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Review on the Development of a Two-Phase Vehicle for Handicapped Persons

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Abstract-This project named a two phase new type of vehicle for handicap people is a two phase vehicle project, the first phase vehicle is about to fabricate a robotic wheelchair that can be run with the help of a battery pack and can be controlled with simple hand operated contoller/ remote. While the second phase vehicle is about to fabricate a robotic vehicle that is build in a specific way to incorporate the first phase robotic wheelchair entirely and can be operated with hand held remote as well. Both of these remote are wireless in nature so as to increase comfort and can easily be converted into 10T based operationsThe first phase vehicle incorporates two geared DC motor, battery, controller unit, etc. this vehicle can be used by the handicap person for short distance travel, the battery can be charged with the help of a solar panel. This robotic wheelchair can easily be manuvoered by the operator with the help of a simple controller unit. This robotic wheelchair that is the first phase vehicle can be moved in forward and reverse direction and can be moved in right and left direction with the help of the controller unit.The project uses a calibrated power sully to run microcontroller units of ESP node mcus and other drivers.various other part of this project is made with materials like alluminum sheet. acrylic sheet ,MDF sheet, gearboxes, nut and bolts,screws,wires, battery, toggle switches, push buttons etc.The second phase vehicle is a bigger one that can accommodate the entire first phase vehicle within its volume. This phase is a four wheeled robotic car that incorporates geared DC motors for forward and reverse motion. The left and right motion of this vehicle is also possible with the help of another geared DC motor. These DC motor runs on battery which can be charged with the help of solar panel that is mounted on the roof of this vehcile. This second phase vehicle is meant for longer distance travel. The second phase vehcile can also be manuvoered by the handicap person very easily with the help of again a second controller that is the controller of the second vehicle. Thus the combined use of these vehicle will give the handicap person freedom and power to move or travel not only in shorter travel but also in longer travel and that to very easily and swiftly there by empowering the person This vehicle being a solar vehcile will be green in nature.

1. INTRODUTION

In the present era transportation of disabled peopleplays a vital challenge to achieve their destination. Sincethe 1980s, engineers and industries have helped todevelop solar-powered cars, two wheelers and aerovehicles. In sprit of using cars or two wheelers that arecostly, people will prefer to use robotic wheelchair as their vehicle.Several types of robotic wheelchair usually categorised as pedalpowered wheelchair, electric powered wheelchair and Engineused wheelchair. The most commonly used pedal powered robotic wheelchair utilises more energy from disabled people sothat it results in tiredness and illness. The poweredwheelchair are generally motorised form of vehicles whichleave pollution to the environment. When the fuelbecomes empty, the manual pedalling operation isdifficult for the disabled people to move from one placeto another, since he wants to drive the weight of ICengine and self-weight. In order to reduce the effort ofthe disabled people, we hope this will be helpful for thefurther manipulation in developments and provides theguide line for the new innovations in automotive for thedisabled people.

The problem for fabrication of the project work was given as to do sometimes new for communication for handicapped people. It was decided to build a two phase vehicle for handicap person. In which the stage one should be a motorized wheel chair which enables the person to new in close personality.

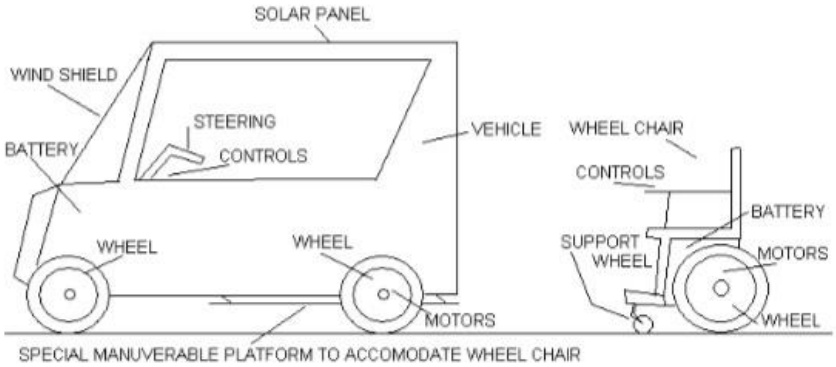

Fig 2.2. Schematic diagram Development Of Two Phase Vehicle For Handicap Person

Which second vehicle should be able to accommodate the wheelchair with its own body which special ramp type mechanism to allow a raw in slope for the motorized wheel chair. To further modify the project work it was decided and work the to work the project work model battery operated those charged solar panel so the project become a solar powered two phase vehicle for handicap people.

2. Components DiscriptionIn Pre- Existing Modified Vehicles

The project model of "two phase of vehicle for handicapped person" is made using various materials like plastic wheels,2mm Aluminum sheet ,8mm,6mm MDF sheet (medium density fiber core handwood plywood)sheet,foam (styrofoam,sheet,Acrylic sheet etc,and various component used are in model.

