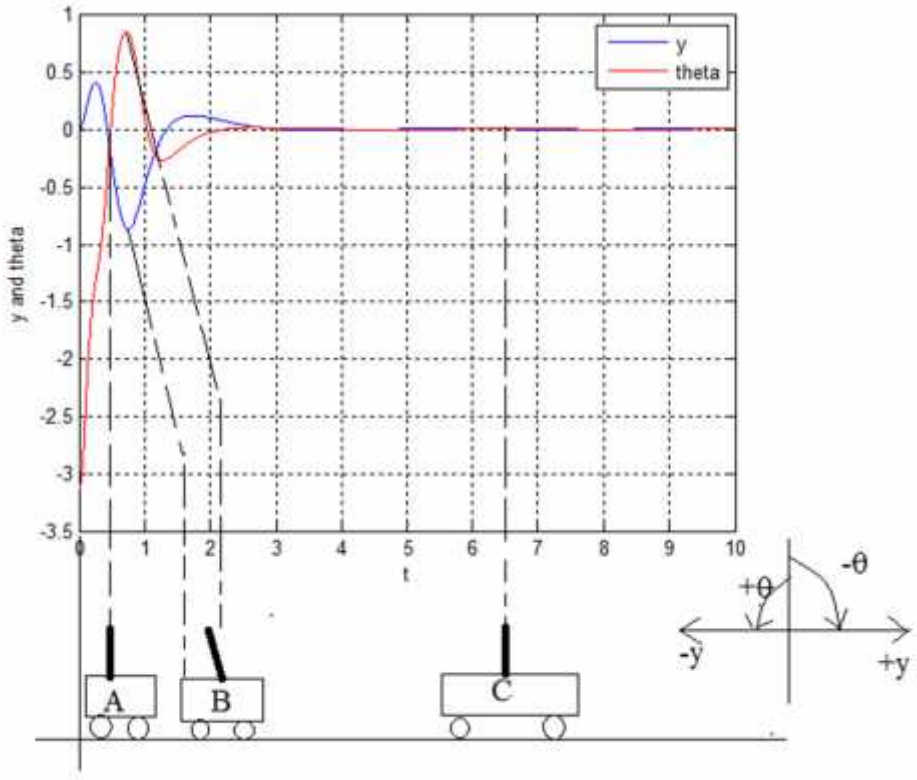

(0-10)A
MI
R
Fuse
R
A
V
(0-150)V
MI
Y
3-Phase,
8 pole Stator
3-Phase
400V AC
Supply
Y
B
B
N
N
3-Phase
dimmerstat
(0-15)A

#6. Control Systems: Modeling of Segway(Inverted Pendulum): A course work project in the area of Control Systems . This project is intended to model an inverted pendulum using MATLAB/SIMULINK as the tool. Core concepts such as various stability rules are implemented in this project.



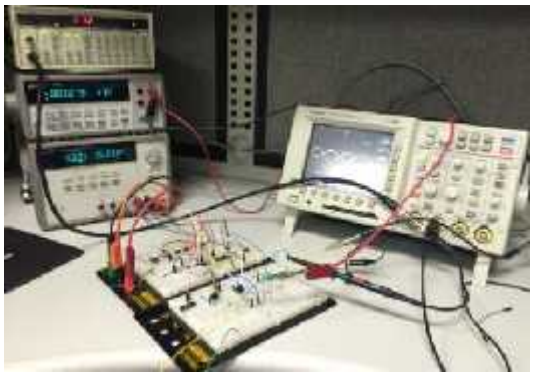
$$\begin{bmatrix}\dot{x}_1\\ \dot{x}_2\\ \dot{x}_3\\ \dot{x}_4\end{bmatrix} = \begin{bmatrix}0 & 1 & 0 & 0\\ 0 & 0 & \frac{-m}{M}g & 0\\ 0 & 0 & 0 & 1\\ 0 & 0 & \frac{(m+M)g}{M} & 0\end{bmatrix}\begin{bmatrix}x_1\\ x_2\\ x_3\\ x_4\end{bmatrix} + \begin{bmatrix}0\\ \frac{1}{M}\\ 0\\ \frac{-1}{M}\end{bmatrix}$$

