

Automatic sliding stair Lift for senior citizens/specially abled

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Abstract— The main objective of this system is to develop an indoor as well as outdoor stair lift. A stair lift is a chair that glides up and down a staircase on a motorized rail. While going up and down the stairs safety is the primary concern. The present day, top quality lifts include many features to maximize comfort, ease of use and attractiveness in the home, which is a safe and affordable solution to overcome the unique needs and challenges that people experience on the stairs. Stair lift, the mobilechair-like mobility device attached on one side of stairways, allows to improve access for aged between floors at homes, and to make many people with mobility problems live independently through the internet of things. A single rail stair elevator is being designed by us to reduce production costs as well as construction time that is required in case of escalators and elevators.

Key Words— Motorized rail, lift, mobile chair, mobility, affordable.

I. INTRODUCTION

The main purpose of the system is to get the knowledge of design and fabrication. The design is done so that knowledge of designing and mechanism are increased. In order to reduce the senior citizen efforts, we planned to create an automatic sliding Automatic sliding panel to up the stair for senior citizens/specially abled. It's special...!!! Feature is that it has rollers which help to slide on defined rods. It reduces friction and makes handling easier. But it has limitation according to handicapped peoples. To overcome this problem, the creation of a system is encouraged that assists individuals with physical disabilities in operating panels without requiring them to change their current position or location. A step lift is a vertical transportation device in the form of a moving carriage, seated along with the staircase that carries people between floors of a building. It consists of a motor- driven carriage step guided by cables that remain horizontal. And use for senior citizens/ especially abled. Easy to use any disable challenging person, after these person go to his destination to fold the sliding panel is easy. step lifts can be installed and used in any buildings. No amendment or major construction to the existing building is required. There is no need to build a shaft or digging underground for placing the motors and components etc.

II. PROBLEM IDENTIFICATION

The development of the indoor and outdoor stair lift system addresses several challenges and limitations faced by individuals with mobility issues. Here are some key problem areas that the system aims to overcome:

- 1) **Safety Concerns:** The primary concern while navigating stairs for individuals with mobility challenges is safety. Traditional methods such as ramps or relying on assistance from others may pose risks of accidents, slips, or falls. The system seeks to provide a safer alternative for ascending and descending stairs.
- 2) **Accessibility in Different Settings:** Many buildings, especially older ones, lack adequate accessibility features like elevators or ramps. This limits the mobility of senior citizens and individuals with disabilities, particularly in areas with multiple floors. The system aims to provide a solution that can be easily installed in both indoor and outdoor settings, enabling individuals to access different levels of a building.
- 3) **Independence and Quality of Life:** People with mobility challenges often face limitations in their independence and quality of life. Depending on others for assistance or being restricted in their movements can lead to decreased self-confidence and reduced participation in daily activities. The stair lift system aims to enhance independence by allowing individuals to navigate stairs with minimal assistance, thereby improving their overall quality of life.

Scope of System

Design and Fabrication: The system involves the design and fabrication of an automatic sliding panel for senior citizens and individuals with mobility challenges to ascend and descend stairs. This includes the development of a motorized rail system and a mobile chair-like mobility device.

- 1) **Safety Features:** The stair lift system should incorporate various safety features to ensure the well-being of users. This may include safety belts, armrests, sensors to detect obstacles or obstructions, emergency stop buttons, and other necessary precautions.
- 2) **Cost-effectiveness:** The system aims to provide a cost-effective solution for improving accessibility. The focus is on reducing production costs and construction time compared to traditional options like elevators or escalators.
- 3) **Customizability:** The stair lift system should be adaptable to different types of stairs, whether straight or curved. It should be designed to fit various indoor and outdoor settings, such as residential homes, hospitals, or public buildings.
- 4) **User-friendly Controls:** The system should be designed with user-friendly controls that are easy to operate for senior citizens and individuals with mobility challenges. This may include remote controls or simple push-button mechanisms.
- 5) **Application Areas:** The system's scope includes potential applications in various settings, such as old age homes, hospitals, or domestic environments. It aims to provide accessibility solutions for individuals facing mobility challenges in these areas.
- 6) **Limitations:** It is important to acknowledge the limitations of the system. For instance, the system may be designed primarily for straight stairs and may not be suitable for stairs with complex designs or turns.

