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# Review on Design & Development of Stair Case Ramp for Disable People using Lead Screw

Prof. Swapnil Chaudhary<sup>(1)</sup>, Mr. Prashant C. Rahate<sup>(2)</sup>

Guide, Department of Mechanical Engineering Wainganga College of Engineering & Management, Nagpur, India<sup>(1)</sup>

PG Student, Department of Mechanical Engineering Wainganga College of Engineering & Management, Nagpur, India<sup>(2)</sup>

**ABSTRACT:** The aim of this article is to illustrate the evolutionary forms of the stair ramp. I know that people with disabilities face difficulties when they want to travel or move from one floor to another. They accepted the other person's support for the move. Sometimes it is more difficult when the person is in a wheelchair. Our focus is on developing the stair ramp for disabled people to move from one floor to another without assistance from the other person. The economy of the ramp must be there. So, I went through several posts to find the stair ramp evolution. I developed the approach that can help people move from one floor to another without additional support.

**KEYWORDS:** DC motor, Stair-climbing mechanism, assistant, low cost; Need of Feasible Stair climber in India

## I. INTRODUCTION

There are many elderly and disabled people in the world and they find it difficult to climb stairs compared to ordinary people. To help them and help people who can't pay for the elevator because their houses are small, the project has been completed. The main concern of this project is to make a mechanism that raises and lowers them whenever they want and with a very low budget. An escalator ladder is a mechanical device used to raise and lower people. The rail is mounted on the stairs, on which a platform is mounted. The platform is raised by a simple rope and pulley mechanism. The person climbs onto the platform and rises, when you turn on the plug, the motor starts, after which the motor shaft is connected to the gearbox (reduction gear). through the Oldham coupling. The gearbox output shaft is connected to another Oldham coupling which transfers power to the spindle to wind or unwind the cable. Winding the cable raises the platform and unwinding the cable lowers the platform. Advances in technology have enabled people with disabilities to lead independent lives and play more productive roles in society. Stairs in buildings pose a significant environmental barrier for people with mobility issues, including older adults. There are several home access solutions that allow users to enter and exit the home safely, but all have some limitations. The aim of this work was to develop a novel and integrative home access solution that integrates a staircase and an elevator in a single device. The Excel stairlift system is installed to give people the independence to move around their home. The use of two individual stairlift systems ensures that she can move from one level to the other with ease. A handle between the two stairlift systems that allows you to move from one chair to the other. A novel remote center mechanism that allows a wheelchair to slide down the stairs has been proposed. With this system, the seat angle in the chair posture changes along with the angle of inclination of the user, regardless of the angle of inclination of the wheelchair. A position sensor was used in conjunction with a relatively small actuator, allowing for this minimal degree of active control. We usually find that people cannot drive wheelchairs properly even on muddy patches or uneven terrain. The same goes for stairs, where one approach is to use the legs. Advances in robotics have made it possible to build and control machines in all sorts of ways. It's not difficult to build a wheelchair with legs that can climb inclines and overcome obstacles. that run along the stairs. In 1, a four-legged chair developed by the University of Illinois at Chicago and the Veterans Administration's Hines Rehabilitation Research and Development Center based on four-legged gait research was developed. This invention could support a weight of about 110 kg. In addition, it has a capacity to carry a payload of 113.6 kg.

## II. LITERATURE SURVEY

Vanish v. Gaikwad, Preeni S. Gaswde, Sandip J. Kadam This topic deals with the production of design and analysis of a collection of the staircase box that can be used as a material handling system. In this model, they used MDF (fire-



resistant medium-density hard core plywood) to make stairs and saddles. From ANSYS analysis, it was found that at a maximum load of 5 kg, the deflection is 0.0089403 mm with a maximum stress of 3.263 N/mm.

Prof. B.B. Biswal, this project involves the construction of an ergonomically designed power wheelchair for home use by elderly Indians. The product mainly consists of 3 modules viz. Seat, Connections and Structure. The design is validated by developing digital mockups of the individual parts, which are generated in CATIA and assembled into the final product. The necessary product simulations are generated in the virtual environment of CATIA.

Weijun Tao, Junyi Xu, and Tao Liu This article provides an overview of the current technology of electric wheelchair stairclimbing and its future trend is discussed to inform researchers of electric wheelchair stair climbing about the development of electric wheelchair stair climbing and popular products. According to the author, the relative advantages and disadvantages of different types of stair-climbing electric wheelchairs are described for an overall comparison of the control method, mechanical manufacturing costs, power consumption, and adaptation to different stairways. because it is an important aspect common to all power wheelchairs with stairclimbers. Finally, a summary of the stair climbing power wheelchairs discussed in this article is given.

AS Shriwaskar and SK Choudhary present in this article a stair climbing mechanism where the chair climbs the stairs unaided. The project reveals the synthesis, modeling and simulation of the mechanism guiding the wheels for the climbing mechanism. Mechanisms such as four-bar linkages, single slider crank gears, double slider crank gears, etc. are used to transmit movement, force, torque, etc. focuses on depicting the development of a stair-climbing wheelchair. This wheelchair is adaptable to go up and down stairs and inclines. Operation on a level surface is similar to the operation of a conventional wheelchair.