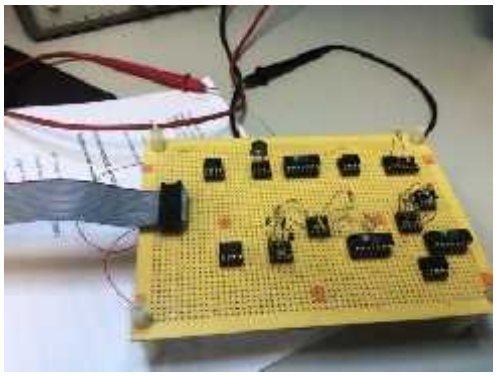




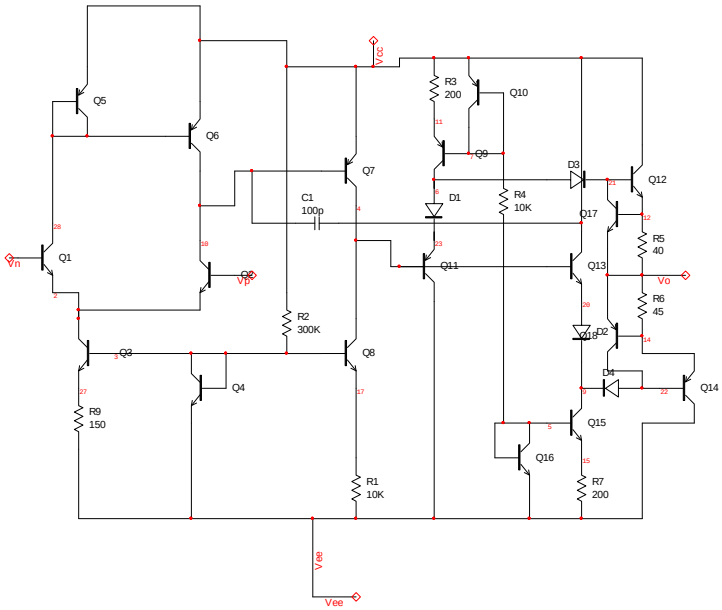
#7. *Analog Devices and Techniques: Internal Design of Op-Amp*- A course work project in the area of Analog Devices. This project is intend to design an Op-Amp with pin configuration equivalent to 741 and should give maximum Open-Loop gain as possible.

From this Experiment: I learnt many important aspects of analog design such as "How to configure a device", "How each parameter in system effects the overall requirement





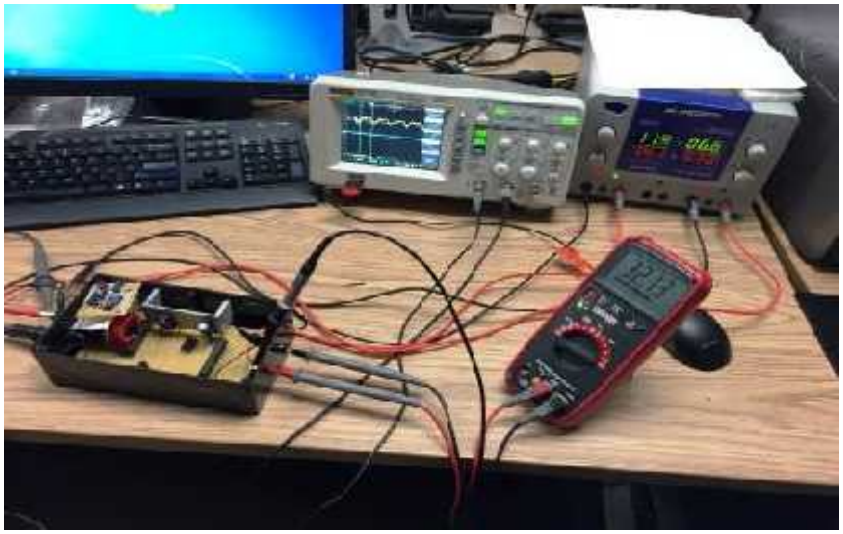
Final Stage of the Design: Wire-Wrapped, On-board 24 Transistors and an open-loop gain more than 900,000.

