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Research Article

Automated Sewer Cleaner With Alerting Mechanism

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ABSTRACT

In our project, the proposal concept is to basically supplant the manual work done in drain gutters with automated systems. We know that water has a great importance in human life and we also know that the place where the water flows such as water inlets/outlets is full of garbage like polythene bags, bottles, edible food wrappers, human/animal/plant waste and industrial effluents like medicinal waste, e-waste, etc. which is responsible for the blocking of water ways resulting in the difficulty of flow of water. Hence, human manual workers are made to clean these areas which is undesirable and may eventually end up in a loss of human life due to the prevailing unsanitary work conditions. This is seen prevalently in India and to eliminate this age-old practice, we came up with an idea which is where our project "Automated Sewer Cleaner with Alerting Mechanism" comes into play which carries out the required task of cleaning and collection of garbage in drain gutters efficiently and also helps prevent the overloading of garbage thus reducing overall human effort which can be spent on doing tasks that are beneficial to society which according to us is key. Furthermore, we are going to install an Ultrasonic electronic sensor which can sense if the amount of garbage in the collecting bin exceeds the prescribed limit and if it does exceed the limit, it sends out an alarm and sends a message using GSM(Global System for Mobile Communications) to the authorities apprising them of the need to send out authoritative workers with specialized equipment to dispose the garbage that has already been collected so that the workers don't have to clean them manually.

CHAPTER 1: INTRODUCTION

Today, the world is quickly growing with new and advanced forms of technology and manual work is being subjugated by the newly introduced 'Automated Technology'. The term 'Automation' is being used extensively and is gaining popularity by the second. It is defined as, in technical terms, technology which carries out jobs and tasks with minimal or no human assistance. Our project "Automated Drain Gutter Cleaner Using An Alerting System" will help clean certain zones of open-air drain gutters which prove to be a hassle for human beings. As a result, these devices reduce overall human effort and save a lot of time which can be used to perform tasks that are beneficial to society.

CHAPTER 2: LITERATURE REVIEW

2.1. LITERATURE REVIEW:

1. **SEWER CLEANER MACHINE:**

The main purpose of this journal was to analyze the problem of cleaning drains and gutters. They provided a solution to that by providing a 100% automated device as mentioned in title above to face issues such as that of gutter jamming. It makes use of an automated drain gutter cleaning system that lets liquids and other substances that can flow to pass through it, but catches significantly more solid wastes likes plastic bottles, food wrappers, etc. This system consists of metal teeth jaws that is placed at the bottom of the mechanism which spontaneously cleans the water in the drainage system randomly and removes waste which forms an efficient way of cleaning water and preventing blockage in turn reducing labor and improving water quality.

2. **DESIGN AND FABRICATION OF REMOTE CONTROLLED SEWAGE CLEANING**
3. **MACHINE**:

The motive of this project was to automate the sewage cleaning process in drains and thereby reduce the spread of germs, bacteria, and diseases to humans. The black water cleaning process helps discourage the infestations of pests by reducing the residues that attract and support pest infestation. It improves shelf life and sensory quality of food products by using a system that avoids the harmful impacts of sewage which in turn helps to prevent mosquito generation from the waste.

4. **SEWAGE CLEANING MACHINE**:

The aim of the above journal is to again supplant the physical work done in drain systems by bringing forth a new semi-automated system in an effective way so as to supervise the jettison of wastes along with systematic sifting of wastes. It uses a pneumatic piston which is connected to a wire rope which is sequentially coupled with some kinematic linkages. The linkage found in the frame is to be immersed into the drain and when the piston is instigated, the grippers at the bottom swell up and collects the solid wastes from the drain which thereby helps in saving money and generation of effectiveness.

5. **AUTOMATIC DRAINAGE CLEANING SYSTEM USING SOLAR PANEL**:

The aim of this study was to devise a new way of replacing manual work in drain cleaning with an automated system wherein a solar panel is used to increase the life span of the drainage system and consequently reduce energy usage from other electrical devices. Furthermore, it claims to avoid the blockage of drainage line caused by solid wastes and to avoid flood situation during rainy seasons.

6. **AUTOMATIC DRAINAGE WATER PUMP MONITORING AND CONTROL SYSTEM USING PLC AND SCADA**:

The aim of this project is basically, drainage water pump monitoring and control system using technologies like PLC and SCADA. Here, PLC is the major supervisory and control unit and the drainage level is monitored by supervisory and authoritative control and data acquisition techniques(SCADA). It is the dominant software used to visualize the functioning of the system which consists of components such as compressor, exhauster, gas sensor, IR sensor, stepper motor, filtering plates and pressure valves.

7. **AUTOMATIC WASTE WATER TREATMENT PROCESS TO REDUCE GLOBAL WARMING:**

The main purpose of this project is to spontaneously clean wastewater so that global warming and melting of glaciers can be prevented. This project deals with hydropower development technology to provide renewable energy so that objects like economic development, adaptation of water supply system can be espoused which are used to address challenges which arise from global climate change, water demand and allocation priority to acknowledge irrigation/industrial/domestic needs, potable pure water suspended in water resources which

will be safe for the environment and prevent global warming which in turn will reduce the melting of glaciers.

2.2. NEED FOR PROJECT:

As we know in our current scenario, humans want to get work done or perform tasks without putting any effort or without moving from place to place. This is the major scenario today. This is where our project "Automated Drain Gutter Cleaner Using An Alerting System" plays a major role because as the name states, it can clean areas in drain gutters and open-air sewer canals without human effort. This role played by our project helps humans to reduce the relative work load and provide time to concentrate on matters that are more beneficial to society. Along with this, our project also saves a lot of time and significantly reduces the loss of the human lives involved which poses as the major problem for these manual workers which is the case when it comes to India. Hence, the need for our project is of great proportions.

2.3. RAW MATERIALS REQUIRED:

The raw materials that are needed for completion of this project are listed below:

1. Sheet Metal
2. Welding gear(Arc welding)
3. Roller Shaft
4. Bearing Set
5. Bearing Cap
6. DC Motor
7. Metal Mesh
8. Battery
9. Nylon Wheels
10. L-Angle Frame
11. Spur Gear
12. Microcontroller Board
13. Ultrasonic Sensor
14. GSM Module

2.4. COMPONENTS OF DEVICE:

The components of our project are given below:

1. **Mesh:** This component revolves around the roller shaft and poses as the support for rake. It is made out of metal.
2. **Rake:** This collects the garbage while resting on the mesh. There are totally 3 rakes installed for maximum garbage collection and are made out of again metal.
3. **Roller Shaft:** There are 2 of these which controls the "conveyor motion" and are welded to the vertical and inclined fixtures. These are also made out of metal.
4. **Electric Motor:** It is a 12V DC motor with power capacity from 60-80 W and speed from 100-250 rpm and is responsible for the operation of the "conveyor motion".
5. **Collecting Bin:** Made from any material and collects the incoming garbage and it can be detached so as to dispose the garbage elsewhere.
6. **Battery:** It is a 12V, 7A lead-acid battery which operates the electronic sensor and the GSM module and the alarm.
7. **Ultrasonic Sensor:** It senses the amount of garbage in the collecting bin and if it exceeds the prescribed limit, it will trigger an alarm and the GSM module.
8. **Alarm:** It is an alarm which is fixed to alert people that the collecting bin has reached its prescribed limit. It is attached onto a microcontroller board.
9. **GSM Module:** As soon as the alarm is triggered by the sensor, the GSM module will send a message to a person or the municipal authorities that the garbage limit has been reached and requires disposal. It has a slot in which a SIM card has to be inserted.

