SMART SEAT FOR DIFFERENTLY ABLED

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Abstract

In recent years, cars are generally used as mode of transportation. However the usage of cars is limited only to the ones without any physical disability. If a person cannot walk on his own due to his age or sickness, he or she is unable to occupy the car seat without the help of at least two-three helpers. This is because a standard car is designed for normal people who are capable of using their legs and arms.

With the population ageing and rising of the sicknesses, it is a critical factor in the public transportation to have a physical setting that fosters independent living. However, none of research studies have designed a barrier free car seat device for supporting elderly persons and those with disabilities while they ingress or egress the vehicle. Using this project, we intend to make it easier for the specially abled and ageing individuals to enter or exit the car.

Introduction

In recent years, cars are generally used as mode of transportation. However a standard car is designed for normal people who are capable of using their legs and arms. Using this project, we intend to make it easier for the especially abled individuals to enter or exit the car. With the population ageing, it is a critical factor in the public transportation to erect a physical setting that fosters independent living. Especially, elderly and disabled persons, the necessary of transportation barrier free designs are extremely increasing. Transportation is also demanded ongoing health care and medication access. The study found the model relationship between transportation, health care access and outcomes . In addition, due to a lack of transportation, about do not obtain medical care. The majority of those people are lined with old age, low incomes, and less education . Then, the result of survey on barriers to health care access indicated 21% of them thought transportation barrier as a reason they had not brought a child in for a medical visit, and 62% of them lacked a car as most frequent transportation difficulty. Barrier-free is defined by the structural or architectural design that does not block user those with physical or other physical disabilities. And accessibility for disabilities in the transportation raised the UN's awareness. The UN standard Rules on equalization of opportunities for people with disabilities and the UN convention on the rights of persons with disabilities were published in 1993 and 2006 respectively . The legislation emphasized the public transportation should identify and eliminate the obstacles and barriers for a person with disabilities.

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Equations

Multiply the number of **rpm** by 3.14. For example, if a motor spins at 140 **rpm**, multiply 140 by 3.14 to get 439.6. Multiply the Step 2 result by the diameter of the circle to find the linear **speed** per minute. Completing the example, multiply 439.6 by 1.3 feet to get a linear**speed** of 571.48 feet per minute.

Gap Analysis

In this project we are designing a fully automated seat unlike the previous ones that are manually operated. With the use of a motor, functioned by arduino and thereby via a Bluetooth module, signal will be sent to it with the use of a remote.
The remote will consist of two buttons mainly the forward and reverse buttons.

Proposed Methodology

Well, previously the same mechanism has been introduced and worked out well in the foreign countries. According to the 2011 Census, India is home to 2.7 crore people living with disability.

In our project we aid to meet the needs of differently abled people using fully automated system. So basically, the automated system does not depend on secondary help. So there is no modification made in the car's structure or core functioning, except that it is now disabled-friendly. The seat that we are constructing/ designing is a detachable one.
On a click of a button, by the provided mechanism the seat travels the customised path and stations itself halfway outside the car. This allows the differently abled person to sit on the automated seat with ease. The reverse mechanism then takes the differently abled person inside the car following the same path.
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Our design is to make car travel easy for a disabled person, using an easily installable seat mechanism. The original seat, has to be removed and the smart seat has to be replaced. So there is no modification made in the car's structure or core functioning, except that it is now disabled-friendly. This seat can be replaced with the original seat which was removed before installing the disabled friendly seat.

The mechanism use the same batteries of the car for the operation. The mechanism require maintenance of the car batteries which should be in good condition in order that the mechanism of the seat is very responsive all the time.

