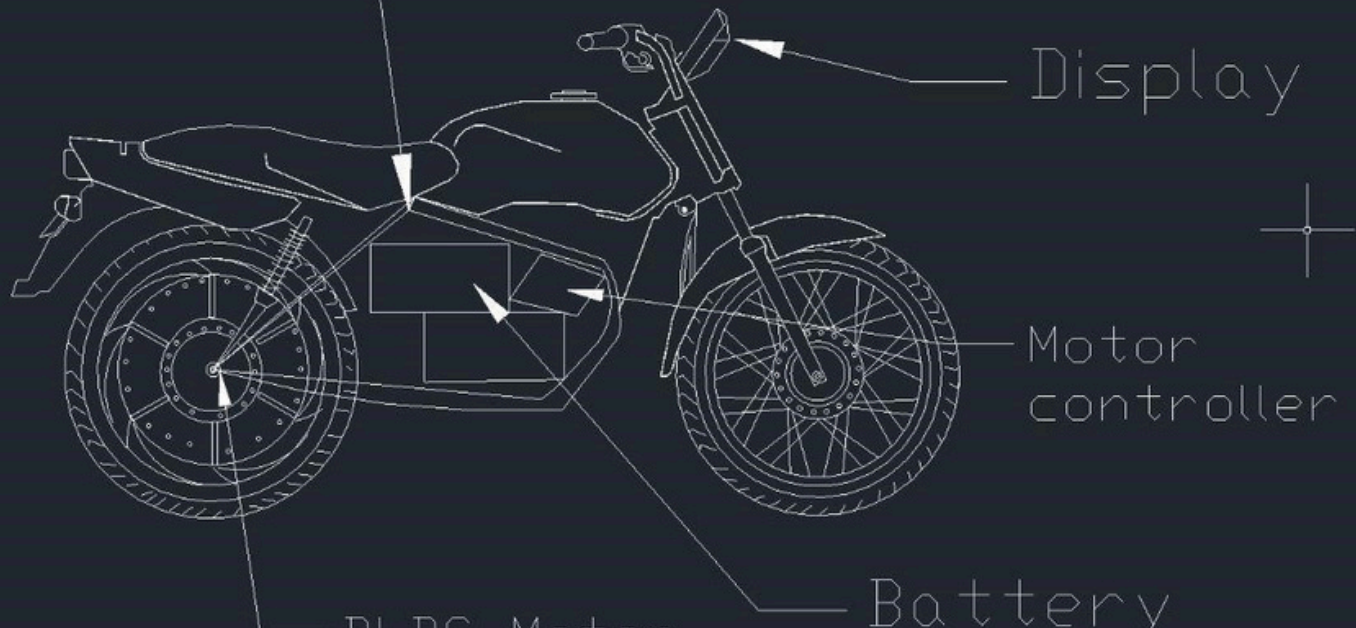




CHASSIS



RETROFITTED E-BIKE

What you will get to know!!!

- Project Overview and Recognition: Details about the Retrofitted E-Bike project at Chitkara University, including guidance from Dr. Rajneesh Talwar and awards received.
- Funding and Support: Information on the funding provided by NewGen IEDC and recognition by the Governor of Haryana.
- Conversion Process: The steps involved in converting a petrol bike to an electric bike, including installing an electric motor, battery, and controller.

About this Project

The Project Retrofitted E-Bike was successfully carried out by a group of students from the DICE at Chitkara University, Rajpura, Punjab, under the expert guidance and mentorship of Dr. Rajneesh Talwar. The project was funded by a grant from NewGen IEDC, and it was recognized and awarded by the Governor of Haryana. The project also won the prestigious Future Award in the ISIE SIEP E-Bike Challenge 2022.

The conversion process involved the following steps:

- The removal of petrol engine and other parts from the old bike.
- The installation of an electric motor, battery and controller.
- Altering the bike within the permitted boundaries.
- Introducing with different functionalities to make it a modern-day vehicle.
- Testing and debugging the modified bike.

COMPONENTS

- BLDC Hub Motor (60/72V, 2000W, 17 inch, 80-90 kph)
- Battery(59V-73V ,42 Ah Lithium-ion battery with bms control, 120 km range)
- BLDC MOTOR CONTROLLER (60V/72V, 2000W)
- Display (LED, Touch Screen)
- Chassis

The modified bike boasts a top speed of 75 km/h and a range of 120 km on a single charge. It comes with a reverse gear for easy maneuverability in tight spaces and a 3-speed mode for customizable assistance levels. Furthermore, the bike features remote ignition for keyless starting. The successful completion of the project means that the modified bike is now ready for use at Chitkara University, highlighting the potential of electric bikes as a sustainable mode of transportation.

BLDC HUB MOTOR

The propulsion system is a vital part of electric vehicles, and the BLDC hub motor is instrumental in delivering efficient and high-performance electric propulsion. The key elements of the BLDC Motor comprise the stator, rotor, permanent magnets, and housing. The stator functions as the stationary portion of the motor and contains the windings that produce the magnetic field. The rotor, which is equipped with permanent magnets, is mounted onto the wheel hub. These magnets interact with the magnetic field of the stator, creating rotational motion.