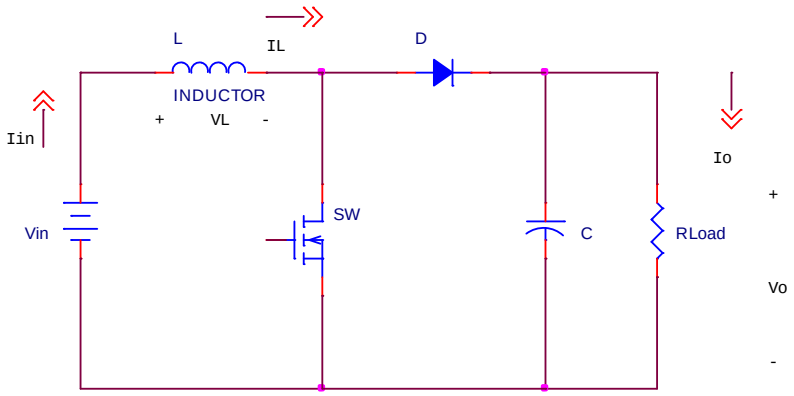


SPECIFICATIONS	VALUE
Offset Voltage (V_{os})	566uV
Input Resistance (R_i)	900KΩ
Bias Current (I_{bias})	114.8nA
Offset Current (I_{os})	87nA
Iee (max)	4mA
Icc (max)	13mA
Output Voltage Swing	-13.4V≤Vo≤13.5V
Open Loop Voltage Gain	900,000

#8. *Power Electronics: Step-Up Chopper*:

A project on Step-Up Chopper is performed as a part of course work submission. A 12V to 30V step-up chopper is simulated using MATLAB and the practical design is realized using components.





Specifications:

Input Voltage	12 V
Input Current	1.25A
Output Voltage	30 V
Output Current	0.5 A
Switching Frequency	50KHz

$V_{in}= (1-D)V_{out}$

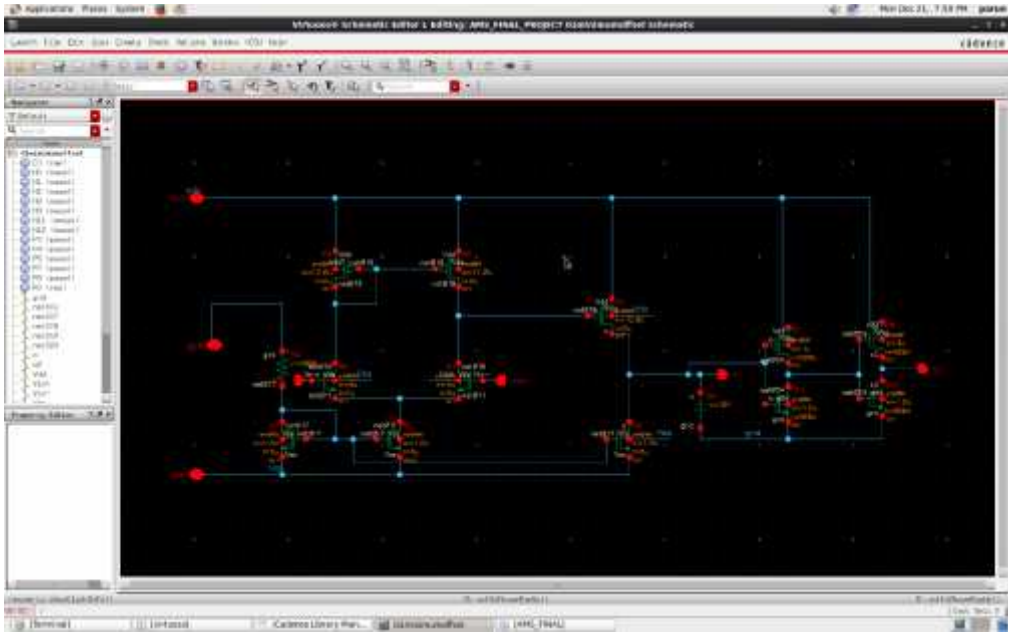
$D= 1-(V_{in}/V_{out})= 1-(12/30)= 0.6=60\%$