2.5. WORK SCHEDULE/PLAN:

Our project is subdivided into 3 parts spanning over 4 months:

1. Project Initialization and Layout(January)-30%
A. Project Title and Member Initialization-5%
B. Guide Approval and Feasibility Check-5%
C. Cost Estimation-5%
D. 3D Software Designing-10%
E. Bill of Materials-5%
2. Device Fabrication(February+March)-50%
3. Device Testing and 3D Post-Processing/Simulation(April)-20%
A. Environmental Testing-5%
B. 3D Simulation/Post-Processing-5%
C. Final Performance Evaluation-5%
D. Compilation of Data and Preparation of Project Report-5%

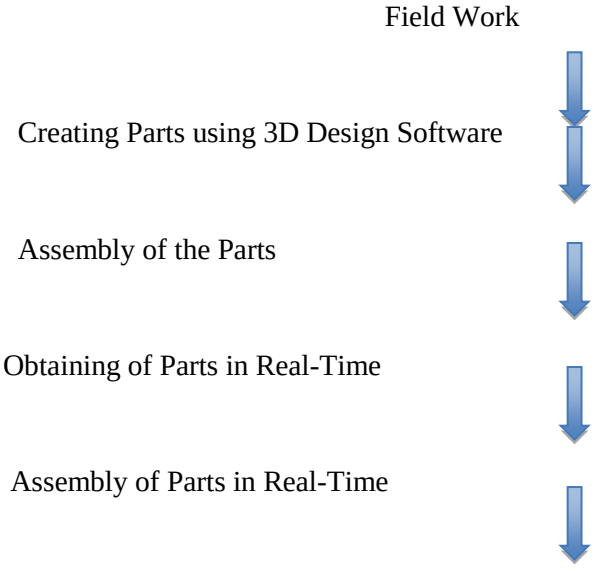
- Actual work plan might change.

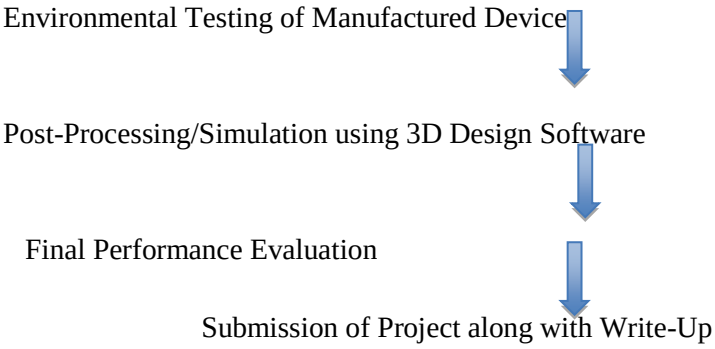
CHAPTER 3: PROBLEM DEFINITION

The main problem in this project is to convert the drawback of a convention into an advantage which is what "problem identification" signifies and the problem in this scenario is that human effort is being wasted in the cleaning and collection of garbage which may also be accompanied by the unfortunate loss of human lives and hence, a lot of time is wasted in performing lowly and inferior jobs like this which don't benefit the society at all and must be discouraged at once as is evident from the consequences. Furthermore, since we're using electronic sensors, alarms and a GSM module, it solves two problems wherein it promotes interval supervision instead of constant human supervision and second, it prevents the already employed manual workers from having to get exposed to the unhealthy work environment found near drain gutters because authoritative workers with specialized equipment will be employed to clean up and dispose the garbage. Thus, we consider our project as the solution to the problem we identified which will help save time and reduce the overall wasted human effort pertinent to these kind of jobs.

CHAPTER 4: METHODOLOGY

The proposed outflow of processes are given below:





4.1. WORKING:

The "Automated Drain Gutter Cleaner Using An Alerting System" works according to the following steps:

1. The "Automatic Drain Gutter Cleaner" is tested for functionality by placing it in a shallow creek or a drain gutter full of waste or garbage.
2. The device manufacturing is completely up to the manufacturer and can vary in size and power according to requirements.
3. Once it is placed in the gutter, the motor is switched on and the roller shaft starts rotating which in turn causes the mesh with the rake attached to it to revolve.
4. The location and position of the device may be changed according to intended collection of wastes.
5. As the garbage approaches the device, they initially get lodged in the mesh waiting for the rake to complete its motion.
6. Once the rake comes back to its initial position, it grabs the garbage and transports it to the top-most position beyond which it falls into a collecting bin.
7. The collecting bin may be detached or removed from fixture so as to dispose the garbage off elsewhere and the collecting bin may be attached again to initiate a new cycle.
8. As the garbage in the collecting bin starts to fill up, an ultrasonic sensor which is attached at the side senses the amount of garbage in the bin. If it exceeds the prescribed limit, the sensor will trigger an alarm which in turn will activate the GSM module which will send a message to a person or the municipal authorities whose contact number is registered with the device.
9. After the message gets sent, people will be alerted and in case the municipal authority gets contacted, authoritative workers with specialized equipment will be sent to the drain gutter site and will be made to clean up or dispose the garbage thus promoting human supervision on an interval basis instead of having to constantly supervise the garbage collection process.
10. Hence, more time can be dedicated to useful work that is actually of benefit to society.

CHAPTER 5: EXPERIMENTAL WORK

The design and the analysis of the manufactured device is explained below as 5 categories using modelling softwares.

1. INDIVIDUAL 3D PARTS:

a. **Metal Fixtures:** This is the support for the whole device and holds the collecting bin in the top-most fixture and it is made from many vertical and inclined fixtures welded together.

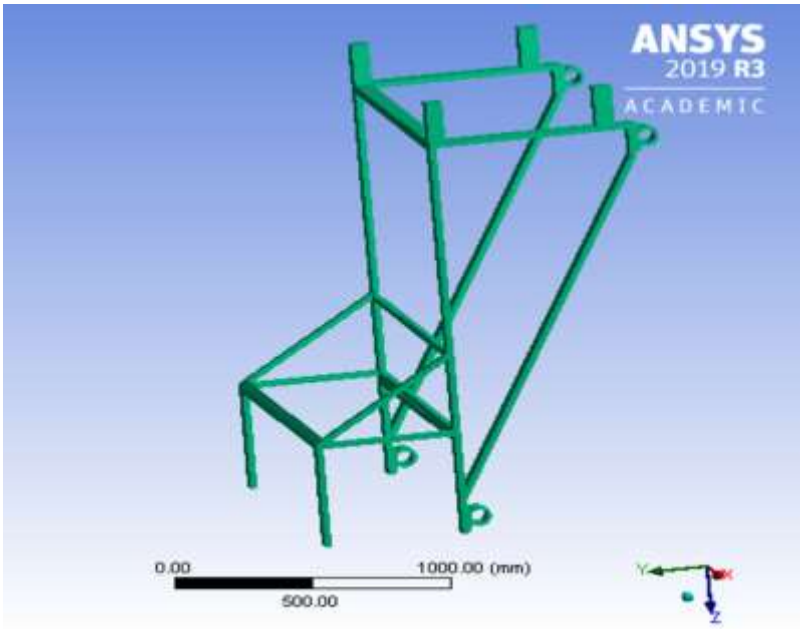


Figure 6.1.

b. Roller Shaft: It is a cylindrical rod made out of metal and it along with the gear makes up the "conveyor motion" mechanism. There are 2 roller shafts: one at the top and one at the bottom.