The operation is based on the principle of electromagnetism. As electric current passes through the stator windings, it creates a magnetic field. The permanent magnets on the rotor react to this magnetic field, either attracting or repelling them, resulting in the rotation of the rotor. An electronic controller manages the control of current direction in the stator windings, thereby ensuring accurate regulation of motor speed and torque.

The advantages of using the BLDC Hub Motor are:

- **Efficiency:** The absence of brushes and reduced friction leads to higher efficiency.
- **Compact Design:** A compact design is achieved by incorporating the motor into the wheel hub, resulting in a more organized vehicle layout and optimal use of space.
- **Regenerative Braking:** The motor has the capability to act as generator while braking, effectively converting kinetic energy into electrical energy to recharge the battery.
- **Low Maintenance:** The absence of brushes in the motor ensures low maintenance requirements, contributing to extended lifespan and decreased wear over time.

BATTERY

The lithium-ion battery is highly preferred due to its exceptional energy density, light weight, and reliable functionality. It is made up of key parts, including a cathode, an anode, an electrolyte, a separator, and a cell housing.

During the charging phase, lithium ions traverse from the cathode to the anode via the electrolyte, effectively storing energy. Subsequently, in the discharging phase, the lithium ions return to the cathode, releasing energy to power the electric vehicle.

The BMS (Battery Management System) is a critical component of the battery pack, responsible for:

- Cell Balancing: Ensuring that each cell in the battery pack maintains consistent charge levels, avoiding overcharging or undercharging.
- Temperature Management: Monitoring and controlling the temperature of the battery cells to prevent overheating, this may lead to diminished performance and safety hazards.
- State of Charge (SoC) Estimation: Calculate the remaining battery capacity and provide accurate range predictions to the vehicle's control system.
- Over current and Overvoltage Protection: Protect the battery from excessive current or voltage that could cause damage to the cells.
- Communication and Diagnostics: Providing data and feedback to the vehicle's control system for efficient operation and diagnostics.



BLDC MOTOR CONTROLLER

A BLDC motor controller is a tool that transforms electrical energy from a battery or another power source into mechanical energy in order to operate a BLDC motor. It regulates the motor's speed and torque by utilizing the input voltage and current from the power source.

The BLDC motor controller has a number of features, including:

- Sinusoidal PWM control for smooth and quiet operation
- Throttle, brake, and reverse functions
- Over-voltage, over-current, and under-voltage protection
- Reverse polarity protection
- LED indicators for status

The controller is made of high-quality materials and components, ensuring long life and durability.

Here are some of the benefits of using a BLDC motor controller:

- They are more efficient than traditional a brushed DC motor, which means they can save energy.
- They are also more reliable, and they have a longer lifespan.
- BLDC motors are also quieter than brushed DC motors.
- They can be controlled more precisely and are ideal for applications that require speed and torque control.

The BLDC motor controller utilized in this application is rated for 60V/72V and has a power rating of 2000W. Additionally, it is designed to be water-resistant and has received an IP67 rating.



CHASSIS

The HF Deluxe, which was initially designed as a petrol-powered motorcycle, has been significantly revamped to operate as an electric vehicle (EV). The conversion process includes a thorough restructuring of the chassis to suit the specific needs and parts of an electric drivetrain. This analysis of the chassis offers a detailed look at the main alterations and characteristics of the converted HF Deluxe electric motorcycle.

Chassis Retention:

The original HF Deluxe chassis has been transformed to support the electric bike, demonstrating the platform's flexibility and strength. The chassis remains sturdy while being adjusted to seamlessly incorporate the electric components.

Frame Modifications:

- The frame underwent strategic modifications to make room for the battery pack, electric motor, and related control systems. Possible reinforcements were also made to ensure that the chassis could support the extra weight and torque requirements.
- The electric conversion of the HF Deluxe chassis has successfully combined traditional design with modern sustainable technology, resulting in an eco-friendly and efficient electric bike. The modified chassis upholds the legacy of the HF Deluxe while embracing the innovation of electric mobility.



CHASSIS

- **Impressive Maximum Speed:** Experience the excitement of high speed with our electric motorbike's impressive, maximum velocity of 80 km/h, enabling you to swiftly maneuver through urban streets and highways.
- **Extended Distance Coverage:** Embark on longer journeys with confidence, as our electric motorbike offers remarkable distance coverage of up to 125 km in a single charge.
- **Efficient Reverse Mode:** Navigate tight spots and parking situations effortlessly with the integrated reverse mode. This innovative feature enhances maneuverability and makes parking in crowded areas or confined spaces a breeze.
- **Multi-Speed Modes:** Tailor your riding experience to your preferences with three distinct speed modes. Whether you prefer a leisurely ride, a balanced urban commute, or a high-speed adventure, our speed modes are designed to accommodate your needs.
- **Remote Ignition and Security:** Maintain constant control with the added ease of remote ignition. Activate your electric motorbike from afar, ensuring that it is ready and operational by the time you arrive.
- **Low Maintenance:** Experience the benefits of electric propulsion, which provides decreased maintenance requirements compared to traditional internal combustion engine vehicles. With fewer moving parts and simplified systems, maintenance costs are reduced, resulting in a hassle-free ownership experience.
- **Regenerative Braking System:** Maximize energy efficiency with the regenerative braking system. This technology captures and converts kinetic energy back into battery power, increasing overall range and optimizing the use of energy during your rides.

