FMAE INTERNSHIP

INTERNSHIP REPORT

Submitted by

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(ROLL No:19R11A0233)

in partial fulfillment for the award of the degree of

BACHELOR OF TECHNOLOGY

in

ELECTRICAL AND ELECTRONICS ENGINEERING

GEETHANJALI COLLEGE OF ENGINEERING AND TECHNOLOGY

Cheeryal (V), Keesara (M), Medchal Dist, Hyderabad– 501 301

(Affiliated to Jawaharlal Nehru Technological University, Hyderabad, Accredited by NAAC and NBA, New Delhi)

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ACKNOWLEDGEMENT

I would like to thank the Fraternity of Mechanical and Automotive Engineers for allowing me to do an internship within the organization. I also would like to thank all the people who worked along with me for their patience and openness. It is indeed with a great sense of pleasure and immense sense of gratitude that I acknowledge the help of these individuals.

I am highly indebted to Principal Dr. Udaya Kumar Susarla for the facilities provided to accomplish this internship. I would like to thank the Head of the Department Dr. Radhika Dora for her constructive criticism throughout my internship.

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Department of Electrical and Electronics Engineering

CERTIFICATE

This is to certify that the internship report titled FMAE Internship being submitted by Pantula Udith Naga Ratnakar, bearing roll number 19R11A0233, in partial fulfillment of the requirements for the award of the Degree of Bachelor of Technology in Electrical and Electronics Engineering is a record of bonafide work carried out under Fraternity of Mechanical and Automotive Engineers guidance and supervision.