Murray J Lawn, Toshihide Sakai, Megumu Kuroiwa and Takakazu Ishimatsu, this article focuses on introducing the ongoing development of "Nagasaki Stair Climber". A double-section crawler stair-climbing wheelchair "The Nagasaki Stairlift" has been developed in Nagasaki, a double-section wheelchair capable of overcoming the large number of winding and irregular stairs usually not counted by the residents living on the slopes surrounding Nagasaki Port. A control system has been added to the proven wheelchair with a double rail mechanism. The control system provides for automation. Recent developments include an automatic steering system, automatic chair angle leveling and active fore/aft steering angle control. Future work includes continued development of the control system with respect to improving automation, security and overall robustness. Other improvements are also needed to reduce the weight of the system.

Harout Markarian wheelchair users have difficulty traversing rough terrain and sidewalks, and going up and down stairs. Since the safety of the user is paramount, the following concept allows the wheelchair user to go up and down stairs while remaining securely in the seat. Consisting of two differential drive wheels and a two-legged mechanism, this conceptual design uses light-weight material. The dynamic analysis of the wheelchair when climbing stairs is shown using Solid Works simulations. A finite element analysis is also performed on the wheelchair frame, along with a DC motor performance analysis and control system design.

Mulik Shriniwas, Salunkhe Rohit, Shaikh Shahrukh, Waghmode Dada, Swipnil Gaikwad. The goal of this article is to develop a mechanism for easily transporting heavy loads over rough terrain. The necessity of such a system arises from the everyday requirements of our society. Devices such as hand trucks are used to reduce the stress of lifting on level ground; However, these devices generally fail when it comes to carrying the load low. Several designs were envisioned that would allow a non-industrial handcart to travel up stairs, curbs, or uneven terrain while reducing the strain on the user. In our project, the cart consists of the Triwheel or Tristar mechanism, which facilitates the movement of the cart on uneven surfaces such as holes, potholes, etc.

### III. PROBLEM DEFINITION

There are few models like escalators and elevators that are used to go up and down stairs, but these are not specifically designed for people with physical disabilities. For example, a person with a physical disability cannot use the escalator. There are also scenarios where elevators and escalators cannot be used due to architectural constraints. Elevators need more space. Therefore, it becomes difficult to use in places where there is not enough space. Healthy people develop the habit of relying on elevators; therefore, physical activity is reduced. In elevators, people get stuck between floors for hours when the power goes out and there is no backup power.

#### IV. OBJECTIVE

The Main Objectives of this project is to develop an indoor as well as an outdoor stair lift.

- A Handicap person can stair without any support of another person.
- The middle class can be affordable.
- While going up and down the stair, safety is the primary

#### PROTOTYPING

##### Base

The project arrangement is in “L” shape to provide support to the link. Links are used to convert stairs into ramp. Base has horizontal and vertical arrangement. Vertical arrangement is used to support two links with the help of two support. Horizontal arrangement is also supporting the two links with of help of stopper.

##### Links

Links consists of several parts that holds the run of stairs and the ramp was also supported by the link. The link was provided with three supports that can be adjustable by the adjuster which was connected by the linkage provided. And also, another three adjustable supports for the run were also provided by attaching to the link, the same support was also provided on each link. Each link length was approximately around 110cm and each support length for run is of around 6.4cm and the three support was provided according to the support needs of run of stairs. The link was supported by a base support.

##### Run

While designing width of run of stairs we came to know that higher width has to be provided in order for smooth movement over stairs and also in ramps and in order to have strong foundation greater width has to be provided. The run was connected to the links and with the help of links the run can be moved upwards or downwards in order for the conversion of stairs into ramp.

##### Design

The stairs and ramps are built side by side for providing path to people and physically disabled people respectively and for providing separate path are not possible in every street corner or on every stair and also cost for constructing separate path were also increased. Next rise and run length are more than the hypotenuse, so if we convert the rise and run of stair into ramp, length will be increased and it should not so it's a problem. In order to create portable product many linkages have to be provided and each has to work on what they are given.

##### Model

The same mechanism applied to the prototype was applied on model but material used here was metal has to take into account.



Image 1: Prototyping As Stair





**Image 2: Prototyping As Ramp**

## V. SCOPE

The frame weight can be reduced by using high strength lightweight materials such as composites, carbon fiber. The wheelchair can be automated by using electronics so that it will automatically sense and climb the stairs.

## VI. CONCLUSION

The design of the wheelchair is compact, so it can be moved on almost all the stairs that we find in institutions, offices, industry and also in some apartments. The design is very safe and there is no possibility of frame failure and wheels under normal conditions. According to the tests carried out, the stair wheelchair has a load capacity of 100 kg on a flat surface. It has the ability to climb a 40-degree staircase weighing 55 kg. The design of the wheelchair is compact, so it can be moved on almost all the stairs that we find in institutions, offices, industry and also in some apartments. The design is very safe and there is no possibility of frame and wheel failure under normal conditions.

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