Present Solution**1st solution**

As an answer to those questions, a slope was created for the stairs itself. Still 2/3 person was applied for them. Along with that the ramp started taking up a lot of space. As a solution to all this we have developed automatic sliding panel for senior citizens / specially disabled people to climb stairs

2nd solution

This method is also very dangerous because there is possibility of slipping. the wooden slab while climbing the stairs if that happens then both the disable person and person who is pushing the wheelchair will fall down, causing injury to both. Due to this device the old people and disabled people can go up and down the stairs immediately

Working Principle:

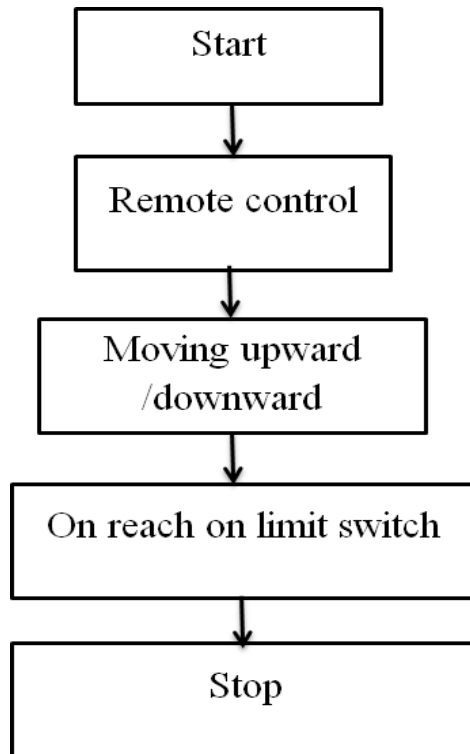
The working principle of the indoor and outdoor stair lift involves the use of a motorized rail and a mobile chair-like mobility device. The system is designed to provide a safe and affordable solution for people with mobility challenges to navigate stairs.

- 1) **Motorized Rail:** The stair lift is installed on a motorized rail that is securely attached to the stairs. The rail serves as the track along which the chair moves up and down.
- 2) **Mobile Chair:** The mobility device is designed as a chair that is attached to the motorized rail. It includes features to maximize comfort and ease of use. The chair is equipped with safety belts and armrests to ensure the user's safety during transportation.
- 3) **User Control:** The stair lift is controlled by the user through a user-friendly control panel or a wireless remote control. The user can initiate the movement of the chair, either ascending or descending the stairs, with the push of a button.
- 4) **Safety Measures:** The stair lift incorporates various safety measures to prevent accidents and ensure the user's well-being. These may include sensors to detect obstacles or obstructions on the stairs, emergency stop buttons, and safety sensors to prevent the chair from moving if the user is not properly seated.
- 5) **Power Source:** The stair lift requires a power source, typically electricity, to operate the motorized rail and move the chair. It is essential to ensure a stable power supply for consistent and reliable operation.
- 6) **Installation Flexibility:** The design of the stair lift allows for installation in both indoor and outdoor settings. The system can be customized to fit different types of stairs, whether straight or curved.