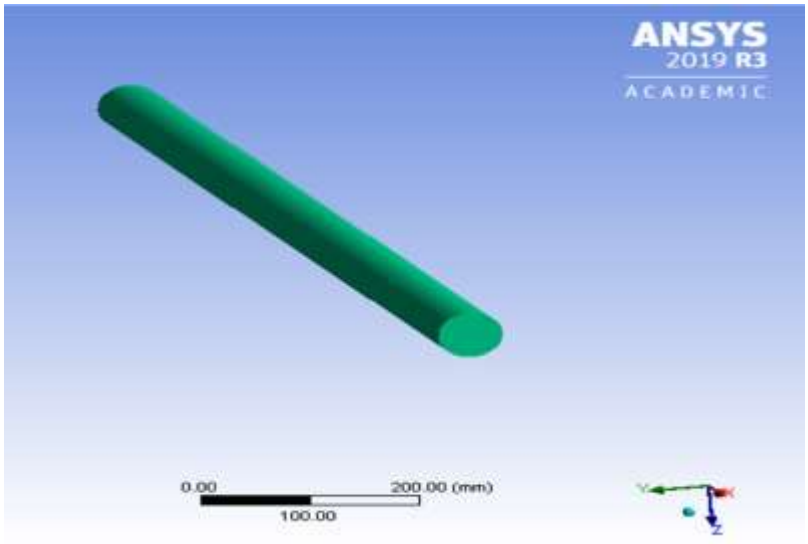


Figure 6.2.

c. Collecting Bin: These are rectangular bins made out of any material which collect the garbage and can be detached from the device fixture to dispose the garbage off elsewhere.

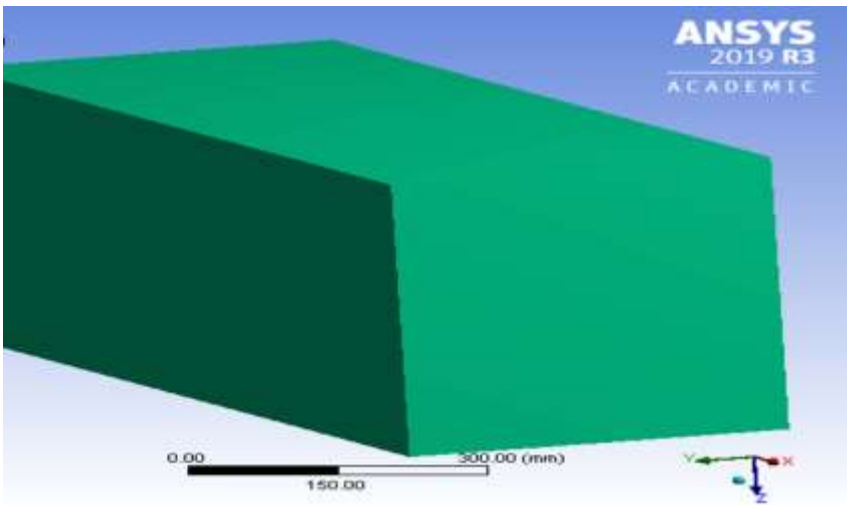


Figure 6.3.

d. Gear: It is a spur gear made out of metal which is fitted with the roller shaft to account for the "conveyor motion" mechanism. The DC motor has a small internal gear attached to it which makes the spur gear rotate.

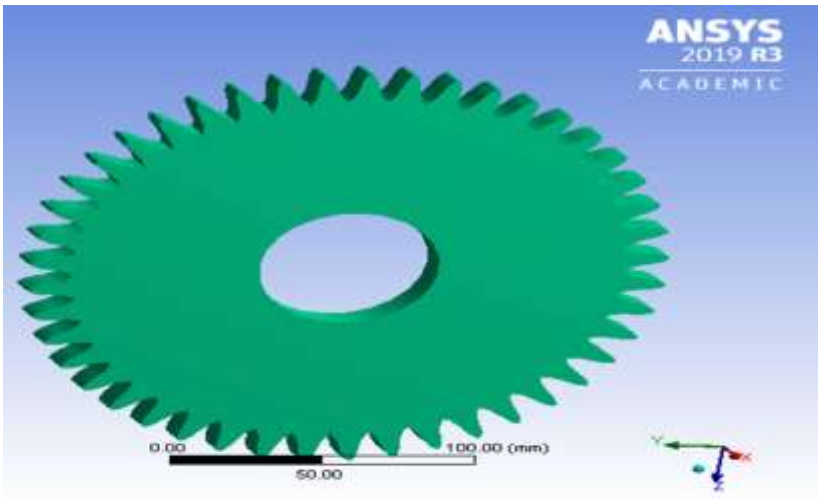


Figure 6.4.

e. Mesh: It is a rectangular sheet of metal which kind of looks like a filter because it has lots of crevices and holes. It acts as the support for the rake which collects the garbage.

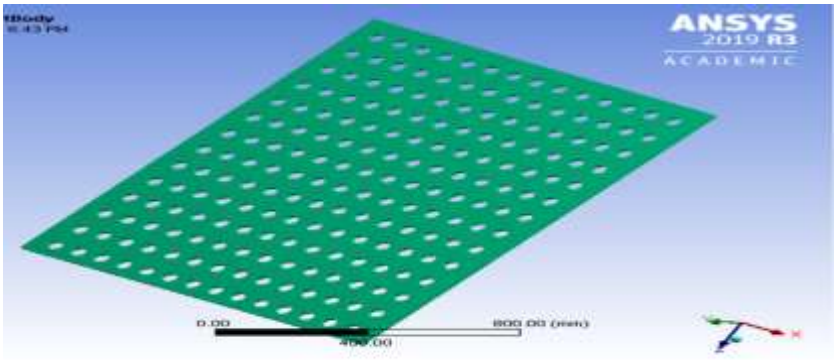


Figure 6.5.

f. Conveyor Belts: This is an alternative solution to the "conveyor motion" mechanism. Roller shaft and gear along with mesh is the technique we used in our project instead of the one mentioned above.

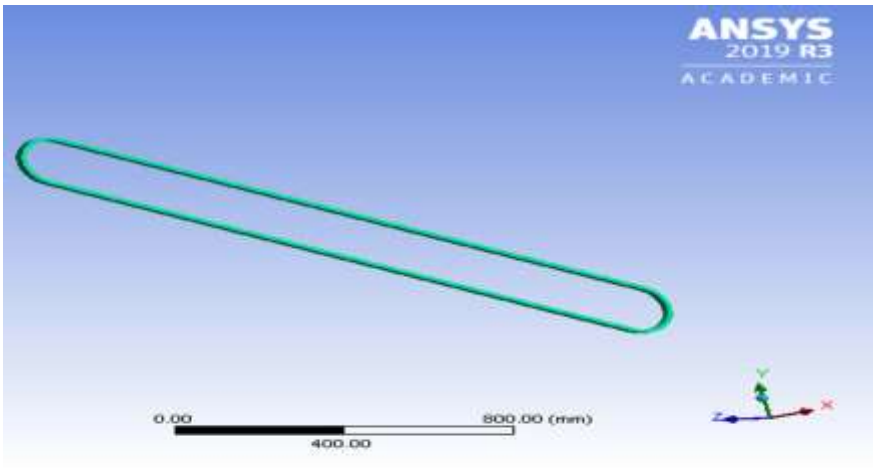


Figure 6.6.

g. Rake: It is made out of metal and is supported by the mesh. This component is the main reason behind garbage collection because it grabs incoming garbage and transports it to the collecting bin.

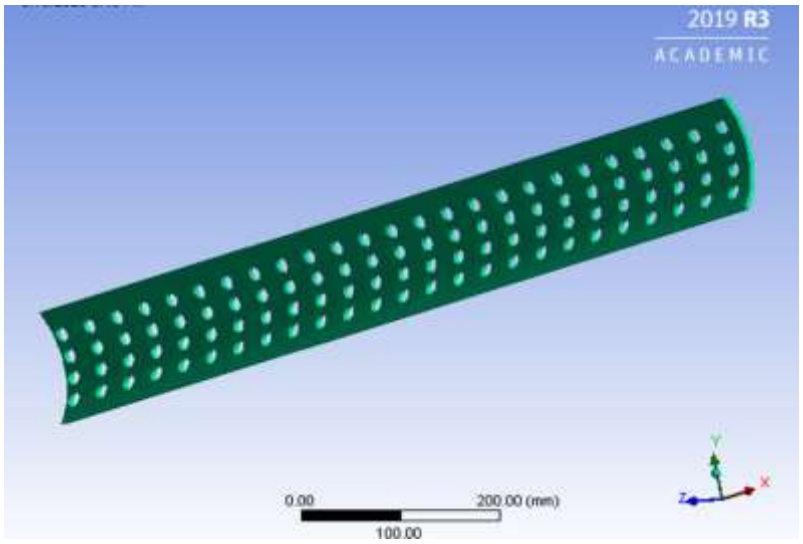


Figure 6.7.