Examiner

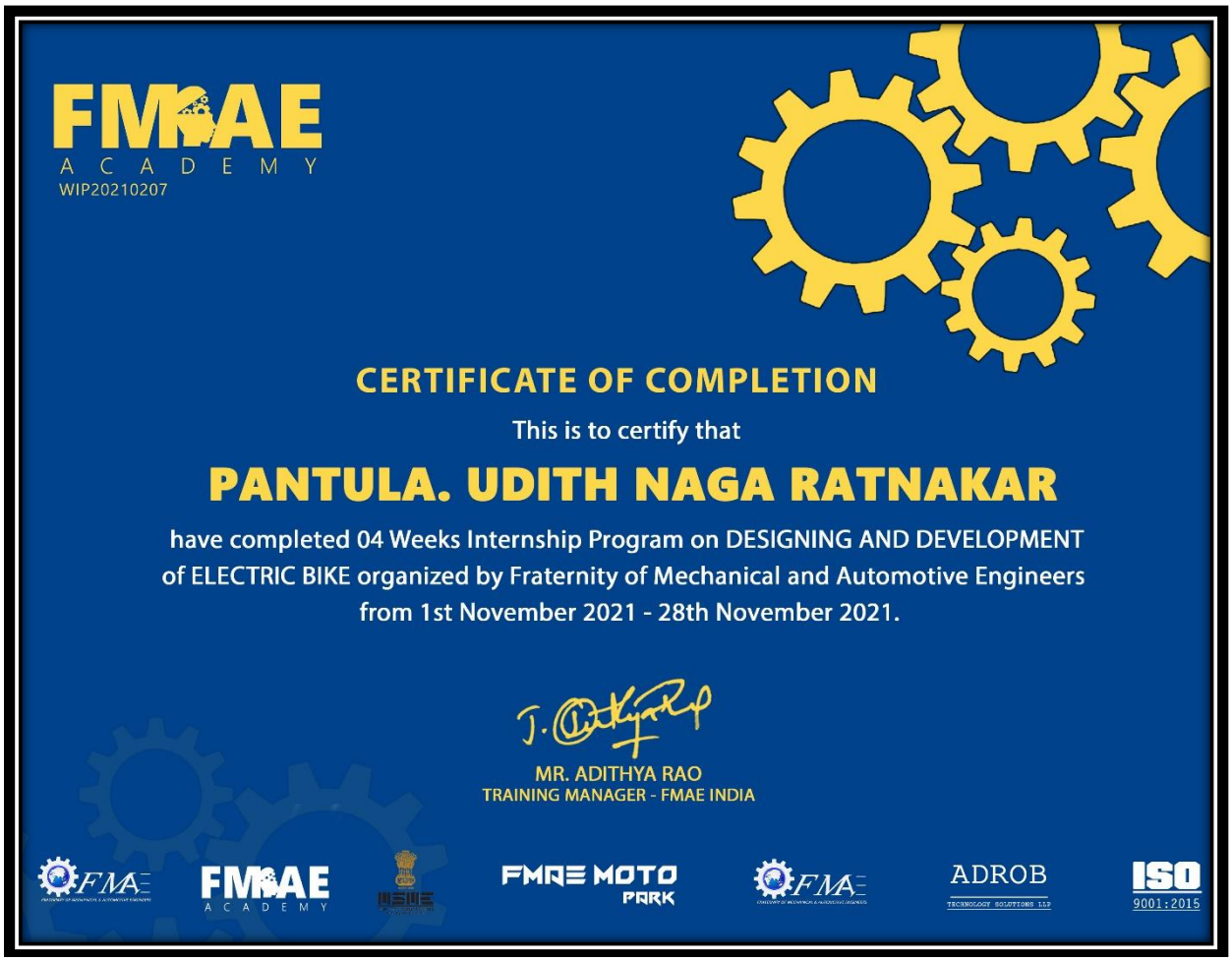
Name:_____

Designation:_____

Dr. Radhika Dora

(HoD)

INTERNSHIP CERTIFICATE



INTRODUCTION ABOUT FMAE ORGANIZATION

FMAE is a 6 years young technology company on a mission to equip students with relevant skills & practical exposure through internships and online training. Contemporizing the conventional learning process and fundamentally changing the way students learn, acquire skills, and build their careers.

Fraternity of Mechanical and Automotive Engineers (FMAE) is a subsidiary of Adrob Technology Solutions LLP. Their initiative is to enlighten every one of their students with a healthy knowledge of motorsports vehicle manufacturing and fabrication through their design challenges and FMAE academy.

They aim to nurture technical and managerial growth in every student throughout the country, providing them the biggest inter-disciplinary competitive platforms with assistance from nationally and internationally renowned delegates by providing them with a healthy and rationalized set of rules and regulations following which they would compete amongst each other.

They visualize a country with upcoming industrial experts' i.e.; the students to inculcate fighting fit proficiency in the respective fields before they sign up for professional venture.

TRAINING SCHEDULE

The training schedule of the Internship is divided into three different stages. They are:

1. 01st November – 09th November'2021:
   In this period, watched the pre-recorded videos about the dynamics of Electric bikes and designed the parts using SolidWorks software.

2. 10th November – 16th November'2021
   For these 7 days, we went to the FMAE moto park located near Keesara. During these 7 days, the first day was for the revision of the concepts learned in prerecorded videos. The second day was for the inspection of SolidWorks models we developed, along with correcting the errors and improving the models.

   The next 5 days were dedicated to completing the live model of the electric bike. Here the model was built from scratch. We had a BLDC motor, brake, tires (rear and front), and circuit elements. Later we built the complete model by taking the preferred mechanical machines like welding machines, cutting machines (off-saw), etc. We painted the model on the 6th day and left it over to dry for the 7th where we had to test the model.

3. 17th November – 28th November'2021
   As we completed the building of the model in SolidWorks and a live working electric bike, we were given these 12 days for building and exploring furthermore options in SolidWorks.

ABSTRACT

Running out of fossil fuels is inevitable. The engine vehicles can only support the transport for a few more decades. Hence another alternative needs to be substituted with the engine vehicles working on petrol or diesel.