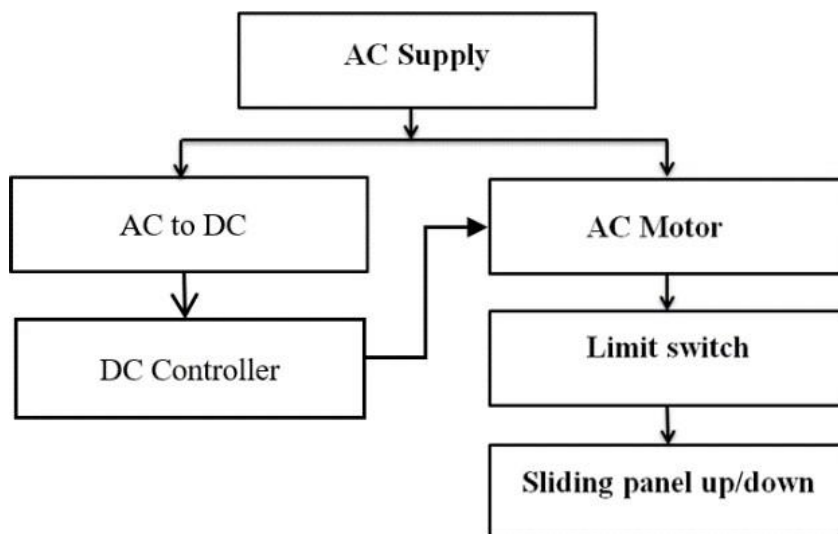
7) **Cost and Construction Efficiency:** The development of a single rail stair lift aims to reduce production costs and construction time compared to traditional escalators or elevators. This makes the stair lift a more affordable and practical solution for improving accessibility in various settings.

The proposed indoor and outdoor stair lift provides a safe and convenient means for senior citizens and individuals with mobility challenges to navigate stairs independently. The system's design considerations include comfort, ease of use, safety features, and cost-effectiveness. Further research and development can explore enhancements such as battery backup systems and adaptability to stairs with turns or complex designs.

Working Flowchart



Block diagram



Material selection

Automatic sliding panel to up the stair for seniorcitizens/specially abled are made using Mild Steel (M S) material.

Mild steel is a type of carbon steel that contains a low level of carbon. Otherwise known as low carbon steel, mild steel contains roughly between 0.05% and 0.25% of carbon by weight. This is opposed to high carbon steel, which can be composed of up to 2.5% carbon by weight. As mild steel doesn't contain large amounts of any elements other than iron and ferrite, it is not an alloy steel.

Cost: The materials to be used for the fabrication of the component parts must be relatively cheap. They must meet up with the standard required for efficient workability and performance of the plant. As this factor will affect the marketability of the process plant and production cost of running the plant, it must be considered.

Availability of Material: The materials to be used for the fabrication of the component's parts must be readily available in other to reduce the overall cost of fabricating the process plant and the cost of maintaining the plant during operation.

Rigidity and Strength: The frames of the machines used in the process plant must be rigid enough to withstand the load of various components been supported. This will help to reduce vibration effect during operation and improve efficiency of the process plant.

Overall Weight: The weight of the components that are used in the fabrication of each machine in the process plant should not be too heavy so as to reduce the stress involve in moving the components for maintenance.

Motor calculation:

Mass- 150kg Length - 2.5m Time-10sec Gravity. 9:8 Electrical energy - E_i mechanical energy- E_o $E_i=E_o$ $E_o = 3,675 \text{ J}$
Electrical energy into mechanical energy losses 10% to 20% Efficiency= E_o/E_i
 $=3675/E_i$ $E_i=4083 \text{ J}$

Input power = 4083 J.

*Motor capacity calculate Electrical Electrical power = electrical energy/time
 $=408.3\text{watt}$ Motor capacity in Hp = 0.5 Hp

According to the calculation half or 1 Hp motor is sufficient Total body factor of safety

Formula : Ultimate stress =150Kg Working stress =100kg Factor of safety = Ultimate maximum stress /working stress
=1.3

1 hp AC Hoist Motor:

The focus of this paper is the implementation and performance analysis of an elevator Single-phase induction gear motor drive and its comparison to the traditional dual stator winding line-supplied elevator motors. e elevator (Constant Speed Drive 10rpm)

Features & details:

