Conversion of Petrol-Based Engine Bike to Electric Bike Using BLDC Motor and Arduino Coding

A Sample Thesis Document

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Abstract

The transition gasoline based vehicles to electric mobility is essential to reduce carbon emissions, fuel costs, and environmental pollution. This study focuses on the conversion of a petrol-based two-wheeler into an electric bike by integrating a Brushless DC (BLDC) motor and an Arduino-based control system. The design includes retrofitting the frame with an electric drivetrain, configuring an energy-efficient battery system, and developing an Arduino-controlled throttle and braking system. The outcomes demonstrate the feasibility of retrofitting as a cost-effective and environmentally friendly alternative to traditional motorcycles.

Chapter 1: Introduction

Background

Rising fuel prices, environmental concerns, and technological advancements in electric mobility have accelerated the demand for electric vehicles.

Problem Statement

Petrol-based motorcycles contribute significantly to urban air pollution and greenhouse gas emissions. Converting existing bikes to electric offers a low-cost sustainable solution.

Objectives

1. To design and implement an electric drivetrain using a BLDC motor.
2. To develop an Arduino-controlled throttle and braking system.
3. To evaluate performance in terms of efficiency, range, and cost.

Scope

Focuses on conversion of a single standard petrol-based bike with modifications limited to motor, controller, and battery integration.

Chapter 2: Literature Review

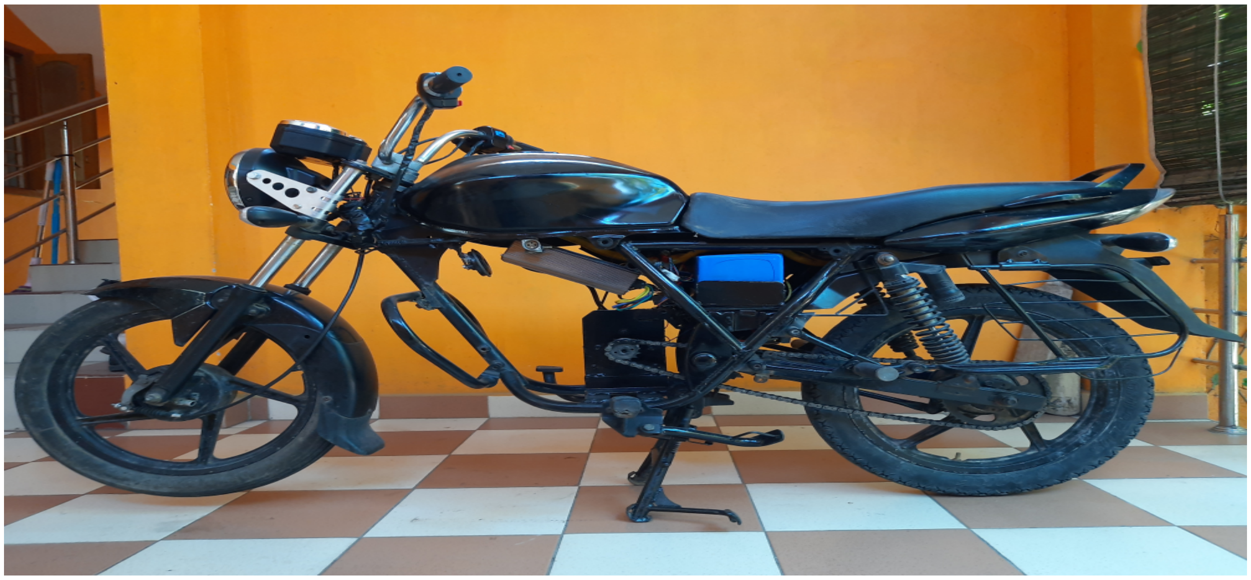
- Review of electric vehicle (EV) technologies.
- BLDC motor advantages: high efficiency, low maintenance, smooth torque characteristics.
- Role of Arduino in motor control: PWM signals, throttle input, regenerative braking logic.
- Previous studies on petrol-to-electric retrofitting.

Chapter 3: Methodology

1. Bike Selection & Disassembly: Choosing a lightweight motorcycle frame; removing internal combustion engine and fuel system.
2. Motor Selection: Using a 1–2 kW BLDC motor suitable for urban commuting (speed 50–70 km/h).
3. Battery Pack: Lithium-ion battery pack (48V/60V depending on motor rating).
4. Arduino Coding:
   - Throttle signal interpretation.
   - Generating PWM signals for BLDC controller.
   - Monitoring speed and battery voltage.
   - Implementing safety cut-offs.
5. Integration: Mounting motor, battery, and controller into the bike chassis.
6. Testing: Range test, speed test, charging time, and cost analysis.

Chapter 4: Results & Discussion

- Successful integration of BLDC motor and Arduino-based control.
- Achieved speed ~50 km/h and range ~40 km per charge (Test run) .
- Charging time: ~ 6 hours from standard AC socket.
- Cost analysis: Conversion significantly cheaper than purchasing a new EV.
- Challenges: Weight balance, heat management, limited battery capacity.



A final output of the Gasoline Bike with metallic frame chassis made into Electic Bike with all consumables inclusive of BLDC based motor , Audino enhanced Operative system , Along with Lithium Ion battery as a conceptualisation used for Tesla Vehicles significantly

Significant faults and difficulties are identified through every successive trail runs after each tests , particular misfortunes and difficulties observed are corrected again .

Chapter 5: Conclusion & Future Work

Converting petrol bikes to electric using BLDC motors and Arduino control is technically feasible and economically viable. Reduces emissions, operating cost, and maintenance.

Future improvements:
- IoT integration for remote monitoring.
- Regenerative braking optimization.
- Use of AI-based energy management systems.

References

(To be filled with IEEE/APA style references such as EV research papers, Arduino BLDC projects, motor datasheets, and EV retrofitting case studies.)

Sample Arduino Code for BLDC Motor Control:

```cpp
int throttlePin = A0;
int pwmPin = 9;

void setup() {
  pinMode(pwmPin, OUTPUT);
  Serial.begin(9600);
}

void loop() {
  int throttleValue = analogRead(throttlePin);
  int pwmValue = map(throttleValue, 0, 1023, 0, 255);
  analogWrite(pwmPin, pwmValue);
  Serial.println(pwmValue);
  delay(100);
}
```