2. ASSEMBLED 3D DEVICE:

The below two drain gutter cleaners have different mesh materials with a different angle of inclination in each to suit user requirements and is shown in a real time landscape and the model like assembly is also shown. These are the assembled versions of the mechanical base product of the device.

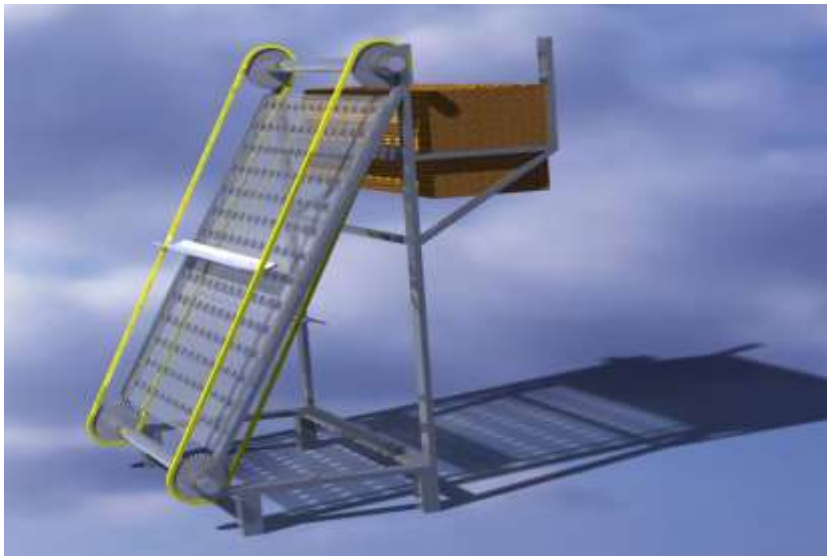


Figure 6.8.

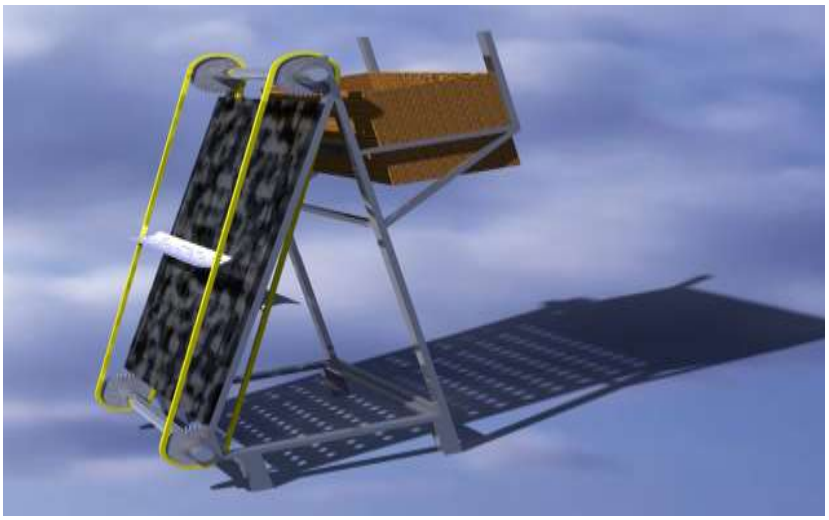


Figure 6.9.

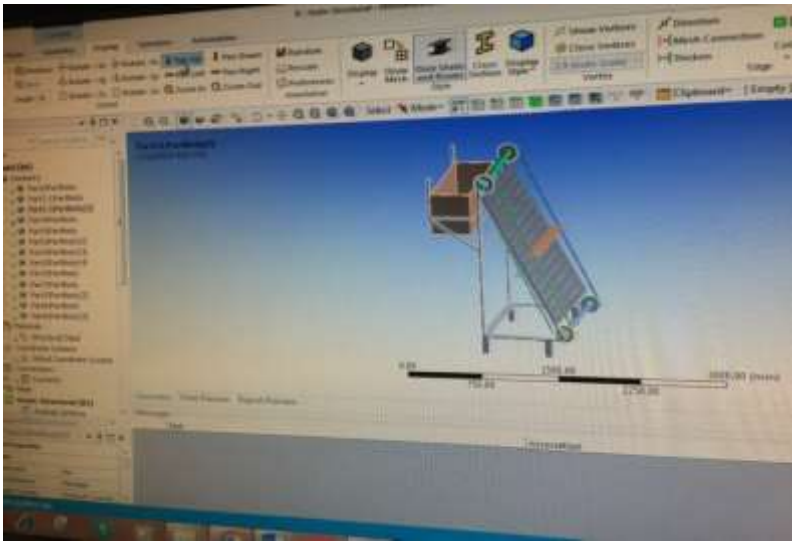


Figure 6.10.

3. COMPONENTS IN REAL-TIME:

a. **DC Motor:** The 12V DC motor which runs at a low speed from 100-250 rpm with power capacity from 60-80 W used in the device to operate the "conveyor motion" is seen below and it also contains a small internal gear which is used to rotate the spur gear.

Figure 6.11.

b. **Gear:** This is a spur gear which along with the roller shaft accounts for the "conveyor motion".

Figure 6.12.

c. **Battery:** It is a 7V, 12A lead-acid battery which is responsible for the operation of the ultrasonic sensor, GSM module and the alarm.

Figure 6.13.

d. Wheels: It is as set of wheels used to roll the device for easy maneuvering.

Figure 6.14.

e. Bearing Set: It is a set of bearings that act as metal casings.

Figure 6.15.

f. Roller Shaft & Bearing Caps: Roller Shaft along with the gear makes up the "conveyor motion" and the bearing cap is fixed at the end of the roller shaft which is in turn welded to the inclined metal fixtures.

Figure 6.16.

g. Mesh: It is a metal mesh which revolves around the roller shaft and consists of many holes and crevices and acts as the support for the rake.

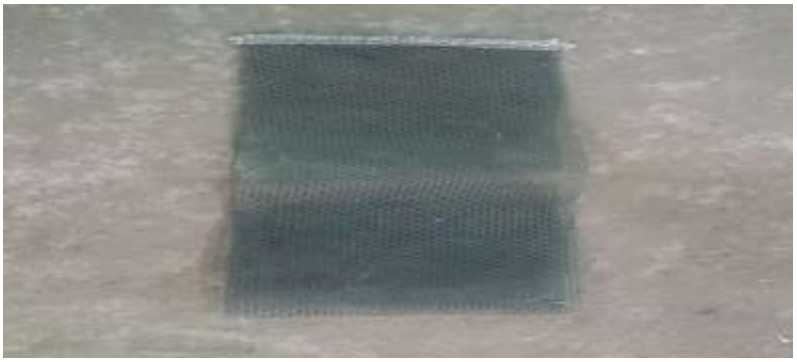


Figure 6.17.

4. 3D ANALYSIS:

The analysis is explained below using Ansys software taking many parameters and quantities into account and the final result taking into account the many parameters are also given. The 3D analysis is done on certain components of the mechanical base product of the device.

a. This image shows the standard earth gravity inclusion on the mesh and collecting bin components which is the first of the "static structural properties".

