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RESEARCH ARTICLE OPEN ACCESS

Manufacturing of Hand Operated Car Attachment for Person with Disabilities

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ABSTRACT
In a conventional car we know that the driving operation needs a combination of operation of accelerator, brake and clutch. A normal person with a normal body can easily drive this car without any hesitation. A person who is disabled (crippled) can not make use of their legs like a normal person and consequently can not drive a car. We have designed an attachment in which a lever is attached in such a way that when pull force is applied ir undergoes acceleration and when push force is applied it undergoes braking operation. A new gear knob is designed which has a push button which when pressed will actuate the servo motor and hence clutch operation will be carried out. A safety feature is added that when brakes are applied, the clutch operation will take place automatically which will be useful in traffic conditions.
Keywords **-** Attachment for Car, Automatic Clutch, Disability, Hand Operated Car, Handicap Car.

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I. INTRODUCTION

1.1 Concept

Driving a vehicle and using it as a mode of transportation is necessity in today's lifestyle. Considering the amount of distance and road safety, a vehicle is considered to be one of the best modes of transportation. While some people consider it to be dream to drive a vehicle. Handicap/disabled person are somewhat unfortunate in these aspects because the cars and vehicles are not designed keeping the condition of them in mind.

Here, we the students of mechanical engineering have came up with an idea to restore the idea of driving in a handicap persons mind. We have an idea to design a vehicle attachment that can enable handicap persons to drive a vehicle comfortably and without any hesitation.

1.2 What is Disabled Person?

Disabilities is an umbrella term, covering impairments, activity limitations, and participation restrictions. An impairment is a problem in body function or structure; an activity limitation is a difficulty encountered by an individual in executing a task or action; while a participation restriction is a problem experienced by an individual in involvement in life situations. Thus, disability is a complex phenomenon, reflecting an interaction between features of a person's body and features of the society in which he or she lives.

1.3 Why are lower limbs important for driving a car?

The aims of this study were to examine the ability of patients to return to driving cars and riding motorcycles after lower limb amputation, and to explore the factors that significantly affect such ability.

A sample of 90 participants, mean age 55.2 years (standard deviation 12.5), were recruited from a tertiary hospital. Inclusion criteria were: age over 18 years; unilateral or bilateral major lower limb amputation; and having been driving cars and/or riding motorcycles 6 months prior to amputation.

Data collected via a structured questionnaire revealed that the most common cause of amputation was diabetic foot complications (75.6%). Nearly half (45.6%) of the participants returned to driving/riding within 1-72 months post-amputation.

The rate of return to driving/riding among patients with lower limb amputation is low.

1.4 Safety and Our vision for Disabled Person

To make the life easier and joyful for any person with disability and fulfill their dream to drive car and travel independently in a safe yet quick and

easily operable mode of transportation. By applying various engineering phenomenon's and modifying the current modes of transportation which are not designed for person with disabilities.

1.5 Why car is safe for Disabled Person?

Firstly cars are considered to be safest mode of transportation in comparison to bikes and 3-wheelers. Cars can protect a person from bright sun to thunder of rain. It can give a disabled person a sense of confidence as well as independent relief to travel from one place to another on their own.

1.6 Working of Project in Detail:

1.6.1 Accelerator and Braking:

A lever is designed in such a way that when pull force is applied on it, the car undergoes acceleration. The RPM rises simultaneously by the amount of pull force applied on the lever.

When push force is applied on that same lever, braking operation takes place by the amount of push force applied on the lever.

Thus we can say that both braking and accelerating can simultaneously be controlled by the constant pulling and pushing of the same exact lever

This lever is placed right beside the steering wheel. The attachment is designed ergonomically and in an aesthetic way to carry out the operation without any hassle.

1.6.2 Clutch:

As far as the clutch control system is concerned, a new gear knob has been designed which consists of a push button. While shifting between gears ,when that button is pressed, a signal is passed to the servo motor which is placed under the driving seat.

A chain drive has been connected to the servo motor which when activates, pulls the chain and the other end of the chain which is connected to the clutch pedal undergoes motion hence operating the clutch pedal by just push of a button.

1.6.3 Safety system:

Considering the traffic conditions in a country like India, it is nowhere possible to drive a car without stopping or getting jammed up in traffic conditions.

We know that in traffic conditions constant operation of brake and clutch needs to take place occupying both our legs.

In our project driving like this, occupying both hands on lever and gear knob would not allow driver to operate on the steering wheel too. So considering that condition we have designed the clutch system in such a way that when brakes are pressed the clutch system gets activated simultaneously without pressing the button.

This will minimize the driving operation and provide safety and also save the engine from stalling. Another safety is that a kill switch is provided on the dash-board which when triggered will turn off all the system i.e. the clutch system and the safety clutch system so that a normal person can also easily drive the car without any hesitation.

II. INDENTATIONS AND EQUATIONS:

[1] Mechanical Advantage

MA= Fr/Fe.

Class I levers are taken into account here which can be equated for Mechanical Advantage calculation.

[2] Newtons second law

F= m*a

Amount of force can be calculated with respect to the magnitude and direction.

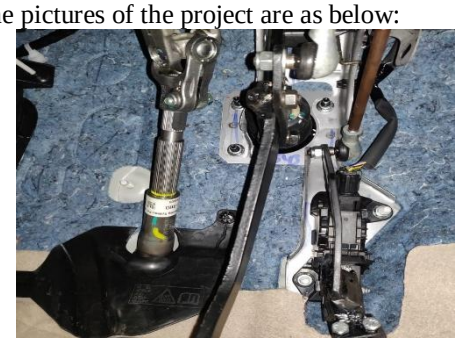
[3] Newton's third law

FA = −FB.

This law is useful to understand the equal and opposite reaction of the lever mechanism.

III. FIGURES AND TABLES

Some pictures of the project are as below:



IV. CONCLUSION

A car driving attachment for disabled drivers has been developed and tested successfully. Modifications were made in the conventional car keeping in mind the ability of the driver. A complete mechanical lever attachment for accelerating and braking has been designed which when undergoes push/pull actions carries out its operations. For clutch operation a near gear knob is designed consisting of a push button connected to a servo motor. By the complete amalgamation of all these components legs free driving operation is carried out safely and effectively.

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