2.1. microcontroller

A microcontroller unit (MCU) is a small computer chip that controls specific tasks in an embedded system. It's a type of microprocessor that's designed to be cost-effective and efficient. The MCU receives data from its input/output (I/O) peripherals.The data is stored in the MCU's data memory.The MCU's processor accesses the data and uses instructions from its program memory to interpret it.The MCU then uses its I/O peripherals to communicate and take action. Controlling motors and servosInterfacing with sensors and communications Controlling features in appliances, power tools, and automobilesControlling features in medical devices, office machines, and vending machines.

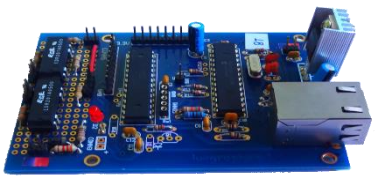

Fig 2.2. Photographic image ofmicrocontroller

2.2. Reduction gear box

A reduction gearbox, also known as a speed reducer, is a mechanical device that reduces the speed of an input while increasing its torque. It's made up of gears, shafts, and bearings. The output gear has more teeth than the input gear, which causes it to rotate more slowly. The gear reduction ratio is calculated by dividing the number of teeth on the input gear by the number of teeth on the output gear. The reduction gearbox aligns the power source's capabilities with the driven load's demands. Reduction gearboxes are used in many applications,

including machinery, vehicles, and industrial equipment. They are essential components for high-precision processing and precision control.

Fig 2.2. Photographic image ofreduction gear box

2.3.MDF Sheet

MDF, or Medium Density Fiberboard, is a versatile engineered wood product made from wood byproducts like sawdust and shavings. It's often sold as sheets or boards and is used for a variety of construction and furniture projects. Wood byproducts are dried The dried byproducts are combined with resin and wax The mixture is molded into panels The panels are treated with heat and pressure to compress them into rigid shapes The panels are sanded and cut into set dimensions.

2.4.Servo motor

A servo motor is a motor that can precisely control the position, velocity, and acceleration of a mechanical system. Servo motors are used in many applications, including robotics, CNC machinery, and medical equipment. A servo motor is part of a closed-loop system that uses a feedback mechanism to control the motor's output. A servo controller uses a feedback device to get information about the motor's position, velocity, and current. The servo controller then adjusts the motor's action based on the feedback information. The motor's output is compared to the desired output, and the difference is used to generate a feedback signal. The feedback signal is used to control the motor's motion and position.

Fig 2.2. Photographic image ofservo motor

2.5.Solar Panel

A solar panel is a device that converts sunlight into electricity. Solar panels are made of photovoltaic (PV) cells, which are made of semiconductor materials like silicon. Sunlight hits the PV cells. The photons in the sunlight are absorbed by the semiconductor materialThe absorbed photons dislodge electrons from the material's atomsThe electrons flow through a circuit to produce direct current (DC) electricityAn inverter converts the DC electricity to alternating current (AC).

Fig 2.2. Photographic image ofSolar panel

The solar power plays an important role, as it is widelyused renewable resources in the automotive in futuregenerations. The solar powered tri-wheeled vehiclesconsist of an additional feature which is nothing but theimplementation of the solar panel which converts thesolar energy into electrical energy and the vehicle isautomated by providing the electric hub motor. The hubmotors are generally Brushless DC motor (BLDC) whichis fixed rigidly on the wheel rims and when the electricpower from the solar panel provides supply to the BLDCmotor, it will starts rotating in the constant speed over aperiod of time during the running conditions. Thephotographic image of solar powered modified vehicle.

2.6.Wi-Fi Unit

A Wi-Fi unit is a wireless router that allows devices to connect to the internet. Wi-Fi units use radio waves to create a network that enables devices to exchange information. A Wi-Fi unit receives radio signals from nearby devices.The unit translates the signals into data that the device can use.The device sends a radio signal back to the unit.The unit connects to the internet through a wire or cable.The unit broadcasts the internet signal to all Wi-Fi-enabled devices in the area.

2.7. LED lights

A light-emitting diode (LED) is a semiconductor device that emits light when an electrical current passes through it. When an LED is forward biased, electrons and holes in the semiconductor recombine, releasing energy in the form of photons. The color of the light depends on the energy band gap of the semiconductor. LEDs are up to 90% more efficient than incandescent bulbs because they convert electrical energy directly into light, rather than first converting it into heat.