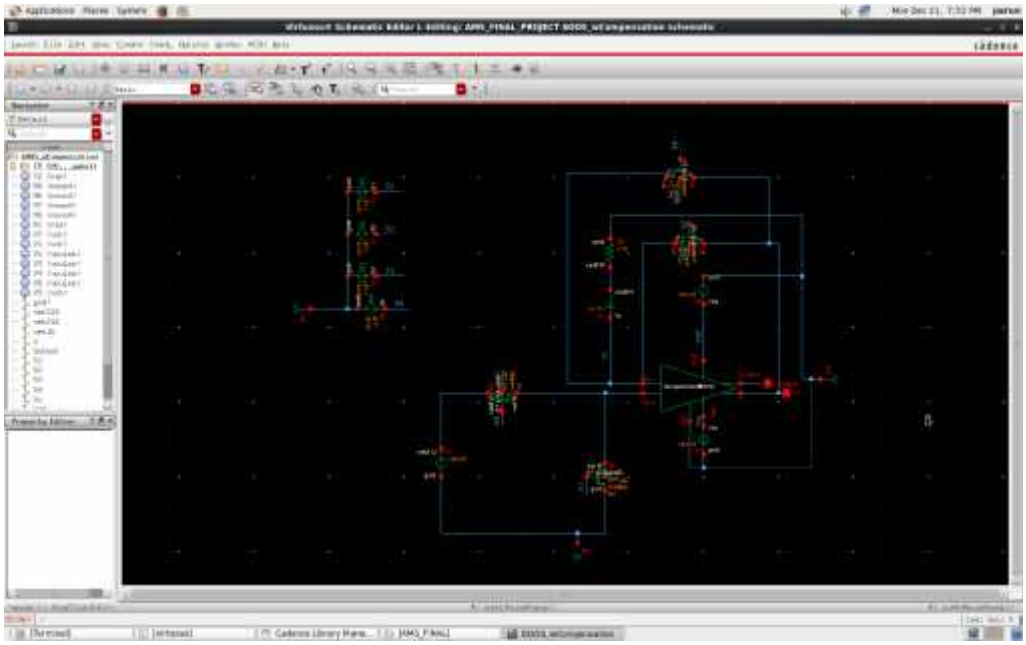
$L= [V_{in}(V_{out}-V_{in})]/[\Delta I_L*f_s*V_{out}]= [12(30-12)]/[0.1*50*10^3*30]= 1.5mH$

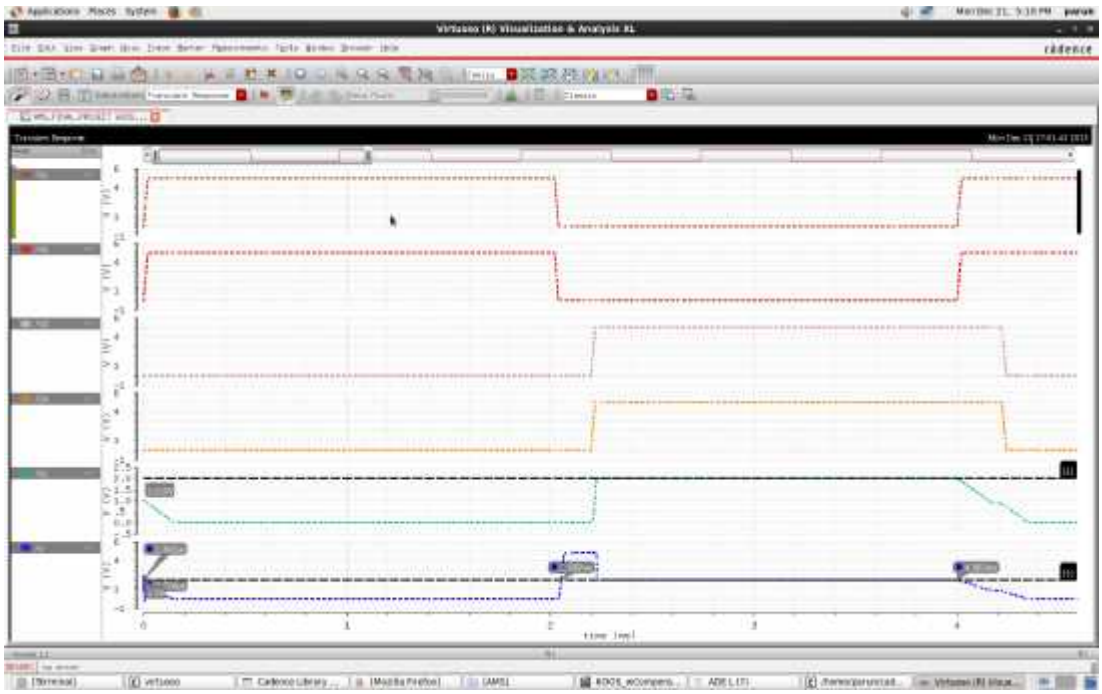
$C_{out}= (I_{out}*D)/(fs*\Delta V)= 0.5*0.6/50*10^3*1.5= 100\mu F$, $P_{out}= 30V*0.5A= 15W$