MATERIAL: Galvanized Mild Steel

SIZE: 65 Dia & 150 kg Capacity Of Each Wheel FINISH: Gold Zinc

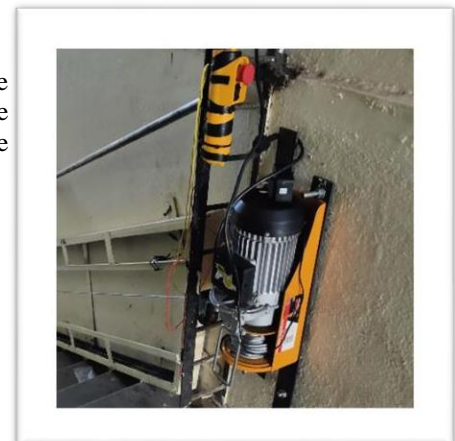
**Set of 4 Wheels:**

Gate wheels are a great option if you want to give large gates a little more support. They are installed on the swinging edge of the gate and take some of the weight off the gate post and hinges. This helps to ensure that the gate won't sag, and that it is easier to open and close.

Specifications:

MATERIAL: Galvanized Mild Steel

SIZE: 65 Dia & 150 kg Capacity Of Each Wheel FINISH: Gold Zinc



Limit switch:

a limit switch is a switch operated by the motion of a machine part or the presence of an object. A limit switch can be used for controlling machinery as part of a control system, as a safety interlock, or as a counter enumerating objects passing a point.

Limit switches are used in a variety of applications and environments because of their ruggedness, ease of installation, and reliability of operation. They can determine the presence, passing, positioning, and end of travel of an object. They were first used to define the limit of travel of an object, hence the name "limit switch".

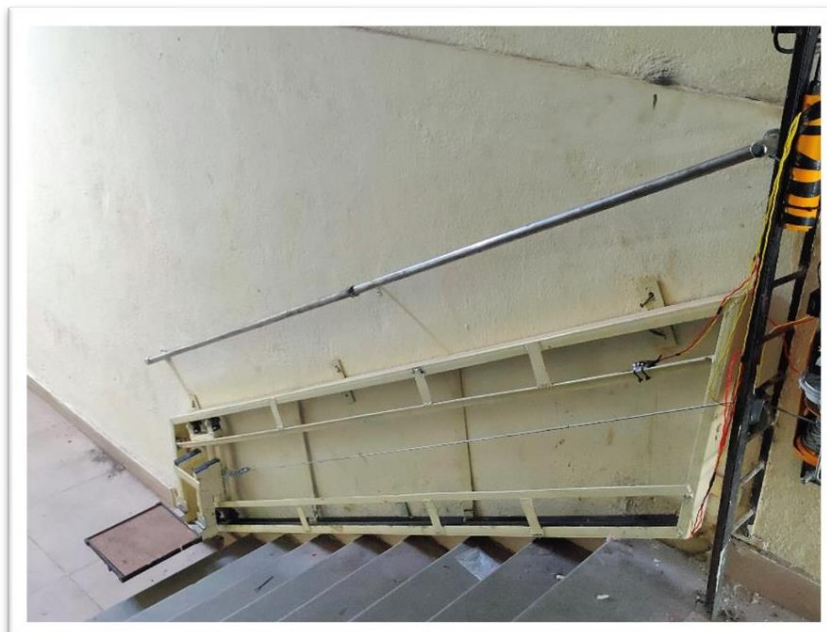
**Wireless remote:**

In electronics, a remote control is an electronic device used to operate another device from a distance, usually wirelessly. In consumer electronics, a remote control can be used to operate

**CONCLUSION AND FUTURE SCOPE**

In this paper, we proposed an remote controlled based system, which provides the easy way for aged and physically handicapped for mobility over stairs. The remote already connected to the system, easily using the remote, which is in your hand. one can ascend or descend over the stairs.

In the remote controlled based system, smart positioning of the sensor enables sliding over the stairs even easier with least efforts made by human. Architecture is cost effective and movability within less time. This system can be advanced to have a battery back in case of any power issues. This system can be implemented on straight stairs only, and can be further modified for even turns



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