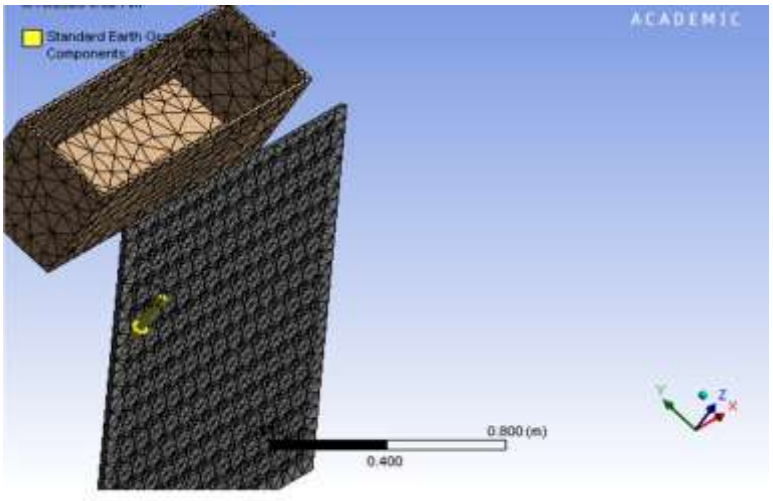


Figure 6.18.

b. This image shows rotational velocity for the same components at a certain location.

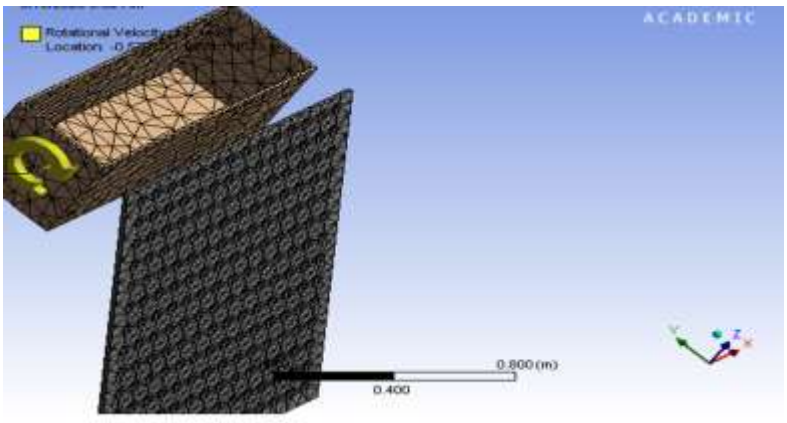


Figure 6.19.

c. This image shows pressure as 212 Pa on certain parts of components as a “static structural property”.

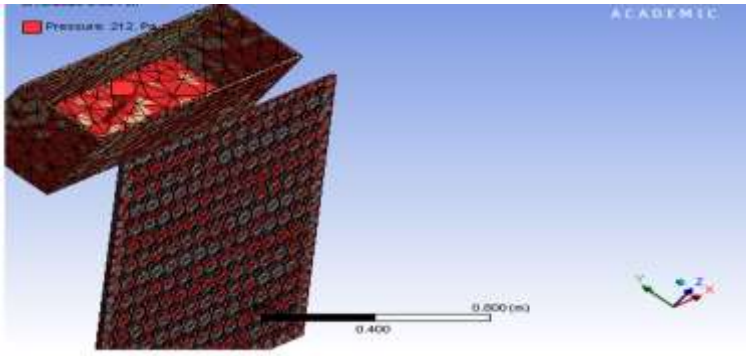


Figure 6.20.

d. This image shows thermal conditions indicated as red colour.

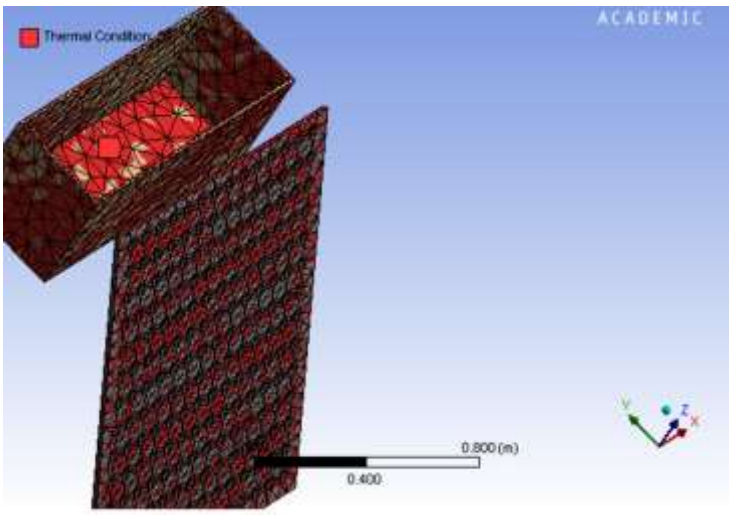


Figure 6.21.

e. It shows a force of 180N on given components.

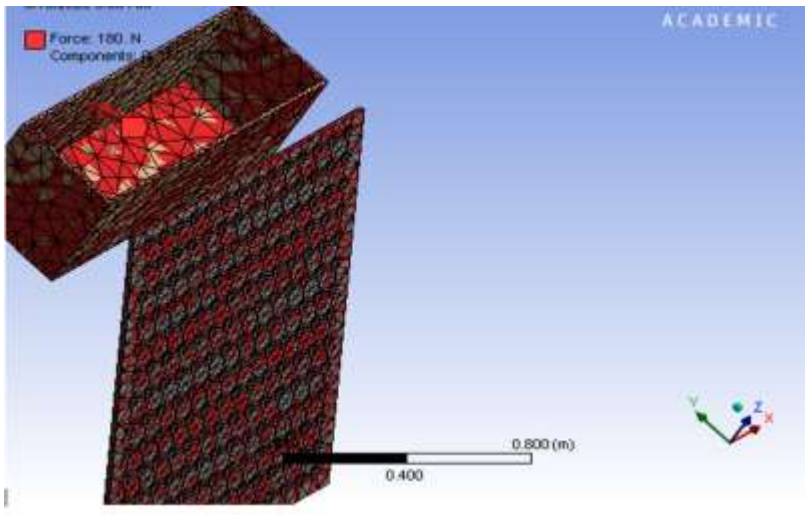


Figure 6.22.

f. Shows fixed support on the same components.

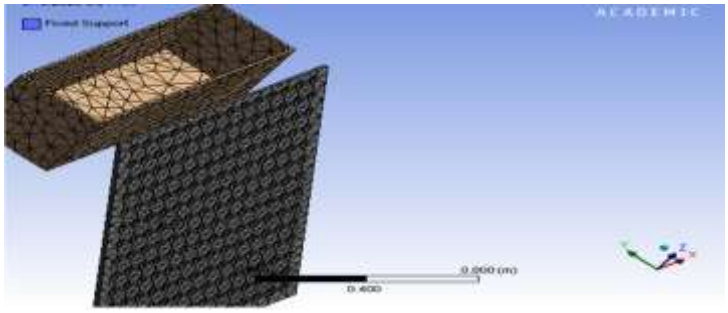


Figure 6.23.

g. Shows total deformation with a wide variety of colours representing different types of deformations. Here, red color indicates maximum deformation and dark blue indicates minimum deformation.

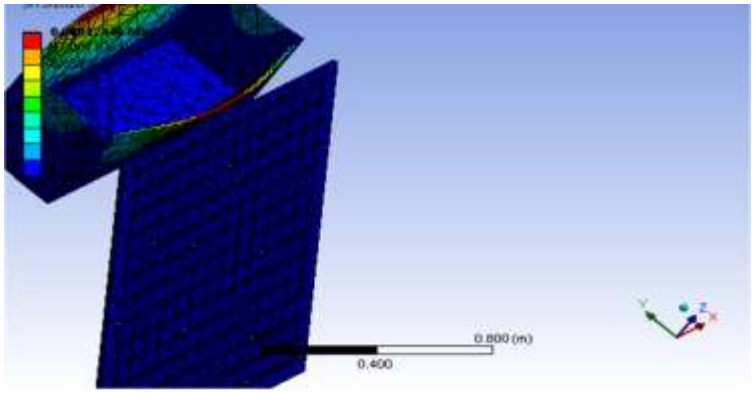


Figure 6.24.

h. Shows the equivalent elastic strain with again, red indicating the maximum value and dark blue indicating the minimum value.