#9. Design of Comparator in Flash Analog to Digital Converters: In this project, a module of Flash ADC i.e. comparator is implemented. Later, the problems associated with comparator such as OFFSET is analyzed and reduced. A method called Dynamic Offset Compensation is used in order to reduce the Offset.

Software: Cadence Virtuoso

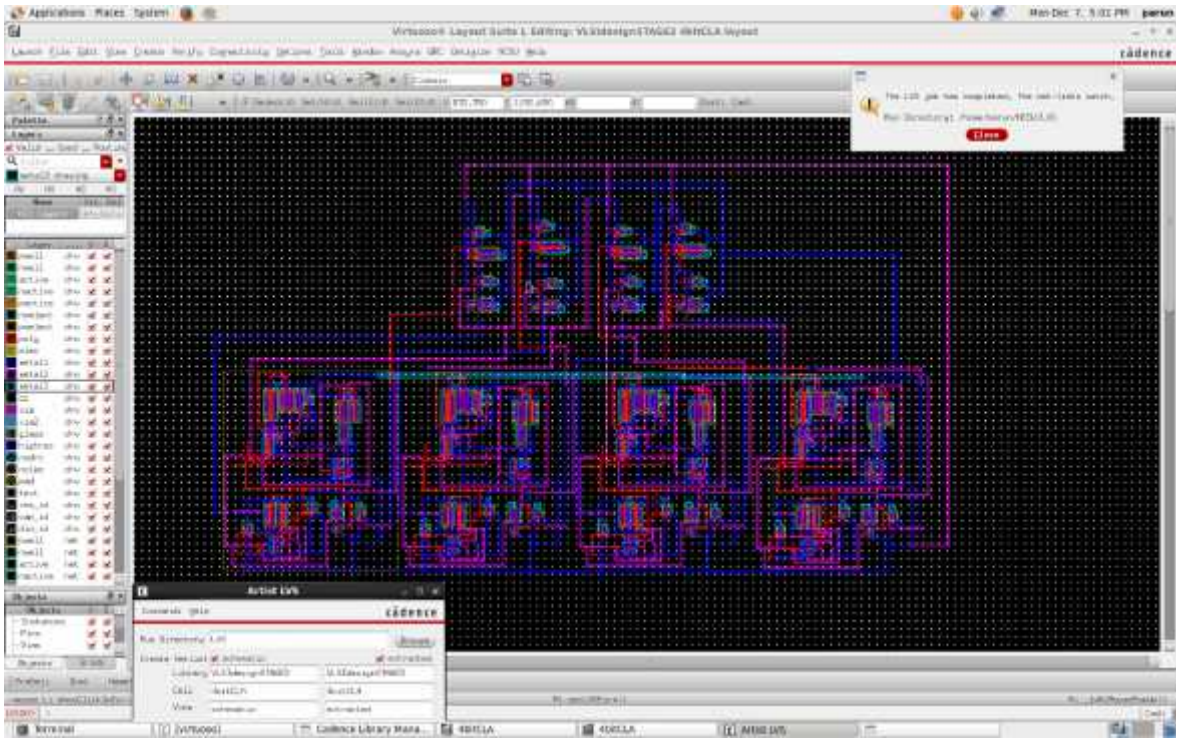


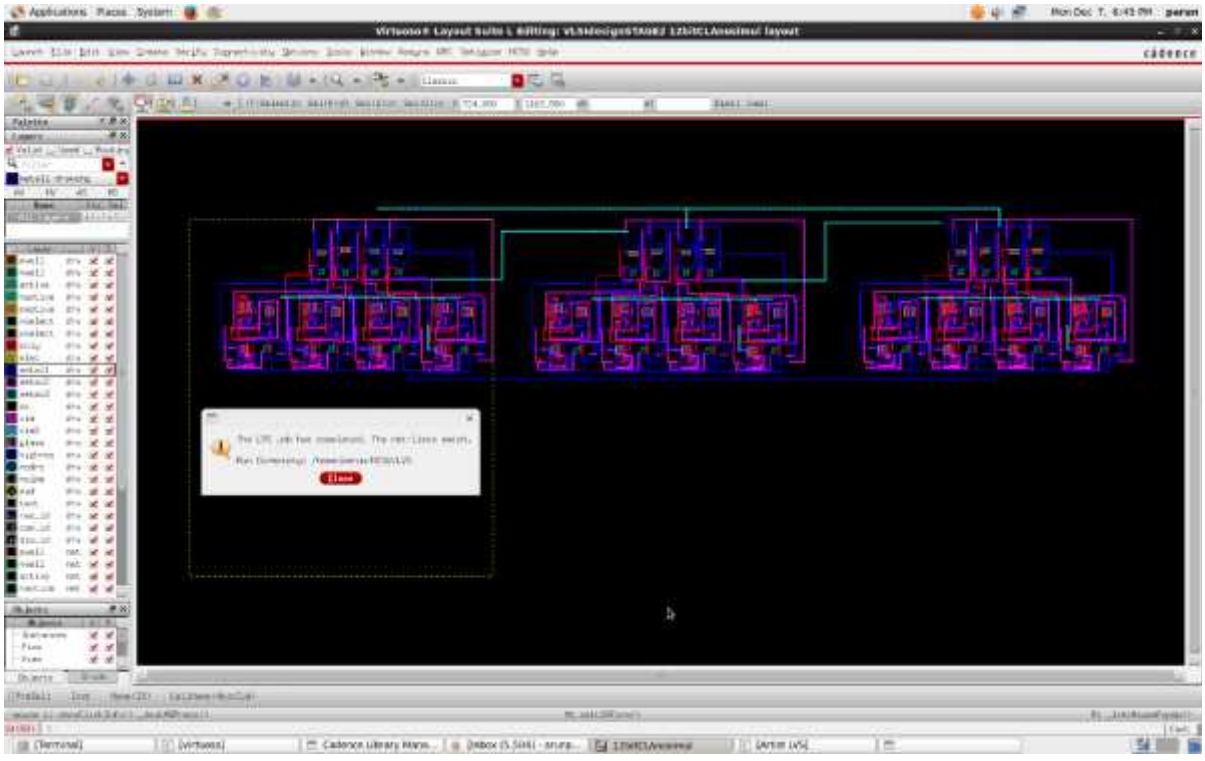


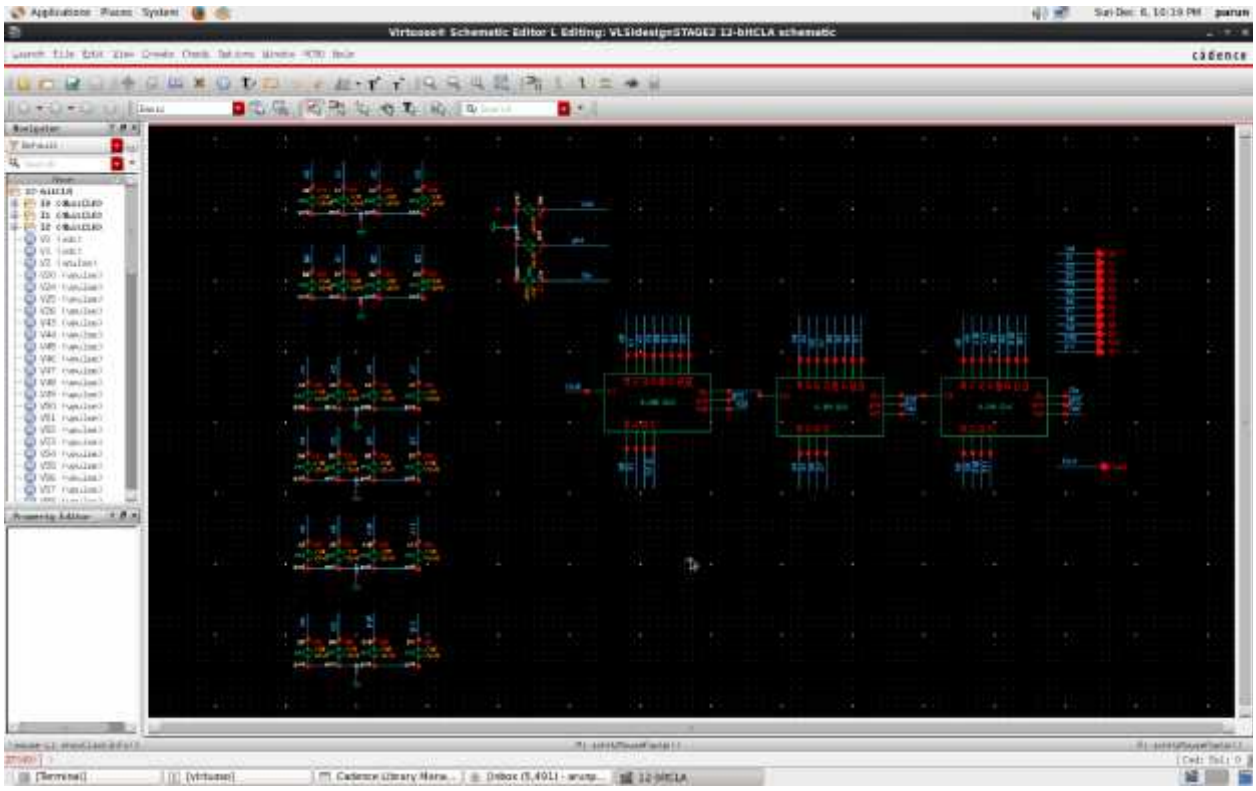


#10. Design of 12-bit Carry Look-ahead Adder: As a final project for VLSI Design was to design, simulate and layout