Block Diagram:
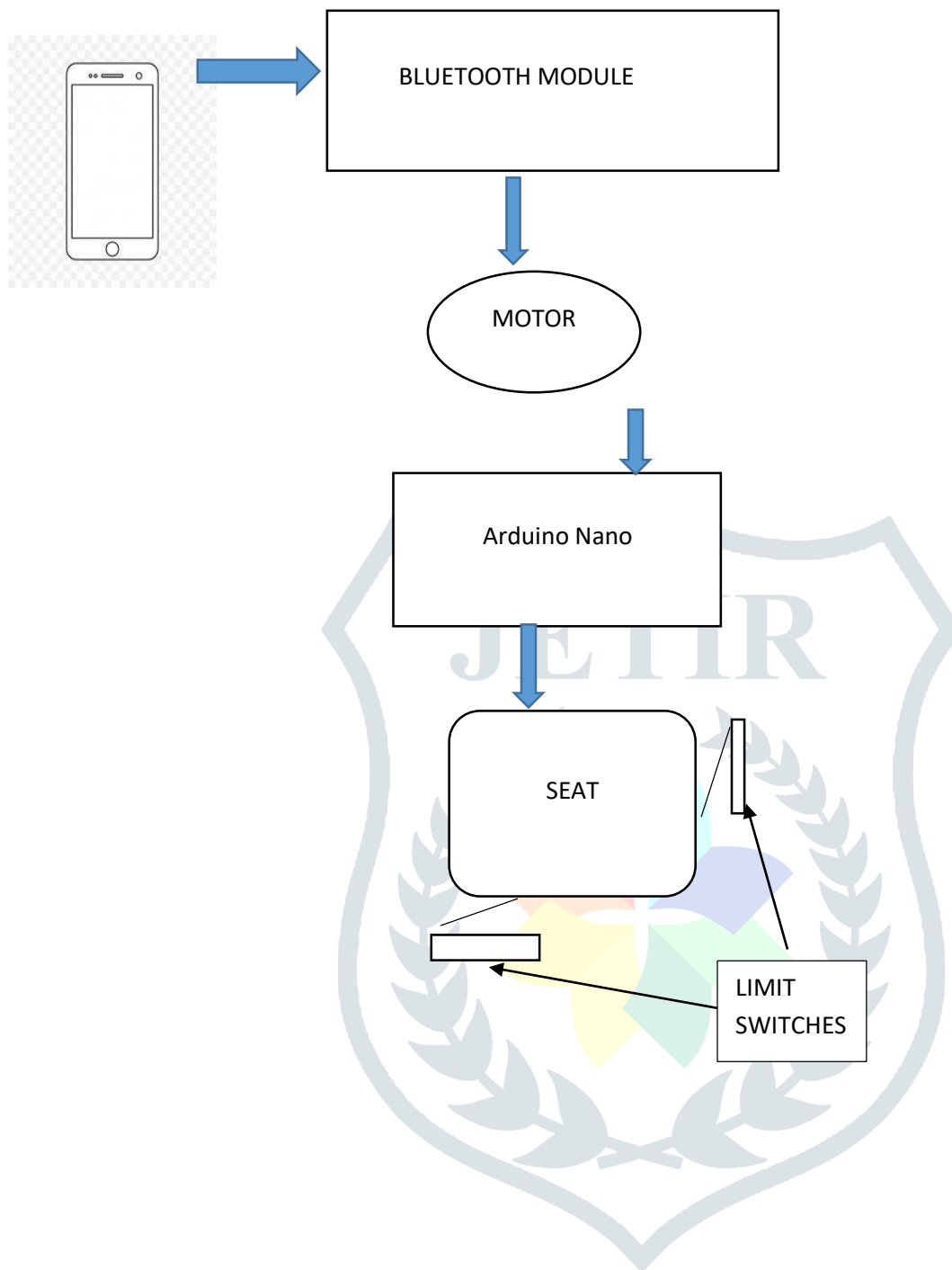
The system is designed in such a way that by a press of a button, the seat comes out in a specific path and then go back in the same path with another press of a button.