Fig 2.2. Photographic image of LED lights

3. Development Of Two Phase Vehicle For Handicap Person

The project model of “Two phase vehicle for handicapped people” is made using various materials like plastic sheets, 2mm aluminium sheet, 8mm; 6mm MDF (Medium density fibre) core hardwood plywood sheet, foam (styromfoam), sheet (acrylic sheet)etc and various components used are mentioned in separate chapter.First of all various chassis point are made using 8mm MDF sheet and assemble so as to keep it length as 24" and width as 10". The height is kept 12" to this chassis, front driving motors are attached to these drives motor a gearbox is attached. The gearbox is 90:1 reduction ratio gearbox and the motor is 2400 rpm PMDC motor. This subassembly of motor and the gearbox is attached with the chassis and an aluminium having made up to 2mm aluminium sheet .These two driving motors a steering motor is fixed using a 8mm MDF sheet part.This motor is also a same specification as of drives motor but the difference in gearbox .The steering motor is attached with a gearbox of reduction ratio 150:1 so as to give sufficient torque and slow speed to steering the vehicle even in loader condition.At the seen of the vehicle a driving wheelattachment(shaft)is provided to fix driving wheels. All the wheeli.e driving and driving wheels are made up of PVC and having dimension 4"the driving motors are connected in parallely are so as to run in either forward on back word directions .The power supply to this vehicle is provided with the help of 6v 5Ah dry cell secondary battery and in mounted in the frontal direction so as to compensable for CG a pivoted platform of size 8.5"*11" madeup of 6mm MDF is attached to the chassis within the capacity of chassis.This platform is connected to a T Lever using a connecting rod .This T lever is attached with the help of a steering to a 10 rpm gearbox motor .whenever this motor is rotated the T lever pushes

and thus two platform up and down the from chassis . The heighted pillar at extreme back of the vehicle is fitted with a 8.5"*12" door that is again made open and closed by using a 10rpm gearbox and motors that is mounted on the subframe placed controlling all the chassis and other path of the chassis vehicle is covered using 4mm thickstrysoform sheet along with 2mm thick transfer Arcyclic sheet. This is how the second phase of the said project is contributed for the first phase i.e for the motorized wheels chassis is fabricated using 6mm and 8mm MDF sheet the wheel chassis is provided his gearbox and motor having reduction ratio of 100:1 on either sides which also supports wheels of diameter 2.5" made up of PVC material at the frontal parts of wheels chassis a caster wheels of omnidirectional ability is mounted.The power supply to this wheels is provided of 6 cell AA size units 1.5 ends total isthe output of 6v DC. This is how the first phase of this vehicle is constructional on the second phase a solar panel of 6v 5w put is fixed on the body cover whose outputs is gives to any one battery and charge the same vehicle the other battery is used for runs the entire vehicle . The connections of each of the motor is given form the buttons with a six pin toggle is two pin on /off type of switch is done to home the possible to quickly charge the polarity of the power supply to the motor so as to charge two directions of rotational of motor shaft. This is required as we need to forward and revered the vehicle is also close and open the gates .This is how the entire project constructed and its works.

In day to day life, mobility of physically disabled people who are partially or fully dependent on others is a difficult task. This project has been an attempt to change the lives of the people those who are basically amputees i.e lost their legs. With a disability, it can be very difficult to drive. The problem is overcome by a three wheeler which include a handle with brake and accelerator in order to reduce thedifficulty faced by them compared with normal people. Hand controls can make thismuch easier with more control and quick response times. Vehicle hand controls aresuitable for almost any make and model car on the road today. The proposed threewheeler is designed in order to meet the comfortless of the amputees by increasedsuspension and the power source by hybrid system which includes motor, solar and electrical type.

In the present trends automobile sector is developing a lot in order to satisfy theneeds of people in stability, ergonomics and aesthetic features. But they are onlyfor the people who are physically good. Our project deals with the people who arebasically amputeesi.e those who have legs. In this context we care for thecomfort of the seating arrangement of the person and the different principles forobtainingpower in order to run the vehicle. The energy sources are depletingcontinuously, so there should be a need to change in to non-conventional energysources which are available in plenty in nature. Solar energy which is available atvast now a day can be converted in to electrical energy. The energy which iswasted normally unnecessarily from the wheels will be converted in to electricalenergy by using dynamo which recharges the battery on running. The reversecurrent from the motor is used to recharge the batteries when engine is working.

3.1. PHYSICAL CHALLENGE - PROBLEM

The People with disability has a problem of body function or has adifficulty in executing any task or action or participation restrictionwhich is nothing but problem experience by him in live situations InvolvementThe impairments is broadly classified into categories they are physicaldisability, mobility impairment. Physical disability is impairment whichrestricts physical functions of legs or damage of limbs mobilityimpairment is another type of disability which includes various types ofdisabilities like upper limb disability, disability in coordination ofdifferent organs, manual dexterity. The mobility impairment can be
either by accidents, congenital or with age and because of any diseasei.e. paralysis. The physically challenged people faces many problemswhile moving from one place to another they are restricted by the socialcultural and physical barriers which stops their access to differentsystems in present scenario which are available for normal people. Thephysicallychallenged people who are interested in studying, doing jobs are facingmajor problem of transportation.

4.Conclusion

A driving system for disabled driver has been developed and tested successfully. Modifications were made on the conventional car keeping in mind the ability of the driver. A completely mechanical steering system has been modified successfully to mechatronics base system by replacing mechanical linkages with motor and

PIC microcontroller. The steering system is effective with proper feel mechanism since it is just like riding a motorcycle. The conventional system of braking and acceleration by foot pedals have been changed to hand-operated mechanism as in motorcycle so that disabled people without lower limb can comfortably drive.

The project work "Development Two Phase Vehicle for handicap person" Was successfully carffed and its exhibit the expected result. After new further modification suggested in the relevant chapter this project work can be of the great use for handicapped people. For India also this project can be great use and can serve handicapped people in every aspects. This project work may have bright future ahead.

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