of 12-bit CLA. This is group project and I share design of 4-bit carry look-ahead Adder and other components to useful in the design.

Software: Cadence Virtuoso



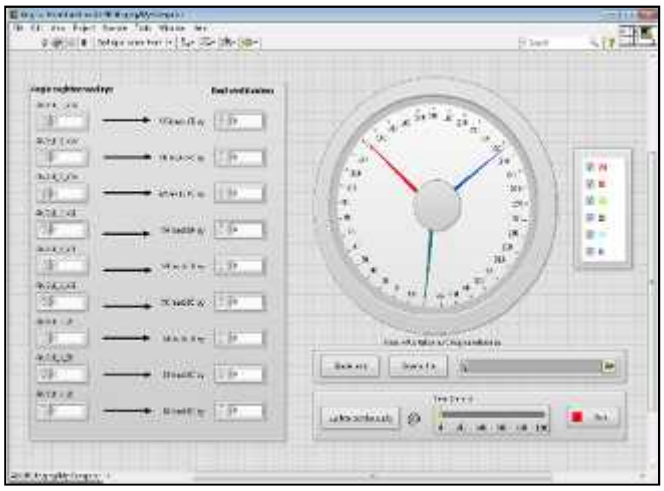




Industrial Experience as Applications Engineering Intern at Analog Devices Inc.