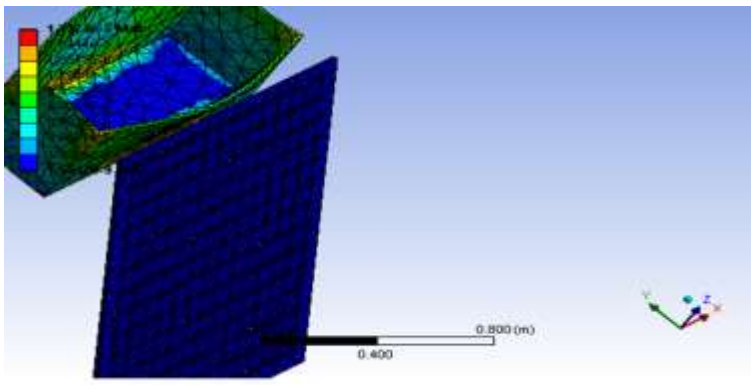


Figure 6.25.

i. Shows equivalent(von-mises) stresses and with the same indications as given above.

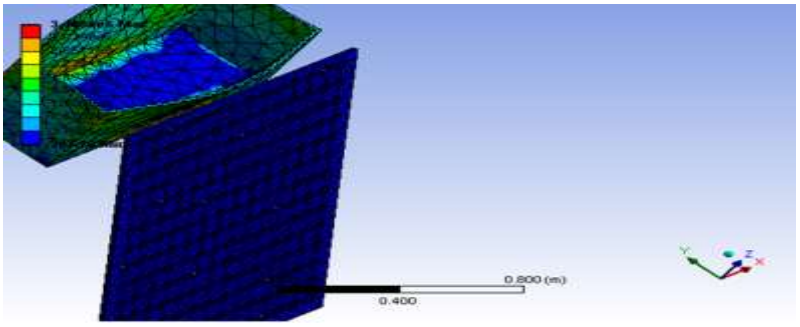


Figure 6.26

j. Shows strain energy with the same indications as given above.

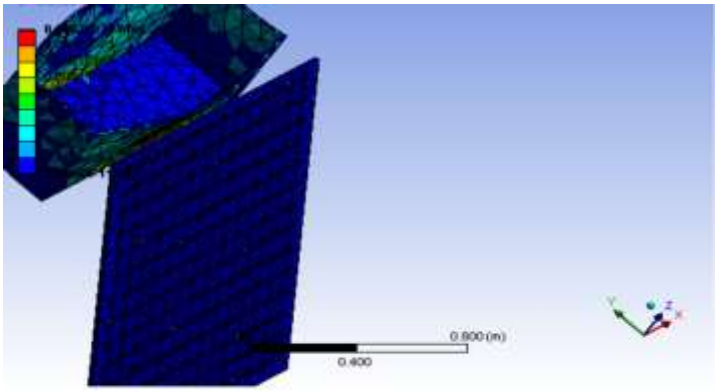


Figure 6.27.

k. Shows nodal triads with red colour indicating X-axis, green indicating Y-axis and finally dark blue colour indicating Z-axis.

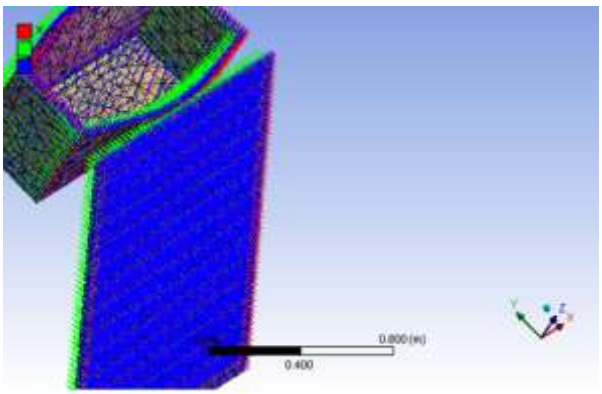


Figure 6.28.

l. Shows elemental triads with same indications as given above.

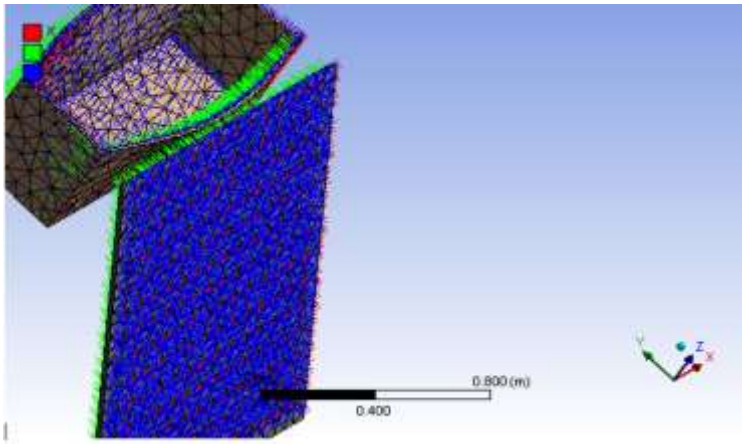


Figure 6.29

m. Shows volume with red colour indicating maximum value and dark blue indicating minimum value.

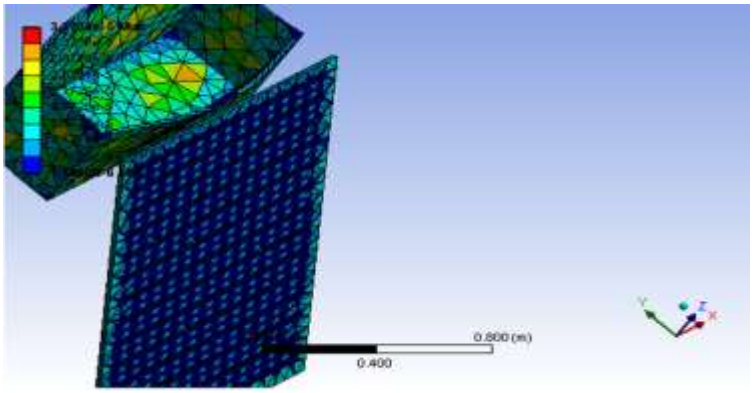


Figure 6.30.

n. Shows safety factor with 15 as maximum value and 15 as minimum value.

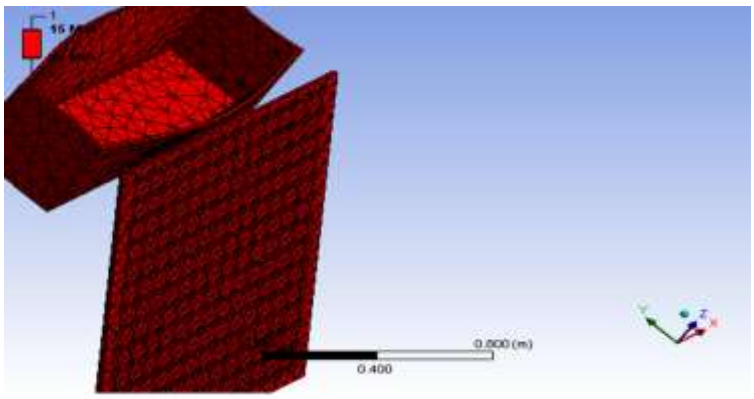


Figure 6.31.

o. Shows life of material with same indications as above but with 6 as peak values.

