International Journal for Multidisciplinary Research (IJFMR)
E-ISSN: 2582-2160 ● Website: www.ijfmr.com ● Email: editor@ijfmr.com

Wheel Chair with Attachment of B - Type Oxygen Cylinder for Copd Patient

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Abstract:
The Unmanned Wheel Chair with Attachment of B - type Oxygen cylinder accompanied by foldable specification, this project is useful for Medical field. We implement IOT device and fully automatic operation gadget. It Utilitarian to Hospitals and public places and also Tourist spots. Also Oversee the Oxygen level and Oxygen flow uninterrupted by IoT device. Programming for heedful to the Attender when Oxygen level comes low or any problems in Oxygen flow. Using Safety Strap and Decelerate mechanism (Brake) for patient Safety. Manipulate the sensors for monitoring Oxygen cylinder and Wheel Chair. Depiction to fix the Oxygen cylinder vertically with wheel chair for Weight Balancing. Our project design is easily Handling and operated by single person.

CHAPTER 1

INTRODUCTION

People with COPD are at increased risk of developing heart disease, lung cancer and a variety of other conditions. Symptoms include breathing difficulty, cough, mucus (sputum) production and wheezing. It's typically caused by long-term exposure to irritating gases or particulate matter, most often from cigarette smoke. A wheelchair is a chair with wheels, used when walking is difficult or impossible due to illness, injury, problems related to old age, or disability. Wheelchairs come in a wide variety of formats to meet the specific needs of their users. They may include specialized seating adaptions, individualized controls, and may be specific to particular activities. An oxygen tank is an oxygen storage vessel, which is either held under pressure in gas cylinders, or as liquid oxygen in a cryogenic storage tank. Breathing oxygen is delivered from the storage tank to users by use of the following methods: oxygen mask, nasal cannula, full face diving mask, diving helmet, demand valve, oxygen rebreather, built in breathing system (BIBS), oxygen tent, and hyperbaric oxygen chamber. The Internet of things (IoT) describes physical objects (or groups of such objects) with sensors, processing ability, software, and other technologies that connect and exchange data with other devices and systems over the Internet or other communications network. An electric motor is an electrical machine that converts electrical energy into mechanical energy. Most electric motors operate through the interaction between the motor's magnetic field and electric current in a wire winding to generate force in the form of torque applied on the motor's shaft. An electric generator is mechanically identical to an electric motor, but operates with a reversed flow of power, converting mechanical energy into electrical energy.

1.1 COPD PATIENT

Chronic obstructive pulmonary disease (COPD) is a chronic disease that is often preventable and treatable. If you or a loved one has COPD, there are steps to take to cope with the lifestyle changes this disease brings. Learning about COPD and its treatment can help you feel more in control. With COPD, the airways in your lungs become inflamed and thicken, and the tissue where oxygen is exchanged is destroyed. The flow of air in and out of your lungs decreases. When that happens, less oxygen gets into your body tissues, and it becomes harder to get rid of the waste gas carbon dioxide. As the disease gets worse, shortness of breath makes it harder to remain active. COPD is the third leading cause of death by disease in the United States. More than 16.4 million people have been diagnosed with COPD, but millions more may have the disease without even knowing it. COPD causes serious long-term disability and early death.

Smoking is by far recognized to be the most important risk factor for development of COPD. Smoking behaviors in India are also peculiar with a large number of people using nonconventional form of tobacco in hookah, bidi, or chillum. Traditionally these forms of tobacco have been believed to be innocuous because of a variety of reasons like passage of smoke through water in case of hookah.

Apart from the issues in reliable epidemiology, peculiar problems remain in the diagnosis, management and follow-up of Indian COPD patients. Lack of awareness of the disease, its symptoms or implications contribute significantly in preventing people at risk from seeking help from their primary care physicians or eliminating risk factors. Even when a person with symptoms does present to general practitioners, levels of under-diagnosis are high. Spirometries are not routine and diagnosis is largely symptom based. Prescription of inhalational devices is attributed to the 'terminal stage' of the disease and such devices carry a virtual stigma in rural settings. Additionally, a good majority gets treated by local 'hakims', practitioners of alternative medicine and faith-healers; who not infrequently dispense harmful and toxic agents that have at times included steroids.

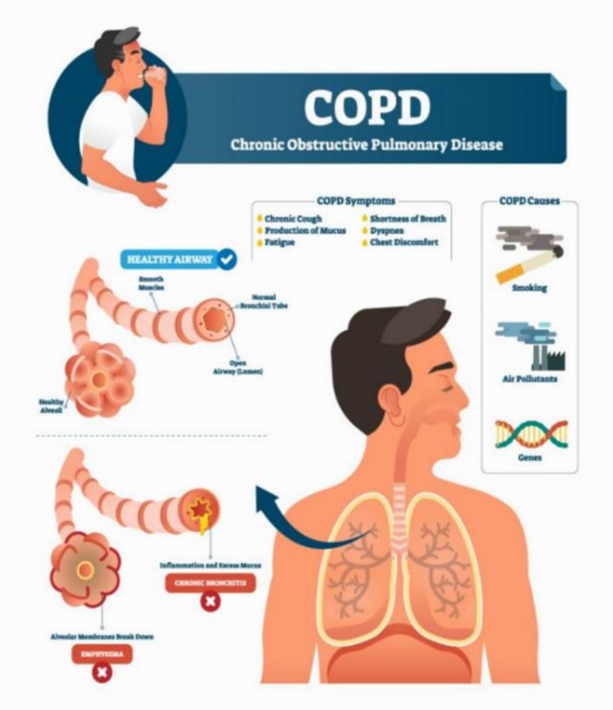


Fig.1.1.1 Copd Pateint

Fig.1.2.1 Copd Pateint With

CHAPTER 2

2.1 OUT COME FOR LITERATURE SURVEY

1. The motivation of this research work is to design an automated wheelchair for the physically disabled people of both developed and developing countries. This design also facilitates the users to adjust the wheelchair seat vertically according to their needs. Though many designs of automatic wheelchairs are published in different research works, those are not so available in present market that common people can buy and use it for their personal purpose. Beside this, the high price restricts most of the disabled people of developing countries like Bangladesh from using the automated wheelchair for their maneuvering. For this reason, A microcontroller based embedded system is designed to control the wheelchair motion comfortably along with the vertical movements of the seat. On the contrary, the price of the wheelchair will not exceed the economic range of general people. The feasibility of this design is also verified through simulation works.

2. As the usage of the Android smart phones has been considerably increasing, a lot of applications have been developed for the benefits of mobile users. In the past, many applications have been designed aiming to help physically disabled persons. This paper presents an android application which providers several options for controlling the movement of wheelchairs effectively. The proposed application enables People with Disabilities (PWDs) to operate the wheel chair with minimum effort. Apart from voice commands, the proposed application detects and measures the tilt change, and moves the wheelchair based on the degree of the tilt. It also provides a soft joystick as in mobile games to ease the operation of the wheelchairs. Furthermore, sensors that are fixed in the wheelchair can detect and avoid obstacles when the chair is on the move. Hence, it ensures the safety while using the wheelchairs. The

proposed application will help both physically challenged persons and elders to operate the wheelchairs more comfortably.

3. A gear-less drive for a wheel chair based on brushless DC motor is presented. The motor has external rotor equipped with neodymium-based permanent magnets and the inner stator is attached to the wheel axle. The performance of the motor is determined using three-dimensional FEM modeling. They are validated by the experimental measurements carried out on the motor prototype.

4. The purpose of an automatic wheelchair (AWC) is to assist and support paraplegics. The proposed chair is particularly suited for people with a higher level of impairment, such as quadriplegics who are unable to move any of their body parts except their head due to their advanced age or infirmity. We created a microcontroller-based wheelchair that moves with the patient's head motion. Electronic and mechanical components make up the system. An accelerometer monitors the patient's head nodes in all four dimensions for head motion recognition. The paper goes over the Bluetooth technology on the wheelchair, as well as the accelerometer that powers the motors and controls the chair's motions inside the house. Our wheelchair is designed with the patient's health in mind as well as the device's maneuverability. The pulse rate and blood oxygen levels are monitored by sensors using an Internet of Things approach. The ultrasonic sensors aid with obstacle recognition, making it easier to move the chair in a certain direction. By observing the directions of head movement along the x and y axes, the implanted accelerometer aids the chair in determining which movement the patient wishes to make. The signal is then sent to the microcontroller. The wheelchair is controlled by a microprocessor-based on the direction of acceleration, and it moves in LEFT, RIGHT, FORWARD, and BACKWARD with the help of viper motors.

5. The wide spread prevailing loss of limbs in everyday situation because of wars, mishaps, accidents, age and medical issues. The main aim of the project is to automate the Control of Wheelchair movements with all directions and producing the emergency alert as well. Elderly peoples can't walk; we have to deal with these peoples each day. Thus, we are utilizing the wheelchair for transporting these peoples. It is difficult for the incapacitated and elderly individuals to move a mechanical wheelchair, which huge numbers of them typically use for velocity. Subsequently there is a requirement for outlining a wheelchair that is clever and gives simple transportation to the physicallychallenged peoples as well as elderly peoples. In this specific circumstance, an endeavor has been made to propose an idea controlled wheelchair, which utilizes the caught signals from the client's activity and procedures it to control the wheelchair. The triggers which are caught are converted into movement triggers by the microcontroller which thus moves the wheelchair. For all the entire system properly supports the elderly people to supplement their physical illness and provides an wonderful solution to live the independent life without other’s physical needs for moving from one place to other place in respective places.

2.2 PROBLEM FORMATION

DESIGN THINKING

- Empathize
- Define
- Ideate
- Prototype And Test ➢ Evolve

2.2.1 EMPATHIZE

A chronic disease that is often preventable and treatable. If you or a loved one has Breathing diseases, there are steps to take to cope with the lifestyle changes this disease brings.
Learning about Breathing diseases and its treatment can help you feel more in control.

With Breathing diseases, the airways in your lungs become inflamed and thicken, and the tissue where oxygen is exchanged is destroyed. The flow of air in and out of your lungs decreases.

When that happens, less oxygen gets into your body tissues, and it becomes harder to get rid of the waste gas carbon dioxide. As the disease gets worse, shortness of breath makes it harder to remain active.

Breathing diseases is the third leading cause of death by disease in the United States.
More than 16.4 million people have been d iagnosed with breathing diseases, but millions more may have the disease without even
knowing it.

COPD causes serious long-term disability and early death.

2.2.2 DEFINE

1. Wheelchairs are used by people for whom walking is difficult or impossible due to illness, injury, or disability. People who have difficulty sitting and walking often make use of a wheel bench.
2. COPD is characterized by long-term respiratory symptoms and airflow limitation. That Patient is moving with the help of wheel chair attached oxygen cylinder.
3. Now a day the oxygen cylinder is not attached with the wheel chair, it will placed separately in a trolly.
4. The wheelchair is one of the most commonly used assistive devices to promote mobility and enhance quality of life for people who have difficulties in walking.
5. Wheelchair mobility opens up opportunities for wheelchair users to study, work, engage in social activities and access services such as healthcare.
6. In addition to providing mobility, an appropriate wheelchair benefits the physical health and quality of life of the users by helping in reducing common problems such as pressure sores, progression of deformities and improve respiration and digestion.

2.2.3 IDEATE

i. The Unmanned Wheel Chair with Attachment of Oxygen cylinder accompanied by foldable specification, this project is useful for Medical field.
ii. We implement IOT device and fully automatic operation gadget. It Utilitarian to Hospitals and public places and also Tourist spots.
iii. Also Oversee the Oxygen level and Oxygen flow uninterrupted by IoT device.
iv. Programming for heedful to the Attender when Oxygen level comes low or any problems in Oxygen flow. Using Safety Strap and Decelerate mechanism (Brake) for patient Safety.
v. Manipulate the sensors for monitoring Oxygen cylinder and Wheel Chair.

vi. We Depiction to fix the Oxygen cylinder incline with wheel chair for Weight Balancing.
vii. Our project design is easily Handling and operated by single person.

2.2.4 PROTOTYPE AND TEST

Fig 2.2.4.(i) Side View

Fig 2.2.4.(ii) Front View

2.2.5 EVOLVE

2.2.5.1MODEL GENERATION

i. Specify jobname (this step is optional but recommended).
ii. Enter Preprocessor.
iii. Define element types and options.
iv. Define real constant for the element types (if the element type(s) require real constants).
v. Define material properties.

vi. Create the model vii. Build solid model (using either top-down or bottom-up approach).
viii. Define meshing controls. ix. Create the mesh.
x. Exit the Preprocessor.

2.2.5.2 BOUNDARY/INITIAL CONDITIONS AND SOLUTION

i. Entesolution processor.
ii. Define analysis type and analysis options.
iii. Specify boundary/initial conditions:
iv. Degree of freedom constraints.
v. Nodal force loads.

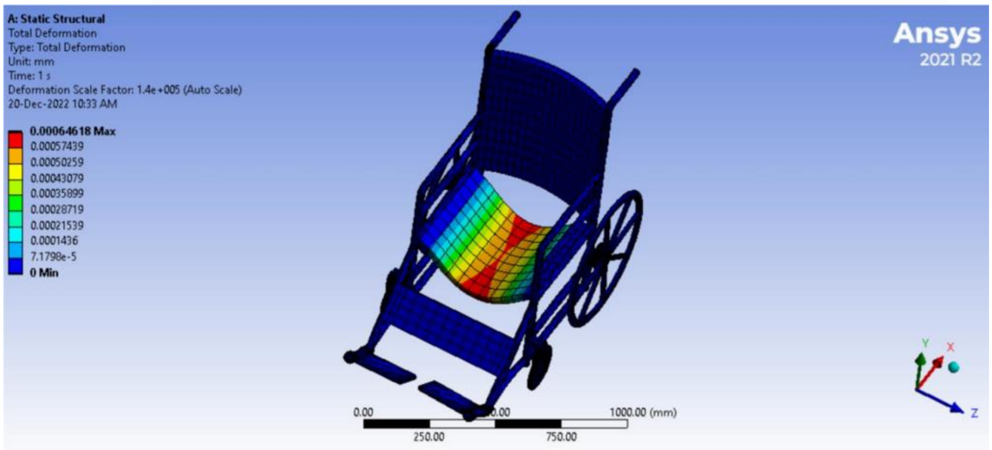


Fig 2.2.5.(I) Ansys Report

Evolve Source : https://youtu.be/qi5nhVW1beQ

CHAPTER 3

3.1 EXPERIMENTAL FACILITY

- Wheelchair
- Oxygen Cylinder (B - Type)
- Sensor
- Pneumatic Pump
- Electric Motor
- Brake
- Seat Belt
- Regulator
- Flexible Hose
- Electric System
- IOT Device
- Respire Device

3.1.1 WHEEL CHAIR

A wheelchair is defined as a chair fitted with wheels. The device comes in variations, allowing either manual propulsion by the seated occupant turning the rear wheels manually, or electric propulsion by motors. There are often handles behind the seat to allow for different individuals to push. Wheelchairs are used by people for whom walking is difficult or impossible due to illness, injury, or disability. People who have difficulty sitting and walking often make use of a wheel bench. A basic manual wheelchair incorporates a seat, foot rests and four wheels: two, caster wheels at the front and two large wheels at the back. The two larger wheels in the back usually have hand-rims; two metal or plastic circles approximately 3/4" thick. An electric-powered wheelchair, commonly called a "powerchair" is a wheelchair that additionally incorporates batteries and electric motors into the frame and that is controlled by either the user or an attendant, most commonly via a small joystick mounted on the armrest, or on the upper rear of the frame. The wheelchair is one of the most commonly used assistive devices to promote mobility and enhance quality of life for people who have difficulties in walking. Wheelchair mobility opens up opportunities for wheelchair users to study, work, engage in social activities and access services such as healthcare. In addition to providing mobility, an appropriate wheelchair benefits the physical health and quality of life of the users by helping in reducing common problems such as pressure sores, progression of deformities and improve respiration and digestion.

Fig 3.1.1 Wheel chair

3.1.2 OXYGEN CYLINDER (B - TYPE)

This is useful for patients requiring continuous intake of oxygen such as those with COPD, ILD and/or those requiring support in end of life conditions. At 2 lit/per min, it lasts for up to 10/12 hours after which it requires to be refilled. This is to be used under guidance of a consulting physician only. This can give a maximum of liters per minute. It is provided with required valve fittings, flow meter, humidifier bottle and spanner and stand with casters. It does not require any power to use so is ideal for situations as a back up where power supply is likely to be interrupted. It only an assisting device and is ideal for home use as it requires less space for storage and is very simple to use.

Oxygen Cylinder 10.2 Liter is also known as B type oxygen cylinder mostly used as Bedside Oxygen Cylinders in Hospital and Clinic and also with Oxygen Cylinder kit for home use (as medical

Oxygen cylinder and with Oxygen cylinder kit for home use). Clinical Purpose: A Container designed as a refillable cylinder used to hold compressed medical Oxygen (O2) under safe conditions at high pressure; O2 is used as an essential life support gas, for anesthesia, and for therapeutic purposes.

Fig 3.1.2 B-Type Oxygen Cylinder

3.1.3 SENSOR

As sensors, actuators, gadgets, appliances, or machines, that are programmed for certain applications and can transmit data over the internet or other networks.

I. **Flow Sensor**
II. **Level Senso**
III. **SOS (Emergency Switch)**

3.1.3.(i) FLOW SENSOR

Flow sensors are devices used for measuring the flow rate or quantity of a moving liquid or gas. Flow sensors utilize both mechanical and electrical subsystems to measure changes in the fluid's physical attributes and calculate its flow. Contact flow sensors are used in applications where the liquid or gas measured is not expected to become clogged in the pipe when it comes into contact with the sensor's moving parts.

Fig 3.1.3(I) Flow Sensor

3.1.3(ii) LEVEL SENSOR

The amount of oxygen present inside the cylinder is measured by the pressure at the outlet nozzle. The pressure is measured using a high precision MEMS Pressure Sensor. The output of the MEMS pressure sensor is voltage of the order milli. An amplifier is used to amplify this milli volt signal.

The substance to be measured can be inside a container or can be in its natural form. The level measurement can be either continuous or point values. Continuous level sensors measure level within a specified range and determine the exact amount of substance in a certain place, while point-level sensors only indicate whether the substance is above or below the sensing point. Generally the latter detect levels that are excessively high or low.

Fig 3.1.3(ii) Level Sensor

3.1.3(iii) SOS (EMERGENCY SWITCH)

More and more vehicles now have an SOS button linked to eCall. The eCall system automatically notifies the emergency services if your vehicle is involved in an accident. You can also call the emergency services manually by pressing the SOS button.

The SOS button is a safety function that lets you send a pre-made custom SMS message or call the emergency services. Depending on whether you have a regular smartphone or a rugged phone, this feature is activated and used in different ways.

The SOS emergency panic button inside the Crises Control app, enables any employee to trigger an alert if they are in trouble, for example caught in a terror attack, or trapped during a crisis. Pressing the SOS emergency panic button alerts the rapid response team, deploying them to the location of the user who activated it. The SOS emergency panic button is available with the Crises Control Incident Manager module.

Fig 3.1.3 SOS

3.1.4 PNEUMATIC PUMP

A pneumatic cylinder is a mechanical device that utilizes compressed air to move a piston, and in the process, the compressed air energy produces linear motion. Depending on the operating principle, pneumatic cylinders can be classified into two types: single and doubleacting pneumatic cylinders. We shall discuss these two types in detail in the later sections. sensors are usually mounted on the pneumatic cylinders body to send position feedback to the piston in the case of automated machinery.

Like hydraulic cylinders, something forces a piston to move in the desired direction. The piston is a disc or cylinder, and the piston rod transfers the force it develops to the object to be moved Engineers sometimes prefer to use pneumatics because they are quieter, cleaner, and do not require large amounts of space for fluid storage Because the operating fluid is a gas, leakage from a pneumatic cylinder will not drip out and contaminate the surroundings, making pneumatics more desirable where cleanliness is a requirement. Pneumatic cylinders (sometimes known as air cylinders) are mechanical devices which use the power of compressed gas to produce a force in a reciprocating linear motion.

Fig.3.1.4 Pneumatic Pump

3.1.5 ELECTRIC MOTOR

An electric motor is an electrical machine that converts electrical energy into mechanical energy. Most electric motors operate through the interaction between the motor's magnetic field and electric current in a wire winding to generate force in the form of torque applied on the motor's shaft. An electric generator is mechanically identical to an electric motor, but operates with a reversed flow of power, converting mechanical energy into electrical energy. Electric motors can be powered by direct current (DC) sources, such as from batteries, or rectifiers, or by alternating current (AC) sources, such as a power grid, inverters or electrical generators. Electric motors produce linear or rotary force (torque) intended to propel some external mechanism, such as a fan or an elevator.

An electric motor is generally designed for continuous rotation, or for linear movement over a significant distance compared to its size. Magnetic solenoids are also transducers that convert electrical power to mechanical motion, but can produce motion over only a limited distance. DC motors were the first form of motors widely used, as they could be powered from existing direct-current lighting power distribution systems. A DC motor's speed can be controlled over a wide range, using either a variable supply voltage or by changing the strength of current in its field windings.

Fig. 3.1.5 Electric Motor

3.1.6 BRAKE

A disc brake consists of a metal disc, or "rotor", attached to the wheel hub that rotates with the wheel. Calipers are attached to the frame or fork along with pads that squeeze the rotors for braking. Disc brakes may be actuated mechanically by cable, or hydraulically. A disc brake is a type of brake that uses the calipers to squeeze pairs of pads against a disc or a "rotor" to create friction. This action slows the rotation of a shaft, such as a vehicle axle, either to reduce its rotational speed or to hold it stationary.

The energy of motion is converted into waste heat which must be dispersed. Primarily a wheelchair user will apply friction to the push-rim and/or wheel with either a bare or gloved hand bare hands can be burned from high friction rims during braking, while gloves can reduce sensation for propulsion. Some users will lean forward to engage the wheel locks against the tire to slow down.

Fig.3.1.6 Brake And Parts

3.1.7 SEAT BELT

A seat belt (also known as a safety belt, or spelled seatbelt) is a vehicle safety device designed to secure the driver or a passenger of a vehicle against harmful movement that may result during a collision or a sudden stop. A seat belt reduces the likelihood of death or serious injury in a traffic collision by reducing the force of secondary impacts with interior strike hazards, by keeping occupants positioned correctly for maximum effectiveness of the airbag (if equipped), and by preventing occupants being ejected from the vehicle in a crash or if the vehicle rolls over.

Choose between a simple two piece belt with velcro buckle, plastic buckle or auto buckle. Equipped with your choice of ends to attach to wheelchair, axle mount or beneath upholstery screws. The belts come in three standard sizes, special sizes are available upon request. Specify color of webbing when ordering your belts.

Fig.3.1.7 Seat Belt

3.1.8 REGULATOR (OXYGEN FLOW)

Oxygen regulator is oxygen conserving device used with oxygen supplying unit can be oxygen cylinder or medical gas supply outlet. Oxygen regulator control flow rate from an oxygen cylinder. You can regulate oxygen flow, simply an oxygen regulator controls the rate of continuous flow of oxygen. Oxygen regulators are intended for the administration of oxygen to patients that are deemed by a physician to need increased oxygen levels to improve or stabilize their breathing conditions.

It is a pressure-reducing device that lowers the pressure of the oxygen from a cylinder to a level that can safely be used. With an optional oxygen therapy flow rate range of 0-15 L/min or 0-25 L/min you can choose the range that most suits the needs of your patient in respiratory distress who requires oxygen therapy. For powering oxygen equipment, different configurations of pressure outlets are available The regulator (sometimes called the adjustable regulator, flowmeter, or control valve) reduces, controls, and measures the flow of oxygen to the patient to ensure a safe and effective working pressure. The regulator and flowmeter usually are coupled together into one mechanical fitting on the oxygen tank.

Fig.3.1.8 Oxygen Regurator

3.1.9 FLEXIBLE HOSE

A flexi hose, also known as flexible tap connectors, are used to connect taps to the Oxygen supply and are a great solution when connecting taps in confined spaces. Choose from the range of highly durable, quickly and easily installed options, some being demountable and reusable. Weather / Ozone/ Abrasion resistant synthetic rubber (Red-Blue-Green in colour), Temperature range: (-) 20° C to (+) 70° C, Colour: Red colour hose is used for Acetylene or other fuel gases, Blue and Green colour hose for Oxygen. This Medical Oxygen Respiratory Supply Tubing by Responsive Respiratory maximizes concentrator and liquid system flow output and features standard connectors for a universal fit; six channel, star-lumen tubing made of 85 durometer materials prevents kinks and twisting.

A variety of accessories include an in-line water trap to reduce moisture buildup and Ear Mates to protect the ears from chafing and uncomfortable rubbing. A flexible hose is a type of piping used to connect two distant points to transport or transfer fluid. In Oil & Gas applications hoses are used when there is a considerable relative movements. A variety of fluids and fluidized solids can easily be transferred through flexible hoses to other locations.

Fig.3.1.9 Flexible Hose

3.1.10 ELECTRICAL SYSTEM (CIRCUIT)

Electric circuit, path for transmitting electric current. An electric circuit includes a device that gives energy to the charged particles constituting the current, such as a battery or a generator; devices that use current, such as lamps, electric motors, or computers; and the connecting wires or transmission lines.

An electrical network is an interconnection of electrical components or a model of such an interconnection, consisting of electrical elements. An electrical circuit is a network consisting of a closed loop, giving a return path for the current.

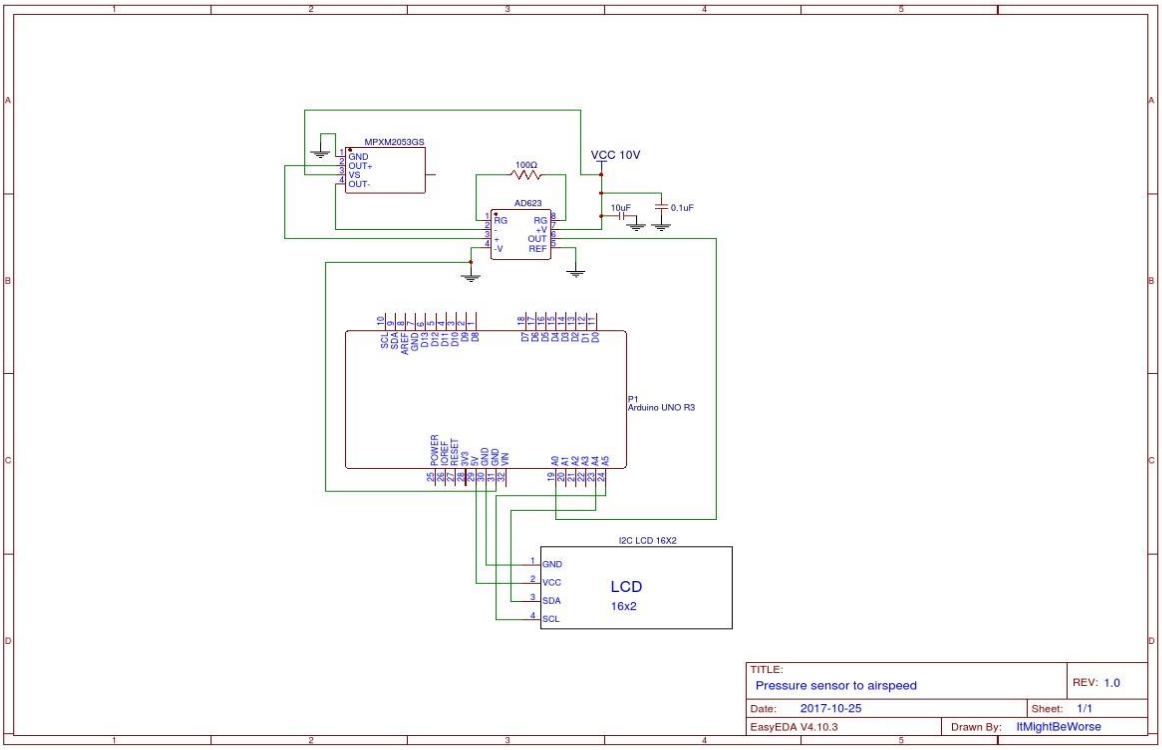


Fig.3.1.10(i) Circuit

Simple electric circuit consists of a source (such as a battery), wires as conducting medium and a load (such as a light bulb). The battery provides required energy for flow of electrons, to the light bulb. As mentioned above in the introduction, a circuit is an interconnection of elements The point where electrons enter an electrical circuit is called the "source" of electrons. The point where the electrons leave an electrical circuit is called the "return" or "earth ground". The exit point is called the "return" because electrons always end up at the source when they complete the path of an electrical circuit.

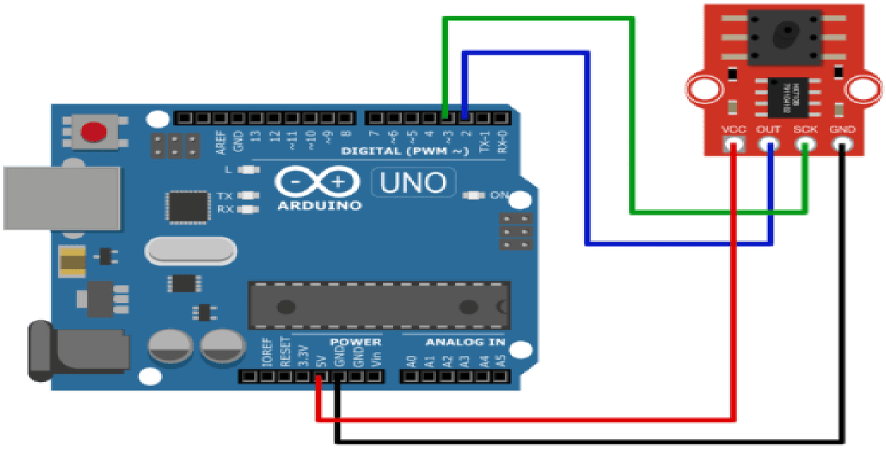


Fig.3.1.10(ii) CIRCUIT

3.1.11 IOT DEVICE

The Internet of things (iot) describes physical objects or groups of such objects with sensors, processing ability, software and other technologies that connect and exchange data with other devices and systems over the Internet or other communications networks. Internet of things has been considered a misnomer because devices do not need to be connected to the public internet, they only need to be connected to a network and be individually addressable. The field has evolved due to the convergence of multiple technologies, including ubiquitous computing, commodity sensors, increasingly powerful embedded systems, as well as machine learning.

Traditional fields of embedded systems, wireless sensor networks, control systems, automation including home and building automation, independently and collectively enable the Internet of things. In the consumer market, iot technology is most synonymous with products pertaining to the concept of the "smart home", including devices and appliances such as lighting fixtures, thermostats, home security systems, cameras, and other home appliances that support one or more common ecosystems, and can be controlled via devices associated with that ecosystem, such as smartphones and smart speakers.

Iot is also used in healthcare systems There are a number of concerns about the risks in the growth of iot technologies and products, especially in the areas of privacy and security, and consequently, industry and governmental moves to address these concerns have begun, including the development of international and local standards, guidelines, and regulatory frameworks Smart Wheelchair is known as a Power Wheelchair that is integrated into multiple sensors, assistive technology, and computers that give the user with a disability such as impairment, handicaps, and permanent injury, the required mobility to move freely and safely.

These types of wheelchairs are gradually replacing the traditional wheelchairs; however, their expensive costs are preventing a large size of disabled people from having one. According to the organization of World Health (WHO), only 5 to 15% out of 70 million disabled people have access to wheelchairs.

Therefore, we need to offer a cost-effective Smart that not only minimized the cost but also provides plenty of features that use the latest components and technologies. In the last years, there have been many pleasant efforts that serve this purpose.

They have adopted various technologies such as artificial intelligence, where they have designed an autonomous wheelchair that used machine learning concepts to navigate, and some also used Internet of Thing technology to control the wheelchair-using voice recognition system. This report will present a cost-effective Smart Wheelchair-based Arduino Nano microcontroller and iot technology that have several features to gain disabled people, especially poor people who cannot afford expensive Smart Wheelchair, the required help to finish daily life tasks without external help.

To conclude this project will make the Smart Wheelchair affordable to a wide range of disabled people and will be based on Arduino Nano, ESP-12e module to give Wi-Fi access, MPU6050 to detect fall with Voice message notification using IFTTT platform, obstacle detection with buzzer and LED to work as hazards, voice recognition system, and joysticks to control the wheelchair.

Iot technologies and Artificial Intelligence technologies to help the users gain mobility and moving freely and safely without needing someone's help. However, they are too expensive, and their hardware is too heavy which makes the software system response too slow. The wish of most of the people in this world is to be wealthy and successful. However, some just want to have a comfortable and normal life. Due to illness, car accidents, impairment, and eldership this wish became impossible at least to them. People with the mentioned disabilities are increasing every year, therefore people who do not have a suitable wheelchair are increasing, too.

There are many cases where disabled people get fall and injured and sometimes for days nobody knows about their situation. Wheelchair besides other commands. In the autonomous mode, the author used a map designed using an RGBD camera that scans the surrounding environment and an IR sensor to detect obstacles, as using only an RGB-D camera will not be enough as the author declared. In contrast with the above paper who used only one unit of obstacle sensor, have used 4 units of IR sensor surrounding the wheelchair from each side, depending on the direction of the wheelchair, one of the four IR sensors will be activated.

Jayakody and other authors presented a project that also contains a health monitoring system that is implemented for the users who have a heart issue and cannot walk permanently.

To provide them the required help, this system will mainly consist of a temperature sensor to measure the patient's temperature and a heart rate sensor beside the output readings will be connected to the medical officers, so they can easily track the patient's status. Comparing to the obtained result of the voice recognition system by shows that system takes about 2 to3 seconds to recognize the voice which is more than the obtained results of To conclude, authors in have succeeded in presenting a smart wheelchair that used the latest technology such ros system to help people with disabilities to move freely and safely without required help For safety purposes, real children were not used to testing how much weight the wheelchair can carry.

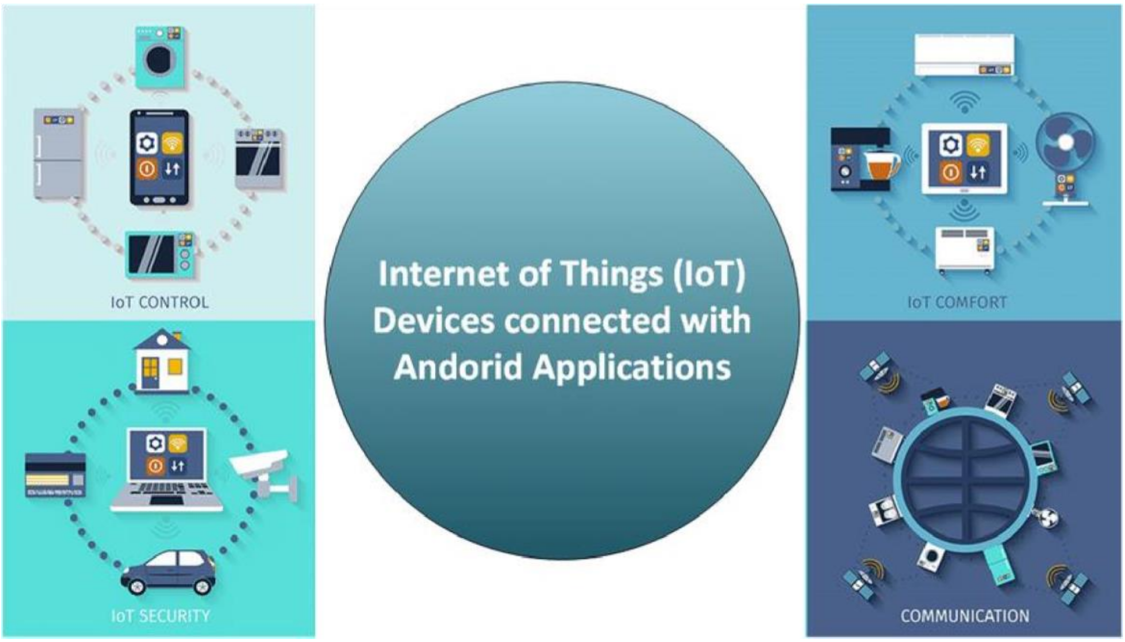


Fig.3.1.11 Internet Of Things

3.1.12 RASPBERRY DEVICE

Easy respire device is a sensor integrated device designed to help people cope with asthma. It senses the asthma triggering attributes using various sensors and notifies the patient to use the inhaler using telegram notifications. It transforms sensor data into an interactive application allowing users to recognize and respond to their asthma symptoms regardless of their location. These sensor data are stored on an open source cloud platform called thing speak, which can be used by the doctor to personalize asthma patient treatment based on the data available. Many AI algorithms can be further applied to detect the severity of asthma in a patient.

Asthma treatment focuses on improving overall lung function, reducing daily symptoms and preventing acute asthma attacks. Each patient has a personalized treatment and disease self-management plan designed to reduce daily symptoms, maintain optimal lung function, and allow for participation in daily life activities, while limiting the number of acute asthma attacks. It is very difficult to predict an acute asthma attack since it often occurs suddenly. with little warning. Predicting the severity level of an asthma attack is even harder because it depends on multiple factors including the person's disease characteristics and severity.

Data for monitoring and managing chronic respiratory illness have led to the development of an Artificial Intelligence algorithm to perform adaptive learning for personalized prediction and treatment plans. Smart Mobile Phones are the most accessible form of technology globally aAccording to some researches, patients of all ages are participated in a study which clearly verified the effectiveness of the mobile use for tracking the asthma.

power for "sensoring" tracking of environment and health

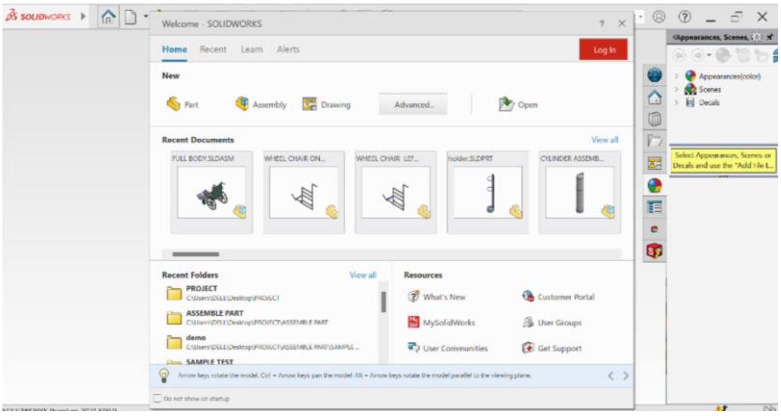
Fig.3.1.12 Raspberry Device

CHAPTER 4

4.1 DESIGN OF THE FACILITY USING SOLIDMODELLING SOFTWARE

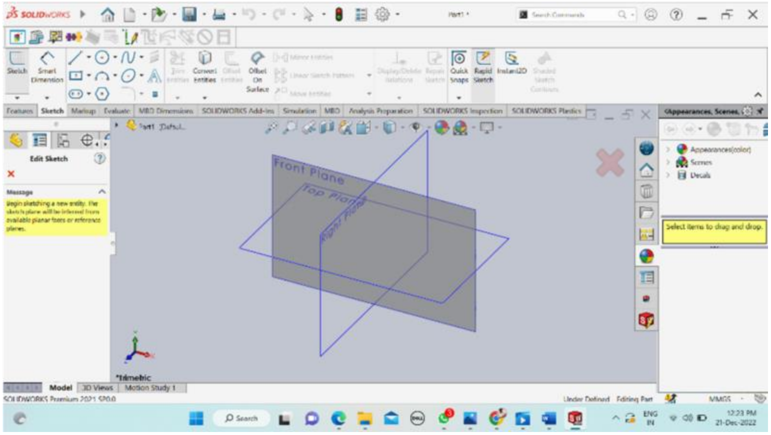
1. Open solid works software.
2. There are three types in solid works. They are

a) Part
b) Assemble
c) Drawing

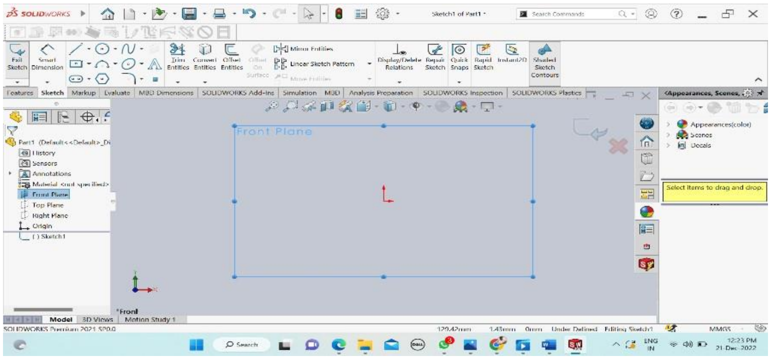


3. Select the part file.
4. There are three types of plane in solid works. They are

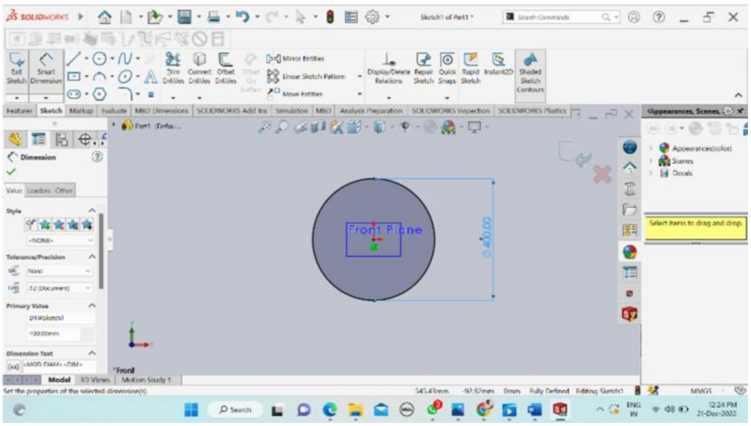
a) Front Plane
b) Top Plane
c) Right Plane



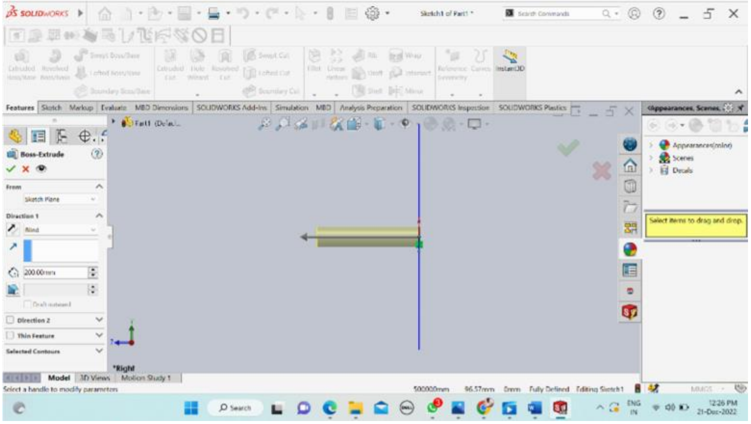
5.Select the front plane.



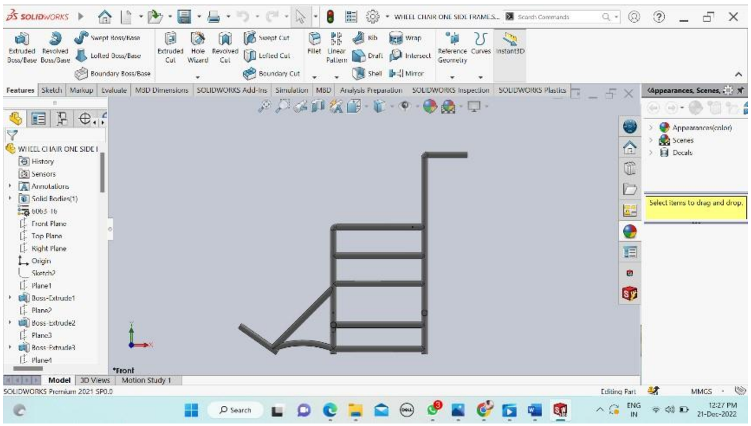
6.Select the sketch, choose circle and draw in the plane.
7.And give the dimension by using dimensions tool.



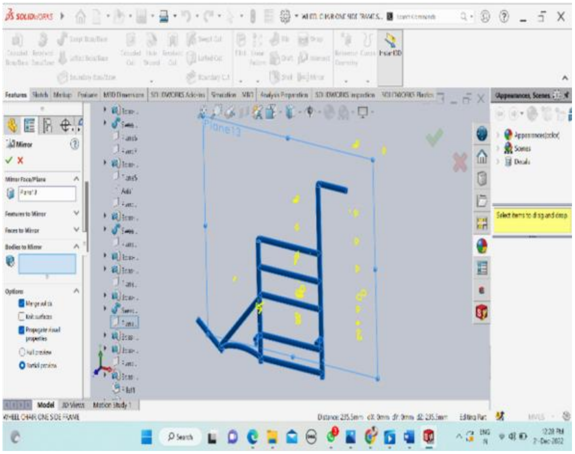
8.Then select the extrude boss and choose the drawn figure and give dimension to the sketch.

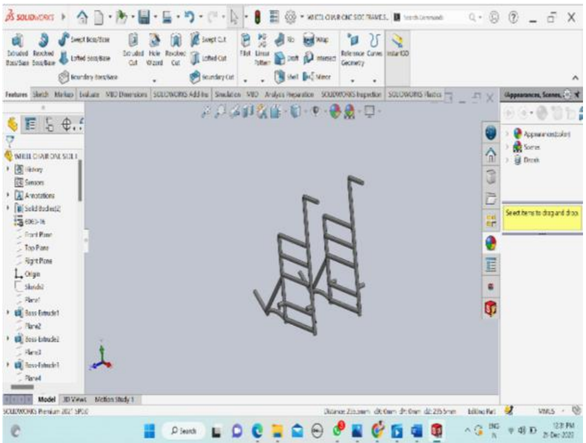


9.Repeat the Procedure and create the wheel chair.

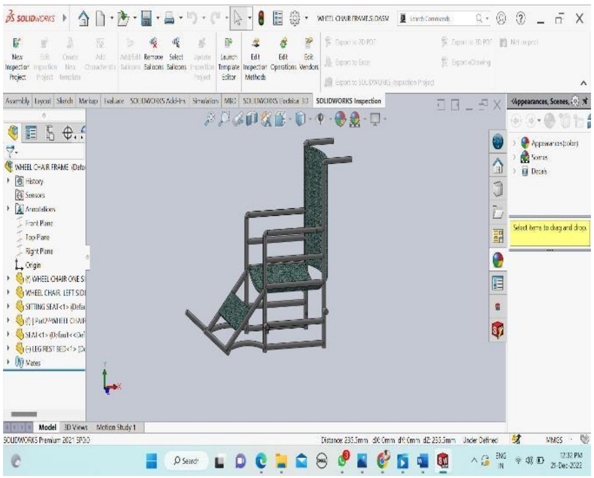


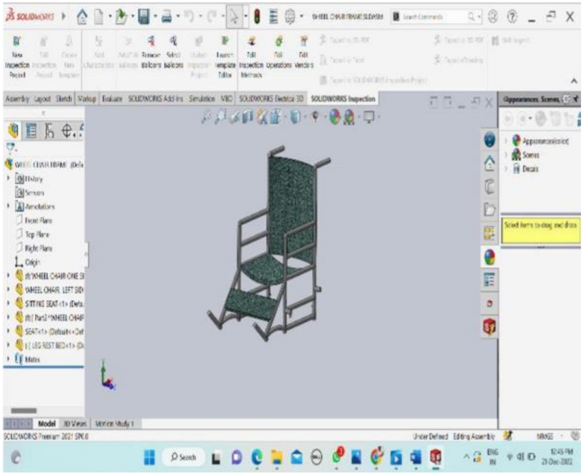
10. Next the wheel chair frame completed and then mirror the frame by using mirror command.



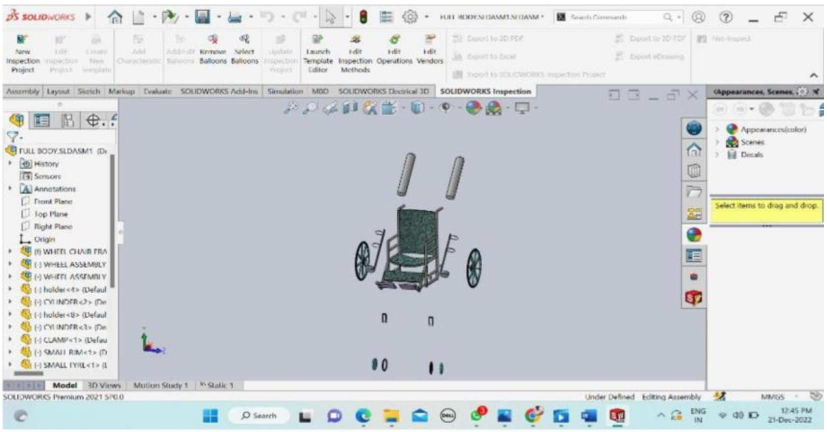


11.The mirror frame is completed.Then draw the seat and other components using sketch and features.

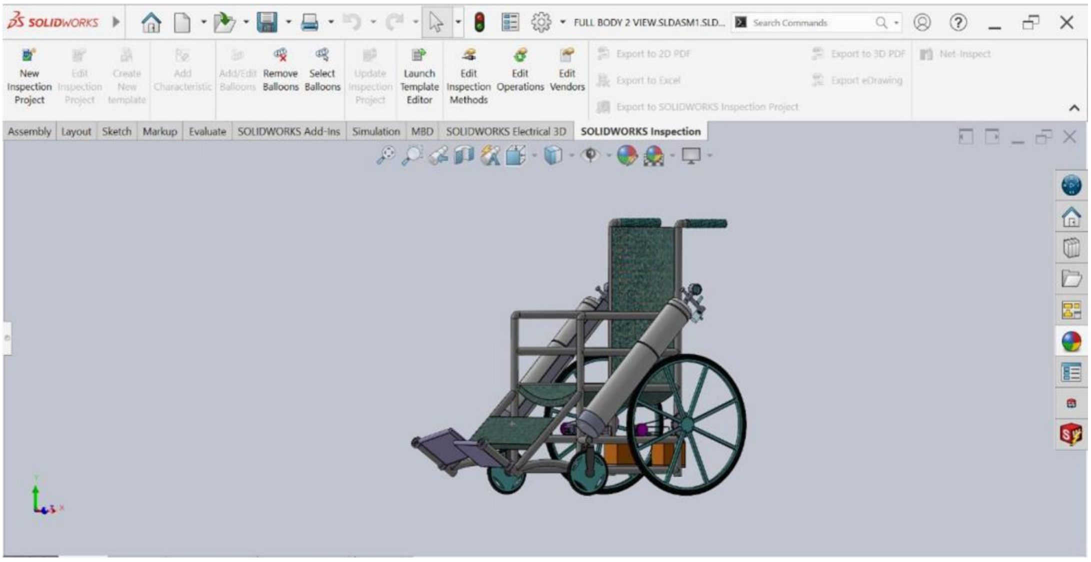




12. Next the completed components are make to assemble using assemble view.



13. Now the components are correctly assembled using mate commands. And now the "Automated Wheel Chair with Attachment Of Oxygen Cylinder Using Iot Device" is completed.



4.2 EXPLOLDED VIEW

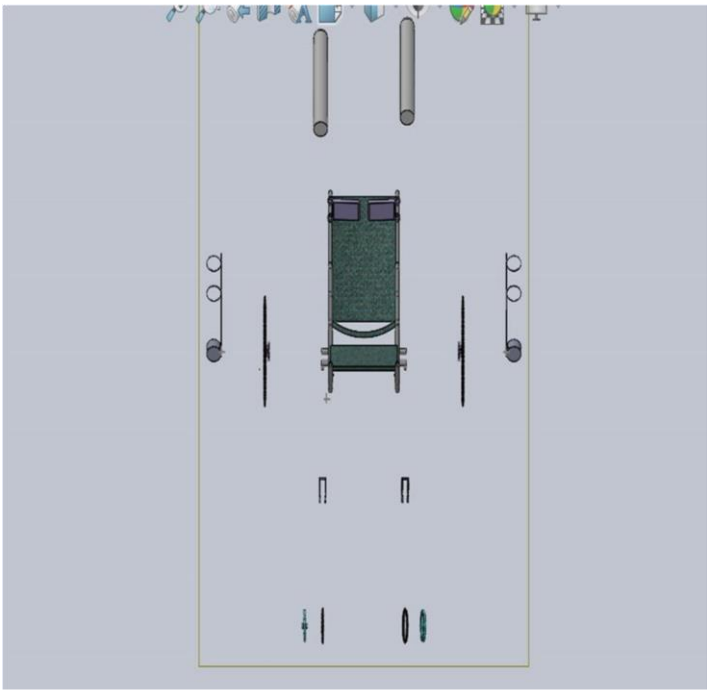


Fig 5.1.1 Front View

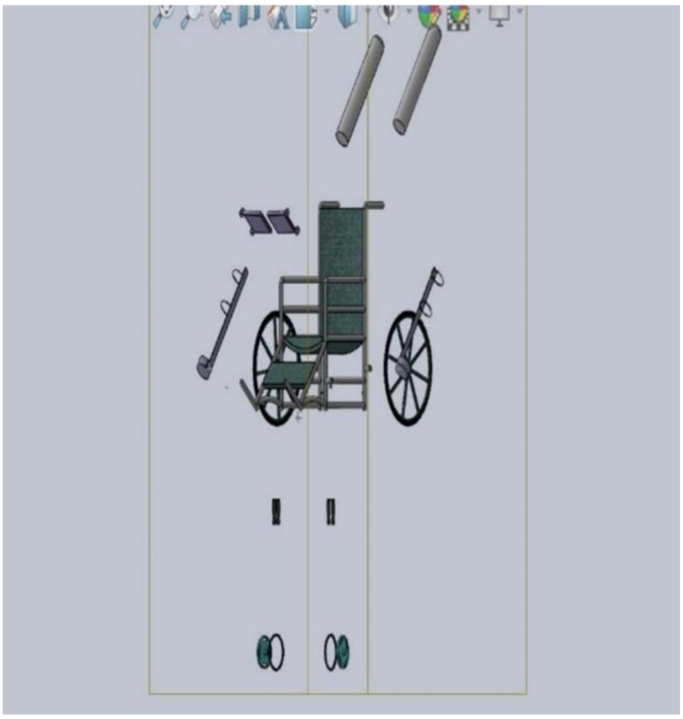


Fig 5.1.2 Side View

CALCULATION

4.3 LOAD:

F (force) = m (mass) * a (acceleration) F = m * a.

Fw (weight) = m (mass) * g (gravity, 9.8 m/s^2) Fw = m * 9.8 m/s^2.

To change from mass to weight multiply by gravity (9.8 m/s^2)

Example
Change 30 kg (mass) to Newtons (weight)
Fw = m * 9.8 m/s^2
Fw = 150 kg * 9.8 m/s^2 = 1470 N.

To change from weight to mass divide by gravity (9.8 m/s^2).

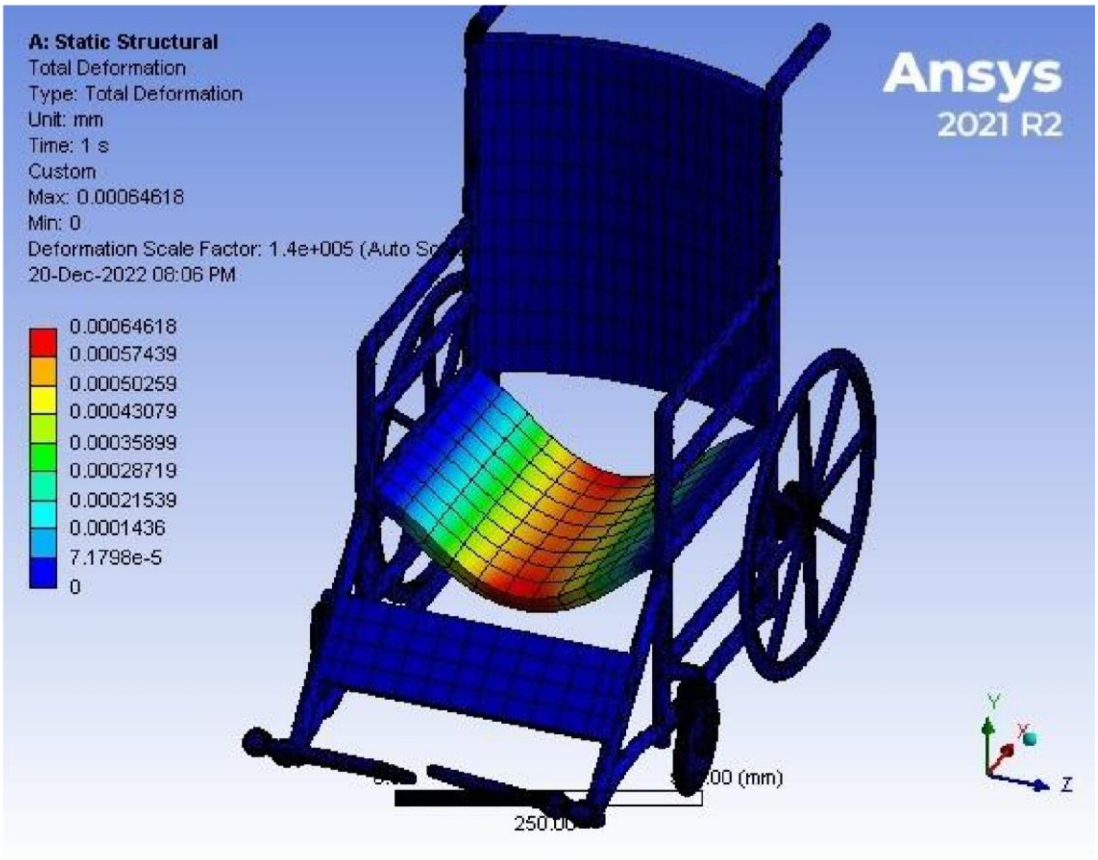
Example
Change 1470 N (weight) to mass m = Fw / 9.8 m/s^2 m = 1470N / 9.8 m/s^2 = 150 kg

International Journal for Multidisciplinary Research (IJFMR)
E-ISSN: 2582-2160 ● Website: www.ijfmr.com ● Email: editor@ijfmr.com

CHAPTER 5

5.1 ANSYS REPORT

AUTOMATED WHEEL CHAIR WITH ATTACHMENT OF OXYGEN CYLINDER USING IOT DEVICE*



Subject	PROJECT
Prepared for	PROJECT I
First Saved	Tuesday, December 20, 2022
Last Saved	Tuesday, December 20, 2022
Product Version	2021 R2
Save Project Before Solution	Yes
Save Project	Yes

After Solution	

Contents

Units

Unit System	Metric (mm, kg, N, s, mV, mA) Degrees rad/s Celsius
Angle	Degrees
Rotational Velocity	rad/s
Temperature	Celsius

Model (A4)

Geometry

TABLE 2
Model (A4) > Geometry

Object Name	*Geometry*
State	Fully Defined
Definition	
Source	C:\Users\DELL\AppData\Local\Temp\WB_DELL_16956_2\wbnew_files\dp0\SYS\DM\SYS.scdoc
Type	SpaceClaim
Length Unit	Meters
Element Control	Program Controlled
Display Style	Part Color
Bounding Box	
Length X	1259. mm
Length Y	1127.7 mm
Length Z	694.06 mm
Properties	
Volume	3.2347e+007 mm^3
Mass	253.93 kg
Scale Factor Value	1.
Statistics	
Bodies	38
Active Bodies	38
Nodes	136951
Elements	67081
Mesh Metric	None
Update Options	
Assign Default Material	No
Basic Geometry Options	
Solid Bodies	Yes
Surface Bodies	Yes

Line Bodies	Yes
Parameters	Independent
Parameter Key	
Attributes	Yes
Attribute Key	
Named Selections	Yes
Named Selection Key	
Material Properties	Yes
Advanced Geometry Options	
Use Associativity	Yes
Coordinate Systems	Yes
Coordinate System Key	
Reader Mode Saves Updated File	No
Use Instances	Yes
Smart CAD Update	Yes
Compare Parts On Update	No
Analysis Type	3-D

Mixed Import Resolution	None
Import Facet Quality	Source
Clean Bodies On Import	No
Stitch Surfaces On Import	None
Decompose Disjoint Geometry	Yes
Enclosure and Symmetry Processing	Yes

E …NE	*WHEEL CHAIR LEFT SIDE FRAME\NONE*	*WHEEL CHAIR LEFT SIDE FRAME\NONE*	*WHEEL CHAIR LEFT SIDE FRAME\Boss-Extrude35*	*WHEEL CHAIR LEFT SIDE FRAME\Sweep15*	*SITTING SEAT\Boss-Extrude5*	*SEAT\Boss-Extrude7*	*LEG REST BED\Boss-Extrude1*	*TYRE*
				Me shed				
				Graphics Propertie s				
				Y es				
				1				
				Definition				
				No				
				Fle xible				
				Default Coor dinate System				
				By Envi ronment				

				N one				
				Material				
				Structu ral Steel				
				Y es				
				Y es				
				Bounding Box				
	1151.3 mm		20. mm	30. mm	435. mm	87.102 mm	127.28 mm	596.1
	1019.3 mm		20. mm	30. mm	86.592 mm	630.5 mm	127.28 mm	596.1
	95. mm		70. mm	30. mm	521. mm			
				Properties				
06	3.5245 e +006 mm^3		21991 mm^3	16655 mm^3	6.0996e+006 mm^3	8.73e+006 mm^3	2.2385e+006 mm^3	4.
g	27.6 68 kg		0.17263 kg	0.13074 kg	47.882 kg	68.531 kg	17.572 kg	
n	445. 62 mm		722.19 mm	725.26 mm	496.69 mm	767.14 mm	103.6 mm	722.2
n	485. 12 mm		340.24 mm	1132.2 mm	442.31 mm	804.99 mm	305.72 mm	
n	630. 77 mm		596.61 mm	631.61 mm	892.11 mm	890.21 mm	892.11 mm	1220.
06	2.9632e+ 006 kg·mm^2		74.614 kg·mm^2	16.662 kg·mm^2	1.7686e+006 kg·mm^2	3.7194e+006 kg·mm^2	3.9557e+005 kg·mm^2	1.3
05	9.3138e+ 005 kg·mm^2		74.614 kg·mm^2	12.188 kg·mm^2	7.7249e+005 kg·mm^2	1.4748e+006 kg·mm^2	3.6396e+005 kg·mm^2	1.3
06	3.8893e+ 006 kg·mm^2		8.5896 kg·mm^2	14.183 kg·mm^2	1.0309e+006 kg·mm^2	2.2941e+006 kg·mm^2	34284 kg·mm^2	2.6
				Statistics				
	17694	17708	506	524	1254	2415	974	
	10203	10219	88	254	198	396	156	
				None				
				CAD Attributes				
				0.00000001				

Model (A4) > Geometry > Parts

TABLE 4

Model (A4) > Geometry > Parts

Object Name	*RIM\Cut-Extrude3*	*BEARING\Boss-Extrude1*	*BEARING\Boss-Extrude1*	*BIG PULLEY\Cut-Extrude6*	*BIG PULLEY\Cut-Extrude6*	*BOLT\Chamfer1*	*BOLT\Chamfer1*	*BOLT\Chamfer1*	*BOLT\Chamfer1*	*BOLT\Chamfe*
State	Meshed									
Graphics Properties										
Visible	Yes									
Transparency	1									
Definition										
Suppressed	No									
Stiffness Behavior	Flexible									
Coordinate System	Default Coordinate System									
Reference Temperature	By Environment									
Treatment	None									
Material										
Assignment	Structural Steel									
Nonlinear Effects	Yes									
Thermal Strain Effects	Yes									
Bounding Box										
Length X	573.69 mm	45.498 mm	46.06 mm	109.77 mm	110.32 mm	2.3273 mm	2.5053 mm			
Length Y	573.69 mm	45.498 mm	46.06 mm	109.77 mm	110.32 mm	2.6391 mm	2.7881 mm			
Length Z	20. mm	12. mm		28. mm		31. mm				
Properties										
Volume	5.9706e+005 mm³	7599.5 mm³		90333 mm³		98.276 mm³				
Mass	4.6869 kg	5.9656e-002 kg		0.70912 kg		7.7147e-004 kg				
Centroid X	722.19 mm					719.62 mm	719.47 mm	697.42 mm	746.96 mm	724.91 mm
Centroid Y	340.24 mm					365.03 mm	365.01 mm	337.52 mm	342.96 mm	315.47 mm
Centroid Z	563.5 mm	1216.6 mm	567.61 mm	1191.2 mm	593.07 mm	1216.3 mm	567.97 mm			
Moment of Inertia Ip1	90760 kg·mm²	10.596 kg·mm²		423.07 kg·mm²		6.2684e-002 kg·mm²				
Moment of Inertia Ip2	90760 kg·mm²	10.596 kg·mm²		423.07 kg·mm²		6.2684e-002 kg·mm²				
Moment of Inertia Ip3	1.8133e+005 kg·mm²	19.76 kg·mm²		796.96 kg·mm²		3.8671e-004 kg·mm²				
Statistics										
Nodes	6631	343		12660		1044				
Elements	3172	42		5983		495				
Mesh Metric	None									
CAD Attributes										
PartTolerance:	0.00000001									
Color:143.163.175										
Color:175.160.143										
Color:225.225.225										

TABLE 5

r1	*BOLT\Chamfer1*	*SMALL RIM\Boss-Extrude4*	*SMALL RIM\Boss-Extrude4*	*CLAMP\Mirror1 [1]*	*CLAMP\Boss-Extrude6*	*CLAMP\Mirror1 [2]*	*CLAMP\Boss-Extrude4*	*CLAMP [*
Meshed								
Graphics Properties								
Yes								
1								
Defi nition								
No								
Flexible								
D efault Coordinate System								
By Environm ent								
None								
Ma terial								

Structural St eel							
Yes							
Yes							
Boun ding Box							
2 73 mm	215.19 mm	216.31 mm	36.54 2 mm		32.42 7 mm		
3 91 mm	215. 19 mm		128. mm		10. mm		
31. mm	42. mm	48.155 mm	51. mm		26. mm		
Pro perties							
27 6 mm^3	2.8056 e +005 mm^3		29584 mm^3		2081.5 mm^3		
47 e-004 kg	2.20 24 kg		0.23224 kg	0.23223 kg	1.634e002 kg		0.232
724.76 mm	2 64.19 mm						264.6
315.45 mm	151. 24 mm		211.0 9 mm		256.2 4 mm		
16.3 mm	571.34 mm	1212.9 mm	555.24 mm	587.44 mm	552.91 mm	589.77 mm	1229
e-002 kg·mm^2	3221.3 kg·mm^2		436.82 kg·mm^2		0.74895 kg·mm^2		
e-002 kg·mm^2	3221.3 kg·mm^2		48.388 kg·mm^2		3.2054 kg·mm^2		
e-004 kg·mm^2	6303.6 kg·mm^2		428.46 kg·mm^2		2.7289 kg·mm^2		
Sta tistics							
1044	709		726	733	481		7
495	298		293	300	56		2
None							
CAD Attributes							
0.00000001							

Model (A4) > Geometry > Parts

TABLE 6

Model (A4) > Geometry > Parts

Object Name	*CLAMP\Boss-Extrude4*	*SMALL TYRE\Fillet1*	*SMALL TYRE\Fillet1*	*FOOT REST\Chamfer1*	*FOOT REST\Chamfer1*
State		Meshed			
Visible		**Graphics Properties**			

		Yes			
Transparency		1			
		Definition			
Suppressed		No			
Stiffness Behavior		Flexible			
Coordinate System		Default Coordinate Sys tem			
Reference Temperature		By Environment			
Treatment		None			
		Material			
Assignment		Structural Steel			
Nonlinear Effects		Yes			
Thermal Strain Effects		Yes			
		Bounding Box			
Length X	33.159 mm	242.09 mm	242.42 mm	165.07 mm	173.35 mm
Length Y	10. mm		242.0 9 mm	134.37 mm	146.19 mm
Length Z	26.919 mm	15. mm	21.938 mm	250.5 mm	252.69 mm
		Properties			
Volume	2081.5 mm^3		68424 mm^3	7.147e+ 005 mm^3	
Mass	1.634e-002 kg		0.53713 kg	5.61 04 kg	
Centroid X	263.66 mm	264.19 mm	-135.84 mm		-131.94 mm
Centroid Y	256.24 mm	151.24 mm	226.44 mm		232.01 mm
Centroid Z	1194.5 mm	571.34 mm	1212.9 mm	748.91 mm	1035.5 mm
Moment of Inertia Ip1	0.74895 $kg \cdot mm^2$	1912.6 $kg \cdot mm^2$	13843 $kg \cdot mm^2$		
Moment of Inertia Ip2	3.2054 $kg \cdot mm^2$	1912.6 $kg \cdot mm^2$	36202 $kg \cdot mm^2$		
Moment of Inertia Ip3	2.7289 $kg \cdot mm^2$	3808.6 $kg \cdot mm^2$	22794 $kg \cdot mm^2$		
		Statistics			

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Nodes	481	8219	2124
Elements	56	4247	1027
Mesh Metric		None	
		CAD Attributes	
PartTolerance:		0.00000001	
Color:143.153.175			
Color:225.225.225			

TABLE 7

Model (A4) > Materials

Object Name	*Materials*
State	Fully Defined
Statistic s	
Materials	1
Material Assignments	0

Coordinate Systems

Model (A4) > CoordinateTABLE Systems 8 > Coordinate System

Object Name	*Global Coordinate System*
State	Fully Defined
D efinition	
Type	Cartesian
Coordinate System ID	0.
Origin	
Origin X	0. mm
Origin Y	0. mm
Origin Z	0. mm
Directi onal Vectors	
X Axis Data	[1. 0. 0.]
Y Axis Data	[0. 1. 0.]
Z Axis Data	[0. 0. 1.]

TABLE 9

Model (A4) > Connections

Object Name	*Connections*
State	Fully Defined
Auto Detection	
Generate Automatic Connection On Refresh	Yes
Transparency	
Enabled	Yes

TABLE 10
Model (A4) > Connections > Contacts

Object Name	*Contacts*
State	Fully Defined
Definitio n	
Connection Type	Contact
Scope	
Scoping Method	Geometry Selection
Geometry	All Bodies
Auto Detec tion	
Tolerance Type	Slider
Tolerance Slider	0.
Tolerance Value	4.5679 mm
Use Range	No
Face/Face	Yes
Face-Face Angle Tolerance	75. °
Face Overlap Tolerance	Off
Cylindrical Faces	Include

Face/Edge	No
Edge/Edge	No
Priority	Include All
Group By	Bodies
Search Across	Bodies
Statistic s	
Connections	84
Active Connections	84

TABLE 11
Model (A4) > Connections > Contacts > Contact Regions

bject ame	*ontact egion*	*ontact egion*	*ontact egion*	*ontac egion*	*ontact egion 5*	*ontact egion 6*	*ct egion 7*	*ontact egion 8*	*ontact egion 9*	*ontact egion)*	*Contact egion 11*
State	lly Defi ned										
cope											
oping ethod	eometry Se lection										
Contact	Faces	Faces	Face				3 Faces		1 Face	Faces	1 Face
Target	2 Faces		1 Face				2 Faces		1 Face	3 Faces	4 Faces
Contact Bodies	WHEEL CHAIR ONE SIDE FRAME\NONE										
Target Bodies	SITTING SEAT\Boss-Extrude5	SEAT\Boss-Extrude7	LEG REST BED\Boss-Extrude1	RIM\Cut-Extrude3	BEARING\Boss-Extrude1	BIG PULLEY\Cut-Extrude6	CLAMP\Mirror1[1]	CLAMP\Boss-Extrude6	CLAMP\Boss-Extrude4	SMALL TYRE\Fillet1	FOOT REST\Chamfer1
Protected	No										
Definition											
Type	Bonded										
Scope	Automatic										

Mode	
Behavior	Program Controlled
Trim Contact	Program Controlled
Trim Tolerance	4.5679 mm
Suppressed	No
Advanced	
Formulation	Program Controlled
Small Sliding	Program Controlled
Detection Method	Program Controlled
Penetration Tolerance	Program Controlled
Elastic Slip Tolerance	Program Controlled
Normal Stiffness	Program Controlled
Update Stiffness	Program Controlled
Pinball Region	Program Controlled
Geometric Modification	
Contact	

Geometry Correction	None
Target Geometry Correction	None

TABLE 12
Model (A4) > Connections > Contacts > Contact Regions

Object Name	*Contact Region 12*	*Contact Region 13*	*Contact Region 14*	*Contact Region 15*	*Contact Region 16*	*Contact Region 17*	*Contact Region 18*	*Contact Region 19*	*Contact Region 20*	*Contact Region 21*	*Contact Region 22*
State	Fully Defined										
Scope											
Scoping Method	Geometry Selection										
Contact	2 Faces	1 Face	2 Faces	4 Faces	1 Face				2 Faces		1 Face
Target	2 Faces	1 Face	2 Faces		1 Face				2 Faces		1 Face
Contact Bodies	WHEEL CHAIR LEFT SIDE FRAME\NONE										

Target Bodies	WHEEL CHAIR LEFT SIDE FRAME\NONE	WHEEL CHAIR LEFT SIDE FRAME\Boss-Extrude35	SITTING SEAT\Boss-Extrude5	SEAT\Boss-Extrude7	LEG REST BED\Boss-Extrude1	RIM\Cut-Extrude3	BEARING\Boss-Extrude1	BIG PULLEY\Cut-Extrude6	CLAMP\Mirror1[1]	CLAMP\Boss-Extrude6	CLAMP\Boss-Extrude4
Protected	No										
Definition											
Type	Bonded										
Scope Mode	Automatic										
Behavior	Program Controlled										
Trim Contact	Program Controlled										
Trim Tolerance	4.5679 mm										
Suppressed	No										
Advanced											
Formulation	Program Controlled										
Small Sliding	Program Controlled										
Detection Method	Program Controlled										
Penetration	Program Controlled										

Tolerance	
Elastic Slip Tolerance	Program Controlled
Normal Stiffness	Program Controlled
Update Stiffness	Program Controlled
Pinball Region	Program Controlled
Geometric Modification	
Contact Geometry Correction	None
Target Geometry Correction	None

TABLE 13
Model (A4) > Connections > Contacts > Contact Regions

Object Name	*Contact Region*	*Contact Region 24*	*Contact Reg*	*Contact Regio*	*Contact Regio*	*Contact Regi*	*Contact Regi*	*Contact Region 30*	*Contact Regio*	*Contact Region 32*	*Contact Region*

	23		*ion 25*	*n 26*	*n 27*	*on 28*	*on 29*		*n 31*		*33*
State	Fully Defined										
Scope											
Scoping Method	Geometry Selection										
Contact	2 Faces	1 Face		2 Faces	4 Faces	1 Face				2 Faces	
Target	3 Faces	5 Faces	1 Face	2 F aces		1 Face				2 Faces	
Contact Bodies	WHEEL CHAIR LEFT SIDE FRAME\NONE										
Target Bodies	SMALL TYRE\Fillet1	FOOT REST\Chamfer1	WHEEL CHAIR LEFT SIDE FRAME\Boss-Extrude 35	SITTING SEAT\Boss-Extrude5	SEAT\Boss-Extrude7	LEG REST BED\Boss-Extrude1	RIM\Cut-Extrude3	BEARING\Boss-Extrude1	BIG PULLEY\Cut-Extrude 6	CLAMP\Mirror1 [1]	CLAMP\Boss-Extrude 6
Protected	No										
Definition											
Type	Bonded										
Scope Mode	Automatic										
Behavior	Program Controlled										
Trim Contact	Program Controlled										
Trim Tolerance	4.5679 mm										

Suppressed	No
Advanced	
Formulation	Program Controlled
Small Sliding	Program Controlled
Detection Method	Program Controlled
Penetration Tolerance	Program Controlled
Elastic Slip Tolerance	Program Controlled
Normal Stiffness	Program Controlled
Update Stiffness	Program Controlled
Pinball Region	Program Controlled
Geometric Modification	
Contact Geometry Correction	None
Target Geo	None

metry Correction	

TABLE 14

Model (A4) > Connections > Contacts > Contact Regions

Object Name	*Contact Region 34*	*Contact Region 35*	*Contact Region 36*	*Contact Region 37*	*Contact Region 38*	*Contact Region 39*	*Contact Region 40*	*Contact Region 41*	*Contact Region 42*	*Contact Region 43*	*Contact Region 44*
State	Fully Defined										
Scope											
Scoping Method	Geometry Selection										
Contact	1 Face	2 Faces	1 Face		2 Faces	1 Face		2 Faces	1 Face	2 Faces	
Target	1 Face	3 Faces	5 Faces	1 Face	2 Faces	1 Face		2 Faces	4 Faces	2 Faces	
Contact Bodies	WHEEL CH AIR LEFT SIDE FRAME\NONE			WHEEL CHAIR LEFT SIDE FRAME\Boss-Extrude35	WHEEL CHAIR LEFT SIDE FRAME\Sweep15	TYRE\Fillet1		RIM\Cut-Extrud e3			
Target Bodies	CLAMP\Boss-Extrude4	SMALL TYRE\Fillet1	FOOTREST\Chamfer1	RIM\Cut-Extrude3	SEAT\Boss-Extrude7	RIM\Cut-Extrude3		BEARING\Boss-Extrude1	BIG PULLEY\Cut-Extrude6	BOLT\Chamfer1	
Protected	No										
Definition											
Type	Bonded										

Scope Mode	Automatic
Behavior	Program Controlled
Trim Contact	Program Controlled
Trim Tolerance	4.5679 mm
Suppressed	No
Advanced	
Formulation	Program Controlled
Small Sliding	Program Controlled
Detection Method	Program Controlled
Penetration Tolerance	Program Controlled
Elastic Slip Tolerance	Program Controlled
Normal Stiffness	Program Controlled
Update Stiffness	Program Controlled
Pinball Region	Program Controlled
Geometric Modification	
Contac	

t Geometry Correction	None
Target Geometry Correction	None

TABLE 15

Model (A4) > Connections > Contacts > Contact Regions

Object Name	*Contact Region 45*	*Contact Region 46*	*Contact Region 47*	*Contact Region 48*	*Contact Region 49*	*Contact Region 50*	*Contact Region 51*	*Contact Region 52*	*Contact Region 53*	*Contact Region 54*	*Contact Region 55*
State	Fully Defined										
Scope											
Scoping Method	Geometry Selection										
Contact	2 Faces			1 Face	2 Faces				1 Face		
Target	2 Faces			4 Faces	2 Faces				1 Face		
Contact Bodies	RIM\Cut-Extrud e3								BEARING\Boss-Extrude1		
Target Bodies	BOLT\Chamfer1		BEARING\Boss-Extrude1	BIG PULLEY\Cut-Extrude6	BOLT\Chamfer1						
Protected	No										
Definition											
Type	Bonded										
Scope Mode	Automatic										

Behavior	Program Controlled
Trim Contact	Program Controlled
Trim Tolerance	4.5679 mm
Suppressed	No
Advanced	
Formulation	Program Controlled
Small Sliding	Program Controlled
Detection Method	Program Controlled
Penetration Tolerance	Program Controlled
Elastic Slip Tolerance	Program Controlled
Normal Stiffness	Program Controlled
Update Stiffness	Program Controlled
Pinball Region	Program Controlled
Geometric Modification	
Contact Geometry Correction	None
Target Geometry Correction	None

TABLE 16

Model (A4) > Connections > Contacts > Contact Regions

Object Name	*Contact*	*Contact*	*Contact*	*Contact*	*Contact*	*Contact*	*Contact*	*Contact*	*Contact*	*Contact*	*Contact*

	Region 56	*Region 57*	*Region 58*	*Region 59*	*Region 60*	*Region 61*	*Region 62*	*Region 63*	*Region 64*	*Region 65*	*Region 66*
State	Fully Defined										
Scope											
Scoping Method	G eometry Selection										
Contact	1 Face					2 Faces					
Target	1 Face					2 Faces					
Contact Bodies	BEARING\Boss-Extrude1					BIG PULLEY\Cut -Extrude6					
Target Bodies	BOLT\Chamfer1										
Protected	No										
Definition											
Type	Bonded										
Scope Mode	Automatic										
Behavior	Program Controlled										
Trim Contact	Program Controlled										
Trim Tolerance	4.5679 mm										
Suppressed	No										
Advanced											
Formulation	Program Controlled										
Small Sliding	Program Controlled										
Detection Method	Program Controlled										
Penetration Tolerance	Program Controlled										
Elastic Slip Tolerance	Program Controlled										
Normal Stiffness	Program Controlled										
Update	Program Controlled										

Stiffness	
Pinball Region	Program Controlled
Geometric Modification	
Contact Geometry Correction	None
Target Geometry Correction	None

TABLE 17

Model (A4) > Connections > Contacts > Contact Regions

Object Name	*Contact Region 67*	*Contact Region 68*	*Contact Region 69*	*Contact Region 70*	*Contact Region 71*	*Contact Region 72*	*Contact Region 73*	*Contact Region 74*	*Contact Region 75*	*Contact Region 76*	*Contact Region 77*
State	Fully Defi ned										
Scope											
Scoping Method	Geometry S election										
Contact	2 Faces				1 Face	2 F aces		1 Face	2 Faces	4 Faces	3 Faces
Target	2 Faces				1 Face	2 F aces		1 Face	2 Faces	4 Faces	3 Faces
Contact Bodies	BIG PULLEY\ Cut-Extrude6		SMALL RIM\ Boss-Extrude4						CLAMP\Mirror1[1]		

Target Bodies	BOLT\Chamfer1	CLAMP\Mirror1[1]	CLAMP\Boss-Extrude6	SMALL TYRE\Fillet1	CLAMP\Mirror1[1]	CLAMP\Boss-Extrude6	SMALL TYRE\Fillet1	CLAMP\Boss-Extrude6	CLAMP\Mirror1[2]	CLAMP\Boss-Extrude4
Protected	No									
Definition										
Type	Bonded									
Scope Mode	Automatic									
Behavior	Program Controlled									
Trim Contact	Program Controlled									
Trim Tolerance	4.5679 mm									
Suppressed	No									
Advanced										
Formulation	Program Controlled									
Small Sliding	Program Controlled									
Detection Method	Program Controlled									
Penetration Tolerance	Program Controlled									
Elastic Slip Tolerance	Program Controlled									

Normal Stiffness	Program Controlled
Update Stiffness	Program Controlled
Pinball Region	Program Controlled
Geometric Modification	
Contact Geometry Correction	None
Target Geometry Correction	None

TABLE 18
Model (A4) > Connections > Contacts > Contact Regions

Object Name	*Contact Region 78*	*Contact Region 79*	*Contact Region 80*	*Contact Region 81*	*Contact Region 82*	*Contact Region 83*	*Contact Region 84*
State	Fully Defined						
Scope							
Scoping Method	Geometry Selection						
Contact	3 Faces	4 Faces	2 Faces	4 Faces	3 Faces		4 Faces
Target	3 Faces	4 Faces	2 Faces	4 Faces	3 Faces		4 Faces
Contact Bodies	CLAMP\ Boss-Extrude6		CLAMP\Mirror1[1]			CLAMP\ Boss-Extrude6	

Target Bodies	CLAMP\Mirror1[2]	CLAMP\Boss-Extrude4	CLAMP\Boss-Extrude6	CLAMP\Mirror1[2]	CLAMP\Boss-Extrude4	CLAMP\Mirror1[2]	CLAMP\Boss-Extrude4
Protected	No						
Definition							
Type	Bonded						
Scope Mode	Automatic						
Behavior	Program Controlled						
Trim Contact	Program Controlled						
Trim Tolerance	4.5679 mm						
Suppressed	No						
Advanced							
Formulation	Program Controlled						
Small Sliding	Program Controlled						
Detection Method	Program Controlled						
Penetration Tolerance	Program Controlled						
Elastic Slip Tolerance	Program Controlled						
Normal Stiffness	Program Controlled						
Update Stiffness	Program Controlled						
Pinball Region	Program Controlled						
Geometric Modification							
ContactGe	None						

ometry Correction	
Target Geometry Correction	None

Mesh

TABLE 19
Model (A4) > Mesh

Object Name	*Mesh*
State	Solved
Display	
Display Style	Use Geometry Setting
Defaults	
Physics Preference	Mechanical
Element Order	Program Controlled
Element Size	Default
Sizing	
Use Adaptive Sizing	Yes
Resolution	Default (2)
Mesh Defeaturing	Yes
Defeature Size	Default
Transition	Fast

Span Angle Center	Coarse
Initial Size Seed	Assembly
Bounding Box Diagonal	1827.2 mm
Average Surface Area	6477.9 mm²
Minimum Edge Length	1.0 mm
Quality	
Check Mesh Quality	Yes, Errors
Error Limits	Aggressive Mechanical
Target Quality	Default (0.050000)

Smoothing	Medium
Mesh Metric	None
Inflation	
Use Automatic Inflation	None
Inflation Option	Smooth Transition
Transition Ratio	0.272
Maximum Layers	5
Growth Rate	1.2
Inflation Algorithm	Pre
View Advanced Options	No
Advanced	
Number of CPUs for Parallel Part Meshing	Program Controlled
Straight Sided Elements	No
Rigid Body Behavior	Dimensionally Reduced
Triangle Surface Mesher	Program Controlled
Topology Checking	Yes
Pinch Tolerance	Please Define
Generate Pinch on	No

Refresh	
Statistics	
Nodes	136951
Elements	67081

TABLE 20
Model (A4) > Mesh > Mesh Controls

Object Name	*Face Sizing*
State	Fully Defined
S cope	
Scoping Method	Geometry Selection
Geometry	1 Face
Def inition	
Suppressed	No
Type	Element Size
Element Size	50.0 mm
Ad vanced	
Defeature Size	Default
Influence Volume	No
Behavior	Soft

Static Structural (A5)
TABLE 21
Model (A4) > Analysis

Object Name	*Static Structural (A5)*
State	Solved
Definit ion	
Physics Type	Structural
Analysis Type	Static Structural
Solver Target	Mechanical APDL
Optio ns	
Environment	22. °C

Temperature	
Generate Input Only	No

TABLE 22
Model (A4) > Static Structural (A5) > Analysis Settings

Object Name	*Analysis Settings*
State	Fully Defined
Step Controls	
Number Of Steps	1.
Current Step Number	1.
Step End Time	1. s
Auto Time Stepping	Program Controlled
Solver Controls	
Solver Type	Program Controlled
Weak Springs	Off
Solver Pivot Checking	Program Controlled
Large Deflection	Off
Inertia Relief	Off
Quasi-Static Solution	Off
Rotordynamics Controls	
Coriolis Effect	Off
Restart Controls	
Generate Restart Points	Program Controlled
Retain Files After Full Solve	No
Combine Restart Files	Program Controlled
Nonlinear Controls	
Newton-Raphson Option	Program Controlled
Force Convergence	Program Controlled

Moment Convergence	Program Controlled
Displacement Convergence	Program Controlled
Rotation Convergence	Program Controlled
Line Search	Program Controlled
Stabilization	Program Controlled
Advanced	
Inverse Option	No
Contact Split (DMP)	Off
Output Controls	
Stress	Yes
Surface Stress	No
Back Stress	No
Strain	Yes
Contact Data	Yes
Nonlinear Data	No
Nodal Forces	No
Volume and Energy	Yes
Euler Angles	Yes
General Miscellaneous	No
Contact Miscellaneous	No
Store Results At	All Time Points
Result File	Program Controlled

Compression	
Analysis Data Management	
Solver Files Directory	C:\Users\DELL\AppData\Local\Temp\WB_DELL_16956_2\wbnew_files\dp0\SYS\MECH\
Future Analysis	None
Scratch Solver Files Directory	
Save MAPDL db	No
Contact Summary	Program Controlled
Delete Unneeded Files	Yes
Nonlinear Solution	No
Solver Units	Active System
Solver Unit System	nmm

TABLE 23
Model (A4) > Static Structural (A5) > Loads

Object Name	*Fixed Support*	*Fixed Support 2*	*Fixed Support 3*	*Fixed Support 4*	*Force*
State	Fully Defined				
Scope					
Scoping Method	Geometry Selection				
Geometry	1 Face				
Definition					
Type	Fixed Support				Force
Suppressed	No				
Define By					Vector

Applied By		Surface Effect
Magnitude		1470. N (ramped)
Direction		Defined

Solution (A6)

TABLE 24
Model (A4) > Static Structural (A5) > Solution

Object Name	*Solution (A6)*
State	Solved
Adaptive Mesh Ref inement	
Max Refinement Loops	1.
Refinement Depth	2.
Information	
Status	Done
MAPDL Elapsed Time	51. s
MAPDL Memory Used	1.0039 GB
MAPDL Result File Size	52.063 MB
Post Process ing	
Beam Section Results	No
On Demand Stress/Strain	No

TABLE 25
Model (A4) > Static Structural (A5) > Solution (A6) > Solution Information

Object Name	*Solution Information*
State	Solved

Solution Infor mation	
Solution Output	Solver Output
Newton-Raphson Residuals	0
Identify Element Violations	0
Update Interval	2.5 s
Display Points	All
FE Connection V isibility	
Activate Visibility	Yes
Display	All FE Connectors
Draw Connections Attached To	All Nodes
Line Color	Connection Type
Visible on Results	No
Line Thickness	Single
Display Type	Lines

TABLE 26
Model (A4) > Static Structural (A5) > Solution (A6) > Results

Object Name	*Total Deformation*
State	Solved
Scope	
Scoping Method	Geometry Selection
Geometry	All Bodies
Definition	
Type	Total Deformation
By	Time
Display Time	Last

Calculate Time History	Yes
Identifier	

Suppressed	No
Results	
Minimum	0. mm
Maximum	6.4618e-004 mm
Average	3.8599e-006 mm
Minimum Occurs On	WHEEL CHAIR ONE SIDE FRAME\NONE
Maximum Occurs On	SITTING SEAT\Boss-Extrude5
Information	
Time	1. s
Load Step	1
Substep	1
Iteration Number	1

FIGURE 1

Model (A4) > Static Structural (A5) > Solution (A6) > Total Deformation

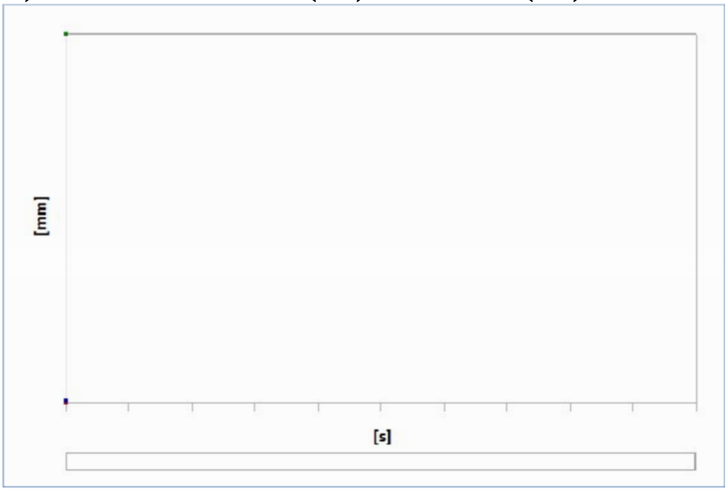

TABLE 27

Model (A4) > Static Structural (A5) > Solution (A6) > Total Deformation

Time [s]	Minimum [mm]	Maximum [mm]	Average [mm]
1.	0.	6.4618e-	3.8599e-

		004	006

Material Data

Structural Steel

TABLE 28
Structural Steel > Constants

Density	7.85e-006 kg mm^-3
Coefficient of Thermal Expansion	1.2e-005 C^-1
Specific Heat	4.34e+005 mJ kg^-1 C^-1
Thermal Conductivity	6.05e-002 W mm^-1 C^-1
Resistivity	1.7e-004 ohm mm

TABLE 29
Structural Steel > Color

Red	Green	Blue
132	139	179

TABLE 30
Structural Steel > Compressive Ultimate Strength

Compressive Ultimate Strength MPa
0

TABLE 31
Structural Steel > Compressive Yield Strength

Compressive Yield Strength MPa
250

TABLE 32
Structural Steel > Tensile Yield Strength

Tensile Yield Strength MPa

TABLE 33
Structural Steel > Tensile Ultimate Strength

Tensile Ultimate Strength MPa
460

TABLE 34
Structural Steel > Isotropic Secant Coefficient of Thermal Expansion

Zero-Thermal-Strain Reference Temperature C
22

TABLE 35
Structural Steel > S-N Curve

Alternating Stress MPa	Cycles	Mean Stress MPa
3999	10	0
2827	20	0
1896	50	0
1413	100	0
1069	200	0
441	2000	0
262	10000	0
214	20000	0
138	1.e+005	0
114	2.e+005	0
86.2	1.e+006	0

TABLE 36
Structural Steel > Strain-Life Parameters

Strength Coefficient MPa	Strength Exponent	Ductility Coefficient	Ductility Exponent	Cyclic Strength Coefficient MPa	Cyclic Strain Hardening Exponent
920	-0.106	0.213	-0.47	1000	0.2

TABLE 37
Structural Steel > Isotropic Elasticity

Young's Modulus MPa	Poisson's Ratio	Bulk Modulus MPa	Shear Modulus MPa	Temperature C

2.e+005	0.3	1.6667e+005	76923	

TABLE 38
Structural Steel > Isotropic Relative Permeability

Relative Permeability
10000

CHAPTER 6

6.1 METHODOLOGY:

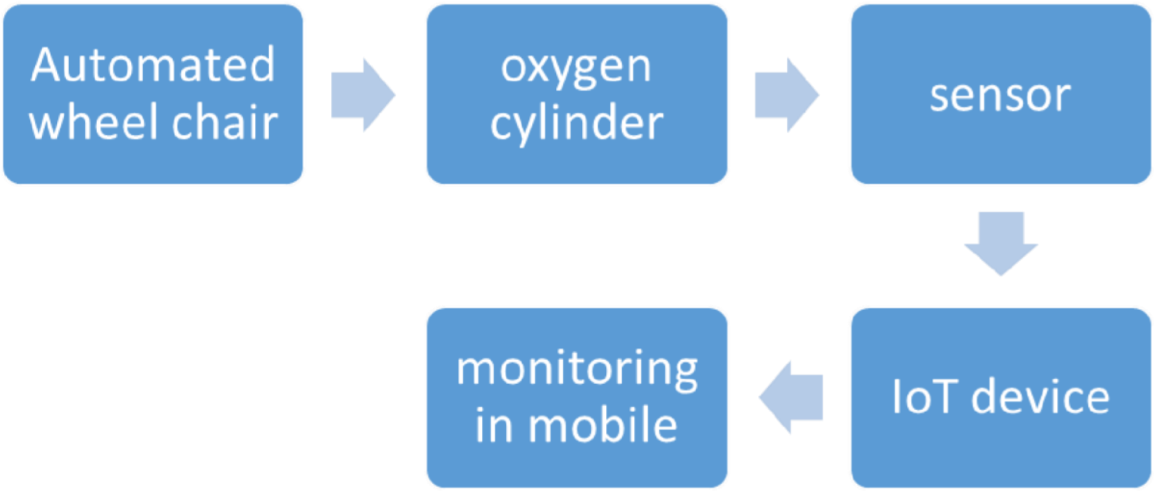

Fig. 6.1 Methodology

6.1.1 AUTOMATED WHEEL CHAIR

A motorized wheelchair, powerchair, electric wheelchair or electric-powered wheelchair (EPW) is a wheelchair that is propelled by means of an electric motor (usually using differential steering) rather than manual power. Motorized wheelchairs are useful for those unable to propel a manual wheelchair or who may need to use a wheelchair for distances or over terrain which would be fatiguing in a manual wheelchair.

They may also be used not just by people with 'traditional' mobility impairments, but also by people with cardiovascular and fatigue-based conditions. Powerchairs are generally four-wheeled or six-wheeled and non-folding, however some folding designs exist and other designs may have some ability to partially dismantle for transit.

Four general styles of powerchair drive systems exist: front, centre or rear wheel drive and all-wheel drive. Powered wheels are typically somewhat larger than the trailing/castoring wheels, while castoring wheels are typically larger than the castors on a manual chair. Centre wheel drive powerchairs have castors at both front and rear for a six-wheel layout.

Powerchairs are generally four-wheeled or six-wheeled and non-folding, however some folding designs exist and other designs may have some ability to partially dismantle for transit.

6.1.2 OXYGEN CYLINDER

In a hospital you have to follow these steps for the easy use of the o2 cylinder.

i. Place the cylinder on the trolly, stand.
ii. After that, you have to connect the regulator with the cylinder.
iii. Ste the pressure and oxygen flow rate by giving instructions.
iv. Connect one end of the gas pipe/cannula to the outflow knob and the other end to the oxygen nasal mask

6.1.3 SENSOR

Technological progress allows more and more sensors to be manufactured on a microscopic scale as microsensors using MEMS technology. In most cases, a microsensor reaches a significantly faster measurement time and higher sensitivity compared with macroscopic approaches. Due to the increasing demand for rapid, affordable and reliable information in today's world, disposable sensors—low-cost and easy-to-use devices for shortterm monitoring or single-shot measurements—have recently gained growing importance. Using this class of sensors, critical analytical information can be obtained by anyone, anywhere and at any time, without the need for recalibration and worrying about contamination.

Analog sensors such as potentiometers and force-sensing resistors are still widely used. Their applications include manufacturing and machinery, airplanes and medicine, of our dayto-day life. There is a wide range of other sensors that measure chemical and physical properties of materials, including optical sensors for refractive index measurement, vibrational sensors for fluid viscosity measurement, and electro-chemical sensors for monitoring pH of fluids.

6.1.4 IOT DEVICE

Iot technologies and Artificial Intelligence technologies to help the users gain mobility and moving freely and safely without needing someone’s help. However, they are too expensive, and their hardware is too heavy which makes the software system response too slow. The wish of most of the people in this world is to be wealthy and successful. However, some just want to have a comfortable and normal life. Due to illness, car accidents, impairment, and eldership this wish became impossible at least to them. People with the mentioned disabilities are increasing every year, therefore people who do not have a suitable wheelchair are increasing, too.

There are many cases where disabled people get fall and injured and sometimes for days nobody knows about their situation. Wheelchair besides other commands. In the autonomous mode, the author used a map designed using an RGBD camera that scans the surrounding environment and an IR sensor to detect obstacles, as using only an RGB-D camera will not be enough as the author declared. In contrast with the above paper who used only one unit of obstacle sensor, have used 4 units of IR sensor surrounding the wheelchair from each side, depending on the direction of the wheelchair, one of the four IR sensors will be activated.

6.1.5 MONITORING IN MOBILE

Here is our list of the seven best IoT monitoring tools

I. Domotz Editor’s Choice
II. Splunk Industrial For Iot
III. Datadog Iot Monitoring
IV. Senseye Pdm V. Sky spark
VI. Team viewer

VII. Aws Iot Device Management

6.2 PARTS

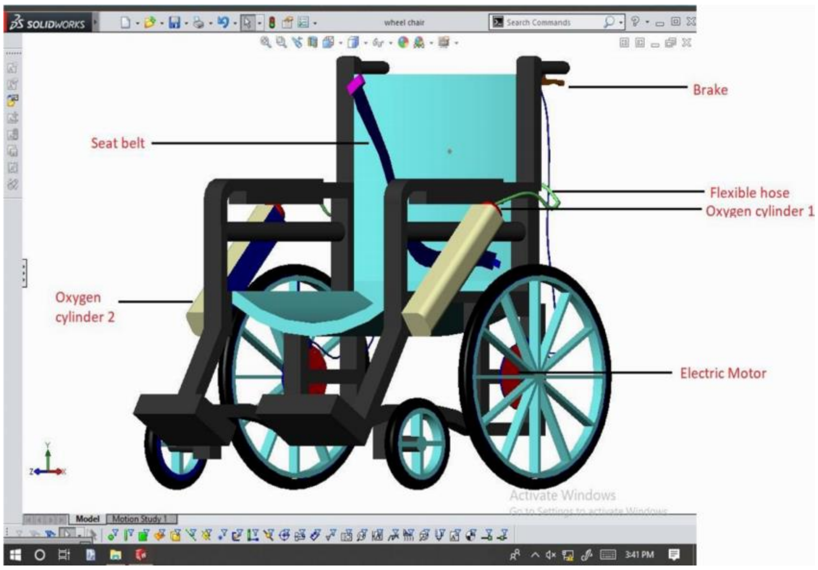

Fig 6.2.1 Parts Name

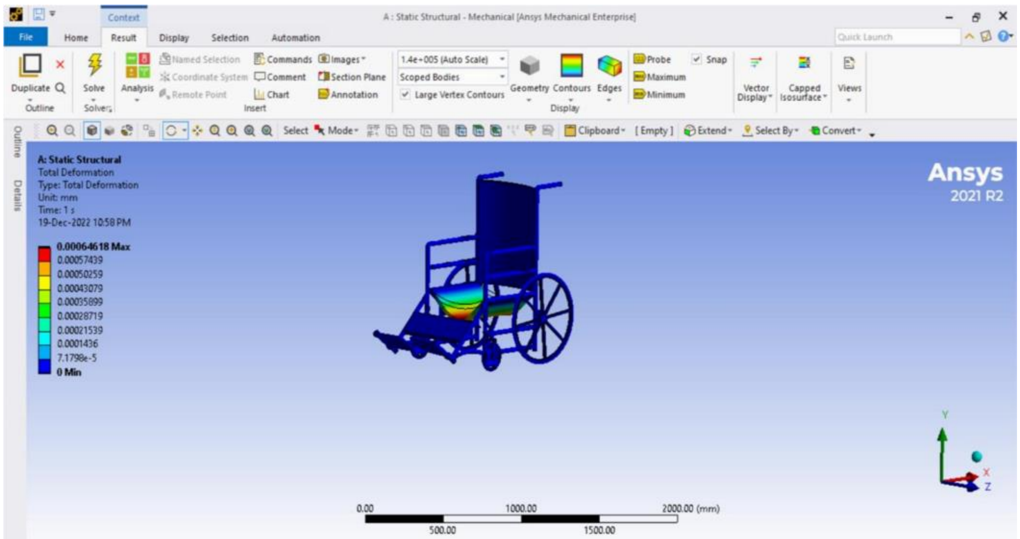

Fig 6.2.2 Ansys

6.3 COST ESTIMATION

SO.NO	MATERIAL	COST RS
1	WHEEL CHAIR	8000
2	OXYGEN CYLINDER'S	16400
3	SENSOR	4000

International Journal for Multidisciplinary Research (IJFMR)
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4	ELECTRIC MOTOR	16500
5	IOT SYSTEM	10800
6	RASPBERRY KIT	7500
7	BRAKE AND MOVING JOYSTICK MECHANISMS	5600
8	REGULATORS AND ATTACHMENTS	3500
	TOTAL	**72,300**

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