The Bluetooth module is interfaced using an Arduino Nano which in turn controls the car seat. The Arduino Nano controls the motor which is connected to the seat and this determines the direction of which the seat moves. The motor rotates 45 degrees anti clockwise in its first cycle and then rotates 45 degrees clockwise in its second cycle, which brings the seat in its initial position. Arduino Nano also uses limit switches for stopping the motion of the motor at a certain point. In this type of system we will be using 2 limit switches. The first limit is responsible for stopping the seat when it is moving in the anti-clockwise direction. The second limit switch is used when the seat has to follow the reverse path and has to go back in. This limit switch stops the seat at its initial position.

Result and Discussion

Weight	RPM of Motor	Angle of Rotation
0kg (without seat)	35rpm	90 $^\circ$
3kg (with seat)	35rpm	90 $^\circ$
50 kgs	34.5rpm	90 $^\circ$
55kgs	34.2rpm	90 $^\circ$

Table 1 Result of the seat rotation

We had begun doing this product by keeping in the cost we are going to put to make a fully working project. So that we reach make a very effective at a reasonable cost. So we were facing a problem in which we had to use two motors which are priced high so we adamant on using only one motor which did the motions of the seat (rotation and forward, backward) so we did a lot of research and came up with Scotch Yoke Mechanism (The Scotch Yoke also known as slotted link mechanism is a reciprocating motion mechanism, converting the linear motion of a slider into rotational motion, or vice versa. The piston or other reciprocating part is directly coupled to a sliding yoke with a slot that engages a pin on the rotating part.).

So we get the rotating as well forward, backward motion simultaneously. This has worked in the cost reduction and also safes the place used to set up and fit only one motor.

APPLICATIONS

System application

The main feature of our project is that it does not depend on any external help, as this seat moves outside by rotating 90 degrees simultaneously. Making it easy for the individual to sit on the car seat and enter the car by pressing a button which will reverse the mechanism and the individual will be inside without struggling the its way inside.

System advantages
1) Can be in cooperated on passenger side as well as driver side making the individual fully independent by using paddle shift car modification.
2) Does not require any external help to get inside the car as the individual can enter the car on a press of the button.
3) Smooth functioning giving comfort to users
4) Available at a reduced cost as not many mechanisms are used.
5) Now anyone can go to work, hospital, shopping etc. without waiting for anyone to drive them to their destination.

Conclusion

Our product helps people with disabilities, it also for those suffering form back pain, knee pain and arthritis and also the senior citizens who avoid travelling simply because they find it difficult to get in and out of the car.

Our product can be used by both either by the driver or the by the passenger as the driver side can be driven by hand using paddle shift modification which is already available in the current market.

This project titled "Automated Car seat provides intend to make it easier for the especially disabled individuals and ageing peopled to enter or exit the car. This project involves the design of a Programmable Turning seat. This seat helps the old or the disabled to get seated safely, conveniently and comfortably.

It is operated using a mobile application which , switches on seat or your mobile phone.
This seat is programmable including programming the movement of lengthwise, rotation and seat backrest angle.

Whenever a person wants to enter the seat will turns outwards in the anti-clockwise direction and when a person is seated, then it turns in the clockwise direction and the person along with the seat in moved into the car. Similarly it operates while a person wants to move out of the car.

In this project we have met the needs of people especially, elderly and differently abled persons it also for those suffering form back pain, knee pain and arthritis.

Future work:

As our project is based on helping the differently abled or elderly people to get in a car without being dependent on an external person. Most of our users will use either a wheelchair or crutches to reach the car and then transfer themselves to the seat.

So what about the wheelchair after the person sits on the seat??

The further work for this project is to help the users to get their wheelchair or crutches in and out of the car with minimum effort. The plan is to attach a clamp to the rear door so that the user can hang the wheelchair on the clamp which will go into the car. The user can make the wheelchair go in and out of the car with the help of the clamp. The clamp will also be connected to the Arduino and the Bluetooth module which will be controlled by the 'Bluetooth terminal HC-05' mobile application. This will immensely help the person get the wheelchair inside without much hassle.

Automatic opening and closing of the car door is another feature that can be added to car, so as to open or close the car door with the press of a button.

References

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