UPCOMING FEATURES

App Integration

- Remote Monitoring: Real-time battery status, range estimation, and charging updates on your smartphone.
- Keyless Start: Start your bike using your smartphone for added security and convenience.
- Navigation Assistance: Get turn-by-turn directions on your smartphone for efficient travel.
- Ride History: Track energy consumption and set eco-friendly riding goals.
- OTA Updates: Receive seamless over-the-air software updates for improved performance.

Accident Detection System:

- Collision Detection: Advanced sensors identify potential collisions and hazards.
- Emergency Alerts: Automatically notify emergency contacts and services of your location.
- Injury Mitigation: Activate safety protocols like hazard lights and battery disconnection

Enhanced Connectivity:

- Bluetooth Audio: Connect your smartphone for music and navigation audio.
- Smartphone Integration: View notifications and calls on the bike's display.

MARKETING ANALYSIS

- According to a report by Markets and Markets, the global electric motorcycle market is poised to witness a CAGR of 15.3% from 2020 to 2025 and is projected to attain a market size of \$24.3 billion by 2025.
- Environmental concerns and government regulations are the key factors propelling the rise of electric motorcycles as a sustainable mode of transportation.
- The cost of running an electric motorcycle is lower than that of a standard motorcycle, given the cheaper price of electricity versus gasoline.
- The electric motorcycle industry has witnessed progress in battery technology, leading to increased range and decreased costs, as well as the growing trend of motorcycle sharing services.
- Retrofitted electric motorcycles stand out as a special and trendy substitute for standard gas-powered motorcycles, capturing the attention of both motorcycle enthusiasts and environmental activists.

AWARDS AND RECOGNITIONS

Our Electric Motorbike project has attracted considerable interest and praise both within the industry and beyond. We are proud of the acknowledgment we have garnered for our innovative initiatives and commitment to advancing the frontiers of electric mobility.

- **Recipient of Rs 2,00,000 Funding:** Our E-Bike Project has successfully obtained a grant of Rs 2,00,000, acknowledging its potential to promote sustainable transportation solutions. This funding not only validates our vision but also enhances our commitment to shaping the future of electric mobility.
- **Future Award in ISIE SIEP E-BIKE Challenge:** We proudly secured the prestigious "Future Award" at the ISIE SIEP E-BIKE Challenge. This recognition speaks volumes about the innovation and engineering excellence that our E-Bike embodies. Our design, performance, and sustainability factors set us apart, positioning us as pioneers in the electric vehicle landscape.
- **Recognized and Awarded by the Governor of Haryana:** The Governor of Haryana's recognition and honor represented the pinnacle of our accomplishments. This esteemed acknowledgment underscores the positive impact of our E-Bike project on sustainable mobility and highlights our unwavering commitment to making a meaningful contribution to both technology and the environment.
- **Paper Presented at International Conference:** A paper was presented on E-Bike by our mentor at the International Conference on "Industry Focused Research," where it was selected, highlighting our project's significance and impact.

The awards and recognitions we have received serve as a testament to our relentless commitment to advancing electric mobility, safety, and innovation. We are grateful for the acknowledgment from esteemed organizations and individuals, and we are dedicated to our goal of creating a more sustainable future in the transportation industry.

Conclusion

In the transformation from the traditional petrol-powered bike to an electric marvel, the process has been much more than just replacing components. It represents a significant leap into the future of sustainable and efficient mobility. As we bring this overview to a close, it becomes clear that the converted electric bike, while retaining traces of its petrol-powered heritage, now represents the vanguard of technological innovation and environmental consciousness. This evolution is poised to benefit everyone, ushering in a new era of undefined transportation.

Nevertheless, this transformation signifies the commencement of a fresh chapter rather than its conclusion. With ongoing enhancements in progress, the electric bike is on the verge of revolutionizing the riding experience. Imagine a forthcoming era where connectivity effortlessly merges with the rider's way of life, predictive maintenance guarantees peak performance, and intelligent navigation directs each excursion.

The progression of these features will give riders a harmonious mix of tradition and technology. The electric bike, once converted, is more than just a mode of transportation; it represents a canvas for future possibilities. Committing to sustainable mobility involves not only reducing emissions but also ushering in a new era of intelligent, connected, and eco-conscious riding. The road ahead is filled with anticipation, and the electric bike is prepared to lead the way towards a greener, smarter, and more exhilarating tomorrow.

With this, the project is able to attain SDG 7 ensuring access to clean and affordable energy. The prompt execution of these fresh energy solutions is important to address climatic change, a major peril to our survival. This Sustainable Development Goal aims to hasten the transition to renewable energy sources and boost energy efficiency to guarantee a sustainable and resilient energy future. These endeavors are geared towards empowering individuals to establish small businesses, generate income, and uplift themselves from poverty.