One of the best alternatives is this electric bike. As all it requires is a few hours of charging and gives hundreds of kilometers to travel. This internship is based on this electric bike.

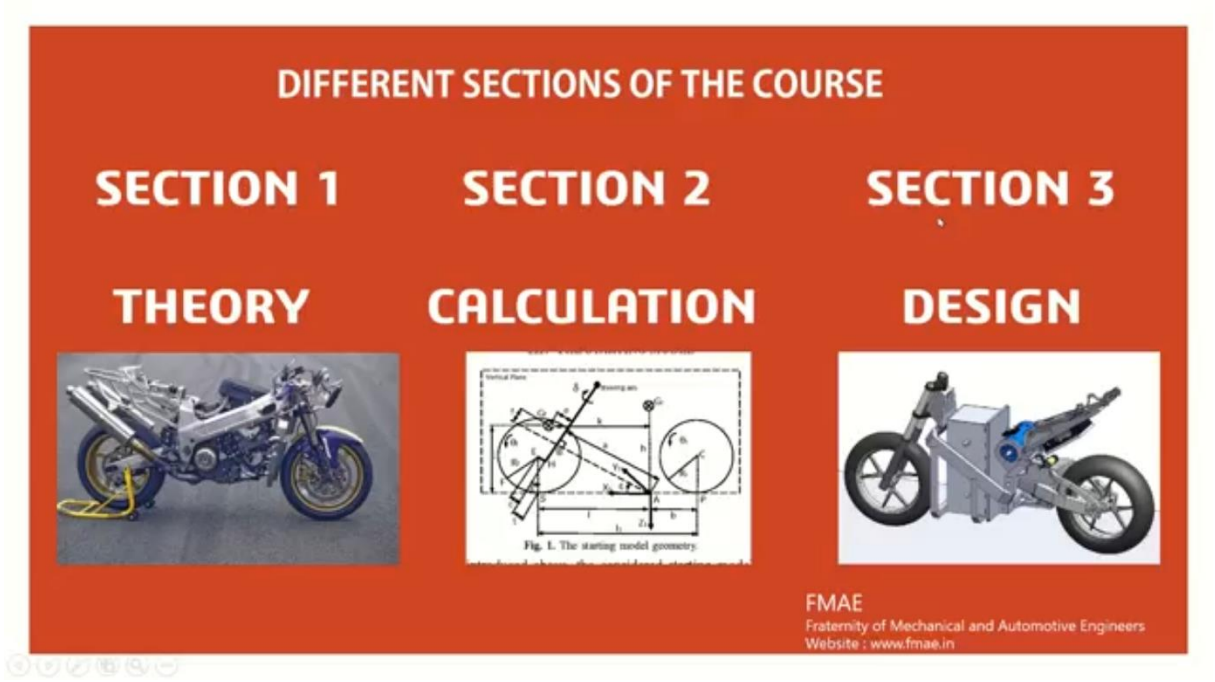
In this internship, we built a live electric bike model at the FMAE moto park in Keesara. The model was not built on random measurements as it was first developed in SolidWorks software, later checked the requirements of the material for building the model, and then we started working on the model.

