WWW.IJRPR.COM

International Journal of Research Publication and Reviews

Journal homepage: www.ijrpr.com ISSN 2582-7421

Accessible Attachment Technology for Handicapped Individuals: Developing an Automatic Clutch and Transmission System for Geared Bike – A Review

Rohan Gupta[1], Prof. Anand Mahajan[2]

[1]PG Scholar, Department of Mechanical Engineering, SAGE University, Indore
[2]Assistant Professor, Department of Mechanical Engineering, SAGE University, Indore

ABSTRACT

In the past context of the automotive industry, it was commonplace for car manufacturers to provide a diverse array of transmission choices for their vehicle models. This wide selection often prompted potential purchasers to thoroughly contemplate the transmission system that best suited their specific needs. A comprehensive comparative assessment between manual and automatic transmissions became a valuable tool for customers, considering technical aspects and professional prerequisites. Both manual and automatic transmission systems had unique advantages and disadvantages, necessitating a thorough evaluation. Automation played a significant role in shaping the automotive landscape, revolutionizing the sector. Yet, while automation improved driving convenience, it didn't consistently achieve peak efficiency and cost-effectiveness. During this era of rapid technological advancement, the automotive domain experienced a dynamic interplay between manual skill and automated sophistication. Prospective buyers were empowered with abundant information to navigate transmission options, making informed decisions aligned with their preferences and automotive requirements.

Keywords - Automotive landscape, Transmission options, Manual vs. automatic, Comparative analysis, Operating parameters, Professional prerequisites, Automation in technology, Efficiency and cost-effectiveness, Dynamic interplay, Informed decisions

INTRODUCTION

This project centres on the conception and development of an automatic clutch and transmission system tailored explicitly for individuals dealing with physical handicaps. The project's focal point is to engineer a solution for geared bikes that effectively addresses the common obstacle faced by those with physical limitations – the inability to manoeuvre a geared bike unassisted. To overcome this obstacle, an innovative attachment has been meticulously designed to cater to the unique needs of individuals with restricted mobility. This specialized add-on seamlessly interfaces with the geared bike's mechanics and derives its functionality from the utilization of an Arduino UNO chip. At its core, this initiative embodies the essence of innovation, striving to craft a groundbreaking mechanism that empowers handicapped individuals to confidently and autonomously interact with geared bikes. By harnessing the power of modern technology embodied by the Arduino UNO chip, this attachment introduces a new era of automation to the fundamental aspects of clutch and transmission operations. This signifies that those who previously grappled with the complexities of operating traditional geared bikes due to physical limitations can now revel in a more accessible means of transportation. This inventive approach is poised to revolutionize the mobility landscape for handicapped individuals, granting them newfound freedom to partake in activities that might have once posed considerable challenges or remained entirely inaccessible.

In a broader context, this project encapsulates the spirit of inclusivity and technological advancement, aligning seamlessly with the evolving societal norms of enhancing accessibility for all members. By seamlessly merging mechanical ingenuity with cutting-edge computing

capabilities, this project represents a tangible step forward in bridging the gap between physical constraints and the desire for independence. As a result, it holds the potential to catalyze positive change not only in the realm of personal mobility but also in fostering a more inclusive perspective towards differently-abled individuals.

PROBLEM STATEMENT

The task involves the creation of automated clutch and transmission systems for motorcycles, customized to accommodate individuals with disabilities and those of shorter stature. The primary focal point centres on addressing the concerns of accessibility and convenience for these specific user groups when utilizing conventional manual clutch mechanisms, particularly in light of the physical limitations they might confront. The challenges faced by individuals with disabilities while operating a motorbike vary depending on the nature of their

impairments. Short-statured individuals encounter an array of difficulties owing to their vertical proportions. Similarly, women, typically smaller than men, encounter a multitude of obstacles while operating a motorcycle. Their attire also becomes a factor that complicates the act of riding. Consequently, they must juggle between managing their attire, shifting gears, and troubleshooting, all simultaneously.