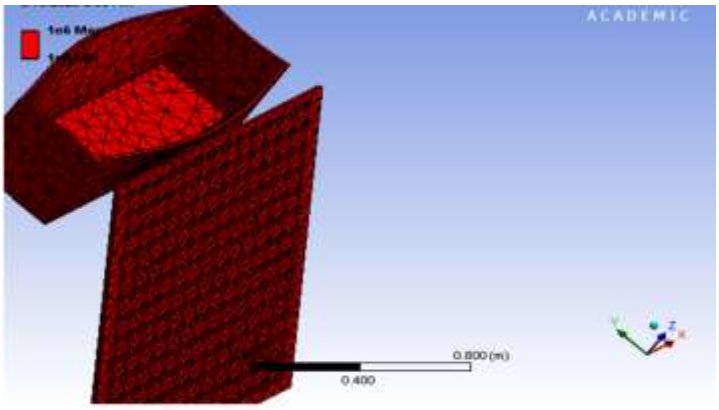


Figure 6.32.

p. Shows damage of material with 1000 as peak values with same indications as above.

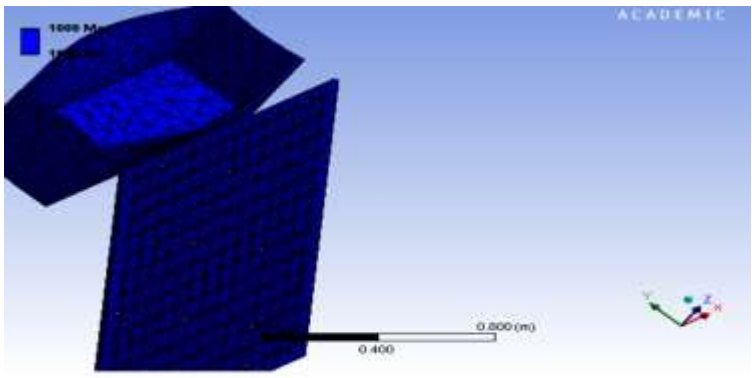


Figure 6.33.

q. Shows biaxiality indication with red indicating maximum values and blue indicating minimum values.

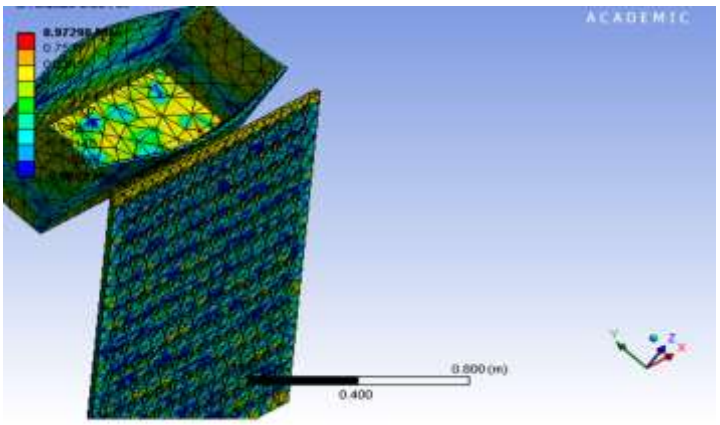


Figure 6.34.

r. Shows equivalent alternating stress with same indications as above.

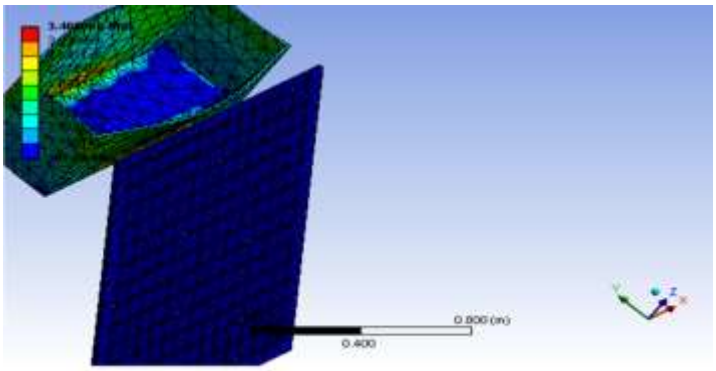


Figure 6.35.

s. The below image shows the mechanical base product meshing of assembled "Automatic Drain Gutter Cleaner Using An Alerting System" and how it would look as a model and this is done to define model based on choosing different element sizes dependent upon local curvature and edge length for all volumes.

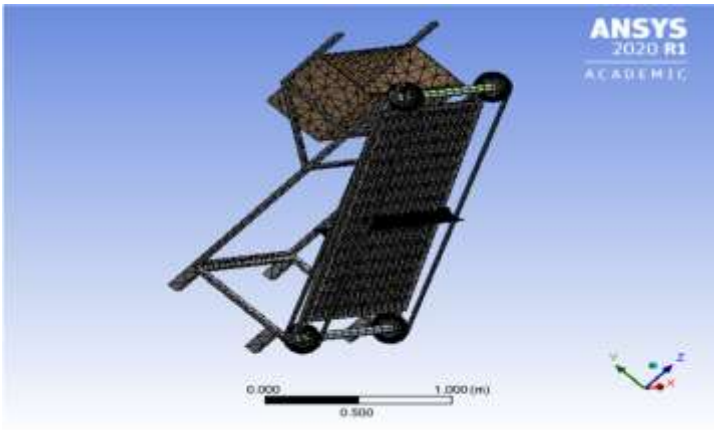


Figure 6.36.

t. The below image displays the geometry of the mechanical base product.

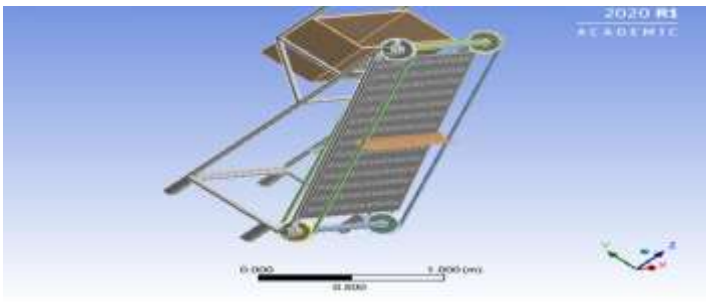


Figure 6.37.

5. DEVICE FABRICATION IN REAL-TIME:

a. Mechanical Fabrication: The mechanical part of the project basically consists of the base mechanical product of the device. It is a combination of many vertical and inclined metal fixtures which are welded together. Two roller shafts connected to two cap rings is is connected to a gear(which make up the “conveyor motion”) wherein the cap rings for both the top and bottom roller shafts is welded to the inclined metal fixtures. There is a DC motor at the top which operates the “conveyor motion”. Rakes are attached to the mesh and collects the garbage as it revolves around the roller shaft and drops it into the collecting bin.

b. Electronics Set-Up: The electronics setup consists of a GSM module which is blue in color and has a slot in which the SIM card can be inserted. The small object at the bottom which has two circular projections is the Ultrasonic Sensor which is responsible for detecting the amount of garbage in the collecting bin. The green device is a micro-controller board which triggers the alarm on the screen at the top. It along with the GSM module and the ultrasonic sensor forms a circuit.