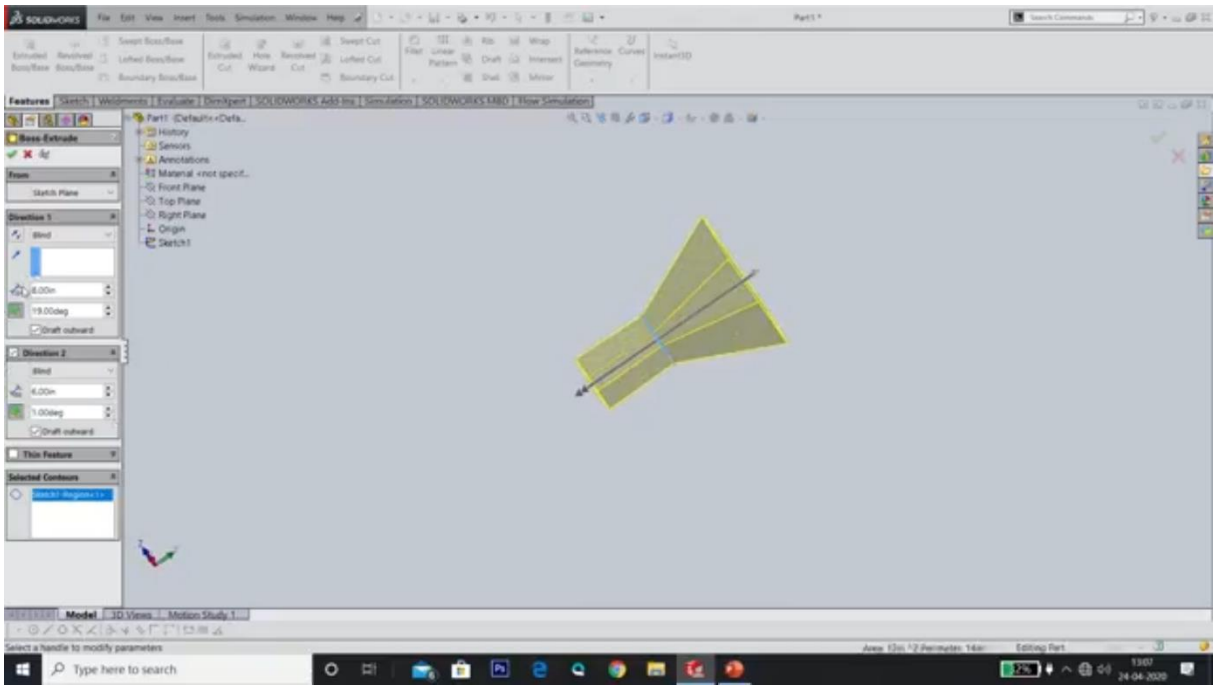
The electric bike was built on three different stages, namely:

1. Stage 1: Learning the theory of the electric vehicle. It includes the dynamics of the machine also where, the function of the bike, degrees of freedom allocation, etc. are covered.
2. Stage 2: The calculation part is done in stage two.
3. Stage 3: Designing the model is in stage three.

LIST OF FIGURES

LIST OF SCREENS





INTRODUCTION

This internship is based on the future of the world, ‘The Electric Vehicles’. With the population growing at a near exponential rate and the petrol depleting at a more than exponential rate, the need for an alternative is a must.

An electric vehicle (EV) is a vehicle that uses one or more electric motors for propulsion. It can be powered by a collector system, with electricity from extravehicular sources, or it can be powered autonomously by a battery (sometimes charged by solar panels, or by converting fuel to electricity using fuel cells or a generator). EVs include, but are not limited to, road and rail vehicles, surface and underwater vessels, electric aircraft, and electric spacecraft.

At the FMAE moto park, we used the BLDC motor as the motor for the vehicle. A brushless DC electric motor (BLDC motor or BL motor), also known as an electronically commutated motor (ECM or EC motor) or synchronous DC motor, is a synchronous motor using a direct current (DC) electric power supply. It uses an electronic closed-loop controller to switch DC currents to the motor windings producing magnetic fields which effectively rotate in space and which the permanent magnet rotor follows. The controller adjusts the phase and amplitude of the DC current pulses to control the speed and torque of the motor. This control system is an alternative to the mechanical commutator (brushes) used in many conventional electric motors.

TECHNOLOGIES USED

In this modern world, with the vast development of technology (mainly the automated softwares'), generally, models are first deployed in the online software and then they're made physically using the required machines.

We also first made our model using the SolidWorks software. SolidWorks is a solid modeling computer-aided design (CAD) and computer-aided engineering (CAE) computer program published by Dassault Systèmes, that runs primarily on Microsoft Windows. While it is possible to run SolidWorks on an Intel-based Mac with Windows installed, the application's developer recommends against this. SolidWorks does not support macOS.