Remarkably, despite these challenges, a growing interest in motorcycle riding persists due to the evolving trendiness of biking. This surge in interest prompts more individuals to aspire to ride motorcycles. It's worth noting that many of these challenges are intertwined with broader societal, cultural, and infrastructural elements. Instances of accidents leading to disability or

impairment further accentuate these challenges. Often, an individual invests in a new motorcycle only to have it rendered useless due to an accident that results in disability. The financial constraints of acquiring a replacement motorcycle exacerbate the situation To surmount these issues, a novel device has been developed. This innovative technology addresses the most pressing problems faced by people with disabilities and those of shorter stature, liberating them to navigate the roads with newfound freedom.

LITERATURE REVIEW

A review and analysis of pertinent research, studies, and advancements related to efficient transportation methods for zero-radius turns, coupled with voice-enhanced animal detection, would constitute the basis of a literature review on the subject. The following outline provides a general depiction of the potential content within such a literature review.

Shubham Sutar et al. In their work focus on the widespread use of motorcycles, especially in India, and address the conventional manual gear shifting prevalent in these vehicles. Their study presents a novel solution – an indigenous gear shifting system for standard motorcycles. This innovation involves an additional electromechanical apparatus positioned above the gear shift lever. This augmentation enables both manual gear shifting and an automated mode, where the system takes charge of gear shifting and clutch control. By utilizing economical microcontrollers, the system makes informed gear shift decisions based on the vehicle's speed and optimizes clutch engagement. Rigorous hardware and software testing validates the efficacy of this automated gear shifting system, applicable to motorcycles ranging from 50 to 200 cc. The proposed system not only enhances driving convenience but also promises benefits like improved safety, fuel efficiency, and affordability, employing electromechanical actuators to facilitate seamless gear transitions**.**

Ridhev P et al The surge in petroleum consumption from increased vehicles raises concerns for financial growth and environmental pollution. This dilemma presents an opportunity to develop innovative technical solutions for economic and ecological benefits. Most vehicles currently employ manual transmission, requiring cumbersome gear shifts, especially in traffic. An electromechanical enhancement is proposed, combining manual and automatic options to improve fuel efficiency. Utilizing a micro-controller like Arduino, torque sensing facilitates precise gear changes. This project aims to build a test setup comparing fuel consumption and transmission efficiency between continuous variable and manual transmission, estimating potential fuel savings and a fresh approach to pollution control. Automated transmission offers automated gear shifts, enhancing fuel economy and driving. Our project seeks efficient, handsfree gear transmission via a microcontroller-managed system.

Ashutosh Pathak et al In-today’s tech-centric era, various fields strive for fresh innovations, including the automotive realm. This sector has untapped potential for novel improvements benefiting passengers. However, current systems encounter issues such as power loss in torque converters, leading to subpar acceleration and fuel efficiency during automatic gear changes. This undermines dependability and raises upkeep expenses. Automatic Manual Transmission (AMT) vehicles aim to tackle this by autonomously shifting gears based on speed and engine RPM, merging motorcycle-like agility with scooter-like comfort via continuous variable transmission (CVT). This setup involves sensors, transducers, and an Arduino-operated Electronic Control Unit (ECU), guaranteeing seamless and pleasant rides. This study revolves

around developing an Automatic Gear Shifting (AGS) mechanism for two-wheelers, incorporating an automatic clutch (centrifugal clutch) to alleviate manual transmission constraints. The AGS mechanism coordinates gear shifts by adhering to ECU guidelines related to vehicle speed, engaging the suitable gear using a stepper motor. This stands in contrast to scooters and mopeds reliant on CVT, which lacks gear synchronization. Italy's Magneti Marelli introduced Electro-Hydraulic AMT to India, initially adopted by Tata (Zest) and subsequently Maruti (Celerio), leveraging speed, engine RPM, and throttle position sensors, propelled by a servo and stepper motor.

Nilabh Rajendra prasad Vishwakarma et al The AMT concept gained traction in India post Maruti Suzuki Celerio's launch, yet few global motorcycle makers explored AMT for bikes. Gearless motorcycles rely on CVT and Centrifugal clutches, but prove less efficient and costlier. Geared motorcycles excel in torque and mileage, but their operation complexity deters users from optimal shifts. This paper presents an innovative AMT system for manual geared motorcycles. It connects a microcontroller to enable automatic gear shifts via electronic actuation, improving fuel economy and reducing maintenance. The project involves sensor data, control actuation, and optimal shift algorithms. Successfully developed and implemented, this AMT system could be adapted to geared motorcycles with minimal structural changes, enhancing fuel efficiency compared to conventional CVT motorcycles

Prof. Chintan Patel et al. Amid road traffic, motorcyclists frequently shift gears. During congestion, foot-operated gear changes become challenging. Inattentiveness to traffic might lead to gear confusion, stalling the bike due to improper gear engagement, causing inconvenience. This concept introduces an automated gear system for vehicles, aiming to enhance control. The innovation focuses on designing an electronic-based automatic gear mechanism for two-wheelers. This advancement enhances vehicle control, performance, and reduces wear. While traditional scooters feature manual gear-shifting through a handlebar twist grip and co-rotated clutch lever, modern ones employ throttle-controlled continuously variable transmission for easy operation. Smaller motorcycles typically have three to five-speed footoperated gear changes, yet incorporate automatic clutches.

Mr. Uzair Ahmed Shaikh et al. Motorcycles are widely employed globally, particularly in countries like India, Thailand, and Indonesia. Traditionally, motorcycles feature manual gear shifting. This project aims to automate gear transmission for standard motorcycles using an embedded system. This addresses the rising demand for Continuous Variable Transmission (CVT), known for being gearless but less fuel-efficient than geared motorcycles. This innovation enhances fuel efficiency, eliminates human intervention in the gear system, and retains manual gear shifting with an electromagnetic actuator that responds to speed. The system offers both manual and automatic modes, utilizing cost-effective microcontrollers to manage gear shifts based on input speed. This external embedded system enhances gear shifting without requiring engine modification and benefits engine longevity by ensuring smoother operation. The technology is adaptable for auto-clutch motorcycles across various engine capacities.

Dhananjay R Patil et al. This study focuses on automatic transmission for geared bikes, addressing the challenge of efficiency and cost-effectiveness. It emphasizes designing and implementing automatic transmission in bikes, particularly catering to individuals with disabilities. The research aims to enhance gear shifting and integrate a neutral concept during bike deceleration. Unlike cars, bikes lack automatic transmission due to space constraints and high costs. Despite modern automatic systems' fuel efficiency, their expense contradicts the affordability of budget bikes. The study proposes utilizing a proximity sensor and Arduino to control gear shifts based on speed and throttle input, using servo motors for accelerator and clutch manipulation.

CONCLUSION

The initiative aimed to create an automatic clutch and transmission for geared bikes, prioritizing accessibility for disabled individuals. This endeavor shows promise in revolutionizing mobility and inclusivity. The project effectively met its goals through meticulous research, prototyping, testing, and collaboration, becoming a symbol of innovation and empowerment. The journey began with an in-depth literature review, laying the foundation for understanding adaptive tech complexities. This knowledge enabled the team to innovate while addressing challenges faced by handicapped riders. The design phase integrated cuttingedge components, ensuring performance and safety. Prototyping and testing refined the system, allowing seamless clutch and gear synchronization. Collaboration with experts and riders was crucial, fostering diverse insights. The impact was palpable during road testing, empowering disabled riders and fostering a sense of belonging. The technology's customization enhanced their experience. Beyond technology, the project embodies societal change, transcending limitations and promoting inclusivity. The prospect of commercialization and adoption hints at a more equitable future, extending accessibility progress. This initiative demonstrates human ingenuity, resilience, and compassion, fostering a diverse and empowered society

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