Brief Description:

My internship is held with Energy Management Group working for Analog Devices Inc. This particular Group manufactures DSP based Energy measuring IC's that go into energy metering products. The products measures Vrms, Irms, Power factor and so on parameters which are required for energy billing. The inputs to IC would be Voltage and Current analog signal obtained from a sensor. These inputs are converted to digital bits using ADC's; the rest of the process is digitally computed and the parameters are given out. These functions are evaluated using a FPGA module acted as a DSP.



Industrial Experience: Analog/Power Electronics Design Engineer, Lutron Electronics Inc.

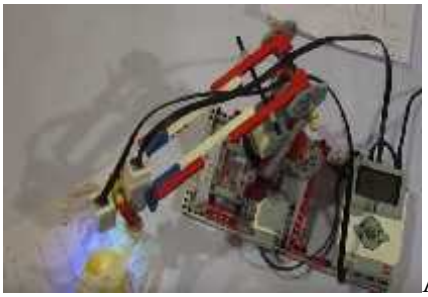
I work for CID (Compact Illumination Devices) which develop High-Performance LED Drivers. My Responsibility is to Design, Evaluate and Test the Driver coupled with Customer Support. Design consists of various component modifications and PCB Layout for an efficient performance of the Driver. In the Evaluation stage, the Driver is evaluated so as to check whether the given customer specifications are satisfied. Testing of the driver is interspersed among the engineers; I have been into ESD Testing, Power-Efficiency Curves and Bench-Aesthetic Checks. Also, Beta and Alpha samples are installed for regular verification of the Driver.

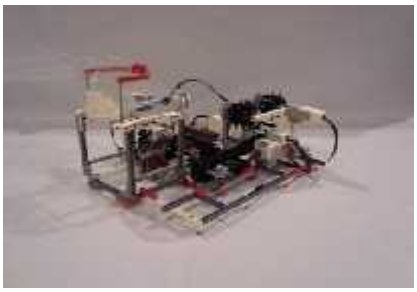
(Picture: Sample LED Driver under Bench test)

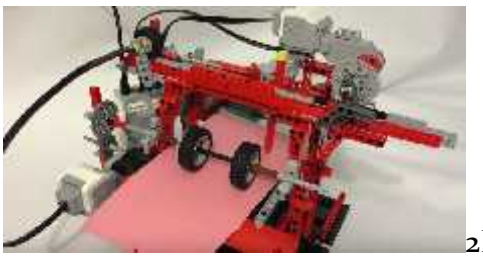
Experience as a Technical Head/ Technical Associate/ Robotics Instructor:

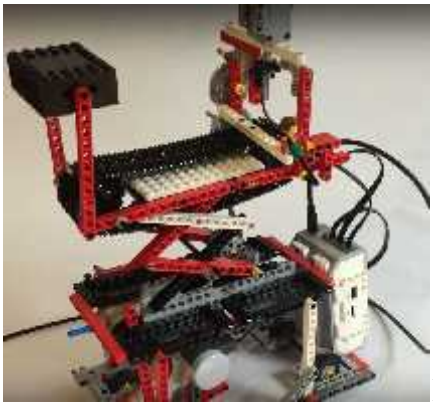
1. Seminar Addressing on Robotics and Control Systems
   Please refer to pictures below:


2. Served as a Technical Associate at Kriyative-Edge: A start-up for Education and Innovative Research


Arm: http://www.youtube.com/watch?v=RSRPjivg6fM


Plant: http://www.youtube.com/watch?v=lFs7jLMCGyk


2D Plotter: https://youtu.be/RooshIg8LIE
https://www.youtube.com/watch?v=DYMSYChD79U



Painter: https://youtu.be/shlswWwZ5hc

RC Hovercraft: https://www.youtube.com/watch?v=BLyK6ol4rfo&list=UUBs8X9b_RteGYmx_nwvAU9A

Drone Testing: http://youtu.be/fYI3hHYcMvw