The use of basic mechanical tools like the cutting machine, angle grinder, chop saw machine, welding machine, mini cutting & grinding machine, pipe clamp, c-clamp, spanner set, screwdriver, wires, etc. were also used.

WORK DONE

During the time I was interning, I learned and did more raw mechanical work. A very different experience considering I didn't have the Engineering Workshop completed (thanks to Covid-19).

The first objective was to create a model in SolidWorks software. I did that with the help of the instructor Pratheek sir. Though I practiced it during the initial days, I still didn't have a grip over it.

Later, we all started working on our model construction from the third day. The most basic one which was to be done is marking the parts and cutting them according to the model made in SolidWorks. As most of us (and me) were beginners to this work, initially a task was given to make the T-section using the scrap material. It included most of the work which will be done in making the model (Marking, cutting, welding). The work was going on parallelly, as we were a set of ten-odd people, all of us were working on the model as well as our t-section. Initially, we only did the basic works like marking and cutting. But once we did a fine welding job, we were given the welding of material of the model. A few difficult parts were still carried out by sir. All of us together completed the parts cutting, shaping, and welding. Finally, before we gave the circuit connections, the sixth day was used for painting and left to dry till morning. After this, the last day was used for circuit connections. The circuit connections were very simple. We had to connect the batteries in series as we needed higher voltage for the BLDC motor to run and the power electronics materials were used for interconnecting the lights, batteries, and motor. The circuit connections were the simplest of the work which shows the advancement of the electrical field in this modern world.

LEARNING AFTER INTERNSHIP

This internship paved a lot of paths for further improvement in my engineering skills. The initial thoughts about making a real-life model were negligible and once I accomplished this task there is a lot of push from the mind for different things.

This also gave me a rough idea about how the problems within the machines should be tackled. The efficiency can be given up for the sake of the weight of the machine. Also, the BLDC motor was giving very high starting torque, so we also thought about the alternatives for it. Considering the funding, a BLDC motor was used during the internship.

The efforts of mechanical staff are often disregarded. During this time, I realized the peaks of awareness. A small error of a single centimeter is leading to the uneven balance of the bike. The amount of criticality of welding is indescribable. This was very ethical learning from the technical workshop.

SolidWorks software was also fun. It can become one of the best hobbies to design a model during your free time. The SolidWorks offers a lot of depth to the model designed as we can topple with the design for a fun and check the best required for the model.

The essence of power electronics in this modern growing world is irreplaceable. Power electronics growth is the sole reason for the circuit designing to be as easy as it was during our connections.

SUMMARY

As mentioned umpty number of times, running out of fossil fuels is inevitable. An alternative is a must! But the drawback of an electric vehicle is even coal will run out eventually. So, the modern world simply can't accept that fact and the resources are being used as if they last till the end of the world.

Further development of this bike should shift to renewable resources. Like capturing the sunlight by using one solar panel and taking the wind energy etc. The ideas are always there but it's about implementation, its efficiency, and working.

Anyhow, even the development of current electric vehicles should be considered so that in the future it doesn't lead to efficiency issues. Hence most of the electric bikes prefer DC motors compared to AC motors as the AC motor has more losses compared to DC motors.

In recent times, ola did come up into a lot of news with its electric vehicles' promotion. They did show mouth staggering pre-bookings and a little bit of faith in the future might see better into it.

The government is also supporting the use of electric vehicles, as they're giving subsidies on the vehicles. The onus now lies in expanding the network as we'll require a lot of charging stations as the batteries will run out of charge and the vehicle stops. This is one of the biggest disadvantages of electric vehicles.

These electric vehicles will also reduce a great deal of sound pollution as their sound emission is negligible compared to combustion vehicles.

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ANNEXURE

Team GCET at FMAE moto park after the completion of electric vehicle: