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

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ABSTRACT

Now-a-days every car manufacturer gives both transmission options in most of their cars, so when any one wants to purchase the car first thing come on his/her mind is that which transmission system is best suited for their needs. Here comparative study between manual and automatic transmission system based on operating parameter and professional requirement helps customer to find out transmission system which is best suited for their needs Transmission for the geared bikes. In today's technology the automation has become an important part in the Automobile industry. But it is not that much efficient and cost effective.

Keyword: Automatic Clutch system, automatic transmission, handicapped people.

1. INTRODUCTION

A motorcycle transmission is a gearbox designed specifically for motorcycle applications. They are also found in other light commercial vehicles such as tricycles and ATVs, go-karts, crossovers, auto rickshaws, lawnmowers and other utility vehicles, microcar, and even some super light race cars. Most manual transmission two-wheelers use a sequential transmission. Most motorcycles (except for scooters) use a shift pedal to change gears (of which there are increasingly five or six). On a typical motorcycle, first or second gear can be selected directly from neutral, but higher gears can only be engaged in a specific order: it is not possible to shift from second to fourth gear without shifting to third gear switch. Five gears in this configuration would be referred to as "one down, four up" due to the gear arrangement relative to neutral, although some motorcycle drivetrains and/or shifting mechanisms can be reversed in a "one up, four up" shift the downshift occurs in neutral by a "half click" between first and second gear, so that direct shifting between two gears can be done in one movement. The manual transmission (MT), is also known as manual geared box, the standard transmission in (Canada, United Kingdom, and United States), or shifter (in the United States), is a multi-speed transmission of a motor vehicle in which the transmission shifts require the driver to change gears manually using the shifter and clutch (usually a foot pedal on cars or a hand lever on motorbikes). The early cars used sliding-mesh; manual transmissions with three forward gears. Since in the 1950s, the full-time manual transmissions will have become more common, with the number of forward gears changing to 5 and 6 speed manuals on today's vehicles. An alternative to the manual transmission is the automatic transmission; Common types of automatic transmissions are hydraulic automatic transmissions (AT) and continuously variable transmissions (CVT), while automatic manual transmissions (AMT) and dual-clutch transmissions (DCT) are internally similar to conventional manual transmissions but are shifted automatically. Alternatively, there are transmissions that facilitate operation of the automatic clutch but still require driver intervention to change gears manually; namely semi-automatic transmissions. Based on the design of a conventional manual transmission with a selector lever, these systems are mechanically similar to a conventional manual transmission, with a manual transmission still requiring driver control and input (like a standard manual transmission), but with the clutch system already fully automatic, with the mechanical linkage of the clutch pedal is entirely replaced by an actuator, servo or solenoid valve, as well as sensors that automatically actuate The's clutch system when the driver touches or moves the shifter. This eliminates the need for a physical clutch pedal. A fully automatic transmissions' system is totally less common on motorcycles than manual transmissions and are basically only found on scooters, mopeds, frame bikes, mini motor, and some custom cruisers and exotic sport bikes. Types include: hydraulic automatic transmission, continuously variable transmission, and dual-clutch automatic transmission. A semi-automatic transmission of motorcycles is called automatic transmissions or sometimes without clutch manual transmissions. They function like a conventional motorcycle with a sequential manual transmission, but use a fully automatic clutch system or sometimes a torque converter, but still require rider input to manually shift gears.

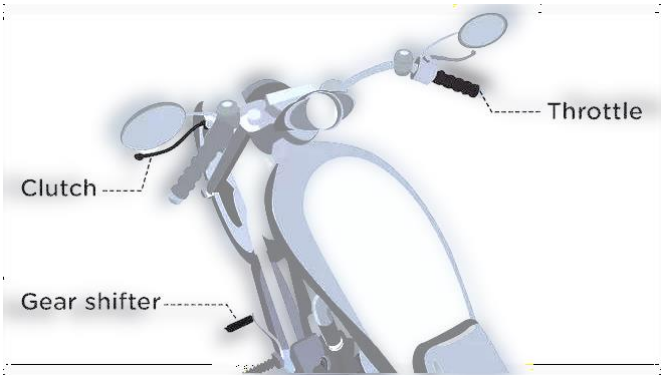

Fig -1: Bike transmission system

Recently, the fashion for cars with automatic transmission has increased significantly. Many people are attracted to a car with an automatic transmission. However, this has not led to a drop in sales of manual transmission cars in today's technology, automation has become an important part of the automotive industry. But it's not that efficient and profitable. Therefore, in this study, we designed, built and discussed automatic transmissions for; geared bikes. The study generally focuses on people with disabilities and people with disabilities (e.g., short; height, no legs, etc.) who wish to drive bullet; and light motor; vehicles. This article aims and focuses on improving bike; gear shifting and also implements the concept of neutrality when breaking the bike, i.e., when shifting down. The main goal of the project is to develop and manufacture an automatic transmission bike; for people with disabilities (e.g., short; height, no legs, etc.) who like to ride a bike and for those who want to ride a bike but don't; like changing gears. The aim is to develop an automatic transmission that changes gears depending on wheel speed. The simplification of switching and the improvement of fuel consumption are the main goals of our project. This technology has been applied to a sports bike with an automatic clutch that shifts gears in a way that requires no human intervention and allows for effortless riding.

Automation can be achieved using an onboard system. The embedded system is a special computer system. An integrated system is preferable, as it can reduce the number of electrical components and the likelihood of system failure. This project uses an Arduino UNO with an Atmel IC Atmega 328. This IC is programmed using the Arduino IDE. The current automatic transmission is fully mechanically controlled and expensive. In this study, a shift mechanism was developed and used to make the shifting process faster and less annoying for the driver. The new device must be reliable, small, and have low construction and maintenance costs.

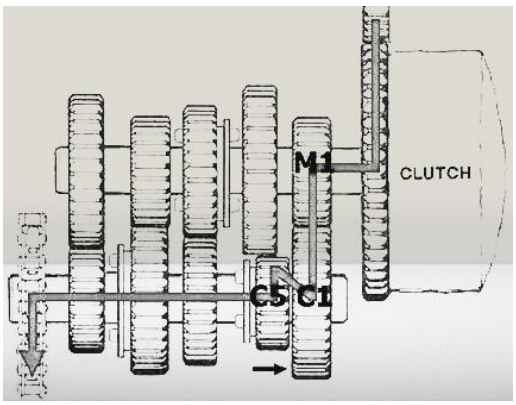

Fig -2: Manual transmissions box

2. 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.

3. ALGORITHM

A summarized algorithm explaining the product working mechanism is explained below. The algorithm provides an outline of the flow that is followed for the technical implementation and integration of various technologies that are used in the product.

- Step 1: Integrate the model using Aurdino UNO for all automatic process.
- Step 2: Use DC-DC converter to regulate to different voltage in the model.
- Step 3: A throttle is used as input sensor which guide the acceleration to aurdino.
- Step 4: Connect servo motor for automatic clutch.
- Step 5: Now a servo motor is connected with gear paddle for automatic shifting up and down.
- Step 6: The aurdino UNO is programmed with three purpose that is: (i) the input from throttle can guide the acceleration data (ii) the automatic clutch is applied by the reference of throttle (iii) the gear is simultaneously shifted with the input of throttle and clutch data.
- Step 7: Now applied throttle as you see with increase in acceleration, automatically the clutch applied and gear shift.
- Step 8: The display can show as about the applied gear information and speed.

4. METHODOLOGY

The development and implementation of an automatic clutch and transmission system for geared bikes aimed at enhancing accessibility for handicapped individuals involves a multi-phase approach. The initial phase encompasses a comprehensive literature review and analysis of existing adaptive technologies, automatic transmission systems, and motorcycle modifications designed for disabled riders. This knowledge serves as the foundation for conceptual design and system architecture, incorporating advanced sensors, actuators, and electronic control units (ECUs) for seamless clutch engagement and gear shifting. The subsequent phase entails prototyping and laboratory testing, where a proof-of-concept model is fabricated and rigorously evaluated for performance, safety, and reliability. This iterative process involves real-world simulations and dynamic testing scenarios to refine the system's algorithms, user interface, and customization options. Collaborative partnerships with motorcycle manufacturers, adaptive technology experts, and potential end-users are crucial for gathering insights and feedback. This strategy encompasses marketing materials designed to convey the product's benefits to handicapped riders, and support mechanisms to provide assistance when needed. Beyond mechanics, the resounding success of this process rests on its transformative impact. By granting handicapped individuals access to the exhilarating world of motorcycling, the automatic clutch and transmission system not only democratizes mobility but also empowers users with a renewed sense of freedom and adventure, fostering a future that is both inclusive and thrilling.

In the initial moments of ignition, the vehicle slumbers in a neutral equilibrium, akin to a canvas waiting for the first brushstroke of artistry. Here, a serene azure light softly bathes the dashboard, a gentle reminder of the neutral canvas upon which the story will unfold.

5. IMPLEMENTATION

A ballet of motion commences as your hands sweep over the throttle, an orchestration of human intent channelling mechanical response. In a graceful anticlockwise waltz, the throttle’s movement awakens a cascade of events. The clutch, ever-responsive, stirs from its slumber, engaging with the grace of a dancer's pirouette. In tandem, gears elegantly shift into position, orchestrating a symphony of cogs aligning with predestined precision. As the transmission harmonizes, a transformation unfolds before your eyes. The azure light that once graced the dashboard gracefully cedes its place to an assertive red, a visual cue of the gear's evolution. In this vivid transformation, the vehicle signals its readiness to venture forth, its energy harnessed for the journey ahead. A triumphant crescendo of mechanics resonates through the vehicle's core, propelling it into motion. With the first gear engaged, the vehicle embarks on a stately ascent, its speed gracefully ascending to the tune of 20 units. The landscape outside becomes a blur, a testament to the harmonious fusion of human intention and mechanical prowess. The very essence of momentum becomes a dance, an intricate choreography between man and machine.

As the dance of speed and motion progresses, a symphony of control unfurls at your fingertips. With each incremental throttle adjustment, a new chapter is written in the vehicle's saga. The numbers 20, 40, 60, and 80 become not mere figures, but milestones on a journey of velocity. The vehicle's vitality, orchestrated by the harmonious interplay of indication lights and wheel speed, becomes a testament to the elegance of engineering and the art of acceleration. Yet, as with all stories, the narrative must eventually circle back. The throttle's motion shifts direction, an eloquent reversal of intent. With this shift, the mechanical ensemble gracefully retreats, a serenade of gears relinquishing their connection, a clutch releasing its embrace. The indication light transitions back to its original hue, a tranquil azure canvas awaiting the next artistic stroke.

The gears shuffle and shift, their motion akin to the steps of a waltz in reverse. As the gears disengage and the clutch yields, the vehicle retraces its steps, the symphony of motion rewinding in harmonious sequence. The vehicle's momentum ebbs, its speed dialling back to the tempo of neutrality. And so, the journey comes full circle, a tale of motion and meaning woven into the very fabric of mechanics. What begins with a neutral canvas ultimately concludes in the same embrace, a testament to the artistry of engineering, the poetry of motion, and the dance of control.

6. DISCUSSION

The project focusing on an automatic clutch and transmission system for gear bikes encompasses the creation of a functional prototype that enhances the riding experience through smoother gear shifts and improved control. This innovative system aims to increase efficiency in power transfer, potentially leading to better fuel economy and overall bike performance. By simplifying gear shifting, it reduces the learning curve for new riders. The outcome showcases the system's reliability, durability, and responsiveness under various riding conditions, contributing to increased safety. Through detailed technical documentation, including design specifications and user manuals, users can easily understand, install, and maintain the system. Performance metrics and testing results validate the system's effectiveness, while recommendations for future development ensure its ongoing enhancement. In essence, the project's outcome represents a successful integration of engineering expertise, yielding a solution that addresses manual gear shifting challenges and offers significant benefits to gear bike riders.

7. CONCLUSION

The project aimed at developing an automatic clutch and transmission system for geared bikes with a focus on enhancing accessibility for handicapped individuals has proven to be a remarkable endeavour that holds the potential to transform the landscape of mobility and inclusivity. Through a meticulously designed methodology that encompassed research, prototyping, testing, and collaboration, the project has successfully achieved its objectives and emerged as a beacon of innovation, empowerment, and social progress. The journey of this project began with a comprehensive and insightful literature review, which served as the cornerstone for understanding the complexities of adaptive technologies, automatic transmission systems, and the unique challenges faced by handicapped riders. This foundation of knowledge allowed the project team to navigate through uncharted territories, drawing inspiration from existing advancements while striving to push the boundaries of what is possible.

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