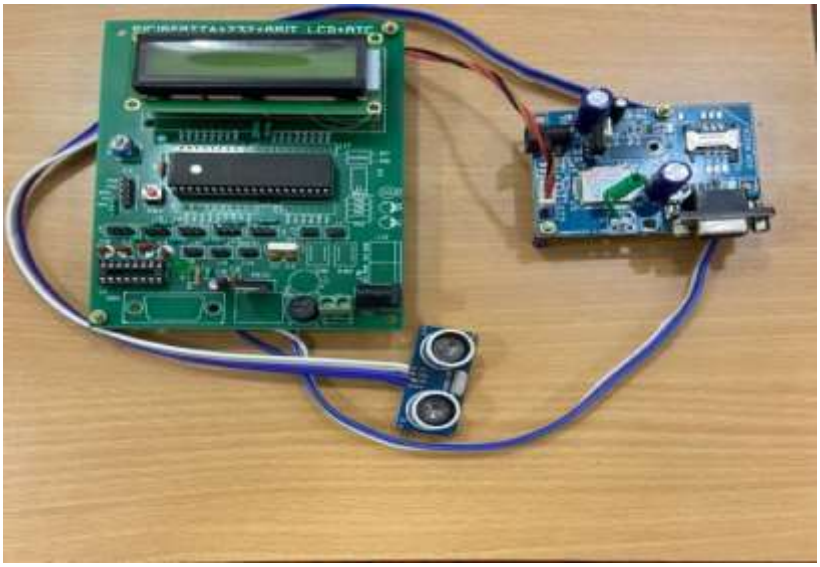


Figure 6.38.

c. Completed Fabrication: The electronics setup has been connected and has been attached to the collecting bin and with this, the project fabrication is completed.

CHAPTER 6: RESULTS AND DISCUSSION

6.1. CALCULATIONS:

The calculations that can be done here have been solved below. Let's first consider the bending stress calculations:

1. **Calculation of Bending Stress:**
   Given: M(Bending Moment)=0.20609 Nm; d(Diameter of Shaft)=20 mm; I(Moment of Inertia)=$9.818 * 10^{-10}$ m^4

We know that (M/I)=(σ/y) from Mechanics of Solids
y=d/2=20/2=10 mm or 0.01 m

Substituting all the given values in the formula, we get:
σ(Bending Stress)=2.099MPa

2. **Calculation of Area & Volume of Collecting Bin**:
   Given: L(Length)= 546.1mm; B(Breadth)= 457.2 mm;
H(Height)=241.3 mm

We know that A=L*B & V=L*B*H

Substituting all the given values in the formula, we get:
A(Area of Collecting Bin)=249677 mm^2 or 0.25 m^2
V(Volume of Collecting Bin)=60247040.796 mm^3 or 0.06025 m^3

3. **Calculation of Battery Power Capacity:**

Given: V(Battery Voltage Rating)=12 V; I(Battery Current Rating)=7 A

We know that P=V*I from Electrical Engineering

Substituting all the given values in the formula, we get:
P(Battery Power Capacity)=84 W

6.2. COST:

The project is basically made up of two parts: the mechanical part and the electronics part which was mentioned above. The mechanical base part alone costs around Rs.15,000 to manufacture and it will take a little more to configure the electronics set-ups and connections, but it will definitely be within Rs.25,000. However, the final cost will always depend on the type of materials used along with the situation for which it will be used. More, the number of quality materials and bigger, the size of the device, higher will be the cost.

6.3. RESULTS:

- Our project helps to avoid using human manual workers to clean the garbage found in drain gutters and sewer canals.
- Prevents them from getting involved in undesirable work and helps to save time and focus our attention on tasks and jobs that actually benefit society.
- Use of our device to clean up garbage found in drain gutters can be done more faster, more efficient and more economically.

- Uses electronics to alert people that the collecting bin is full thereby using digital devices to get work done rather than having to depend upon humans.
- Makes the work of municipal authority easier.
- Usage of a number of these devices in each neighborhood or area's drain gutter in a particular city helps to achieve collection of garbage rated at an efficiency of around 90%.

6.4. MERITS:

The merits of this device are listed below:

1. Reduces the density of garbage in a certain area of a drain gutter and significantly lowers the inflow of garbage so that collection is easier.
2. Reduces overall effort of human manual workers and reduces the threat to their lives.
3. Saves a lot of time which can be used to perform jobs of better benefit to society.
4. Helps to do the dirty work which is undesirable according to human beings.
5. Simple construction and design
6. Quick response is achieved.
7. Promotes interval supervision instead of constant human supervision which is brought forth by the ultrasonic sensor and the alarm.
8. Can easily alert municipal authorities when collecting bin becomes full which is carried out by the GSM module.
9. A row of these devices can maximize garbage collection efficiency to around 90%.
10. It is compact and portable.
11. The cost of production is low and doesn't require any heavy machinery.

6.5. DEMERITS:

The demerits of this device are given below:

1. Initial setup may be a hassle as it requires placement in drain gutters which may lead to human unsettling.
2. It can only collect macroscopic wastes/garbage and not microscopic ones.
3. It can't be installed in drainage canals with high velocity flow so it is recommended the flow either be medium-paced or slow-placed.
4. Cleaning of mesh is sometimes necessary as it may get embedded with many impurities and other wastes i.e. human supervision is sometimes required.
5. It is susceptible to rusting.
6. If chain drives are used, jerks in the chain may occur.

6.6. APPLICATIONS:

The applications of the device are:

1. Catches large solid wastes like bottles, plastics, edible food wrappers which cause accumulation.
2. Used to clean drain gutters and sewer canals which have a mild/medium or slow water flow.
3. This can be done using solar panels too.
4. Can be used by waste treatment plants to help them to reduce their work load.

6.7. FUTURE IMPROVEMENTS:

Some improvements that can be made to this device in the future are:

1. Can be made to use solar panels which can directly operate the motor.
2. More powerful motors can be used to operate it for more number of hours.
3. Bigger collecting bins can be constructed so that human interference can be limited to a minimum.
4. Waste segregators can be used to separate garbage based on nature of garbage's degradability.
5. More sturdier fixtures can be implemented to hold down device in case of stronger or higher velocity water flows such as in case of high current rivers that may be polluted by garbage.

CHAPTER 7: REFERENCES

Some of the literature journals we used which gave us some helpful and informative insights for our project are given below:

I. "Drain/Gutter Cleaner Machine" by N.Dayanidhi from Mech. Engg. Dept. of Wolaitasodouniversity, Ethiopia, B.Babu from Mech. Engg. Dept. of Rathinam Tech. Campus, Coimbatore and S.Damotharan from Mech. Engg. Dept. of Kalaignar Karunanidhi Institute of Tech., Coimbatore, Tamil Nadu.

II. "Design and Fabrication of Remote Controlled Sewage Cleaning Machine" by, C.Manoj Kumar, M.Elamparthi, M.Mohamed Idhris and others from Mechatronics Engg. Dept. of Kongu Engineering College, Erode, Tamil Nadu.

III. "Sewage Cleaning Machine" by S.Ramanathan, R.Sudharshan, Karthik.B from Mech. Engg. Dept. of Sri Sairam Engineering College, Chennai, Tamil Nadu.

IV. "Automatic Drainage Cleaning System Using Solar Panel" by Abishek Anil Batavale, Santosh Dhebe, Durgesh Chinchkar from Saraswati College of Engineering, Navi Mumbai.

V. "Automatic Drainage Water Pump Monitoring and Control System Using PLC and SCADA" by Balachandar.G, Divya.N, Elangovan.K from EEE Dept. of Knowledge Institute of Tech., Salem, Tamil Nadu.

VI. "Drainage Water Treatment" by Lawrence Owens from CSU Fresno, California and Walter.J.Ochs from the Water Management Consultant, Virginia, USA.

VII. "Automatic Waste Water Treatment Process To Reduce Global Warming" by S.D.Rahul Bharadwaj from Automobile Engg. Dept. and Shraddha.R.Jogdhankar from Instrumentation Tech. Dept. of PDA College of Engineering, Gulbarga, Karnataka.

VIII. "Sewage Treatment Based On PLC" by Jiang Jing from Zhang Xuesong Campus, China.

IX. "Wireless Real-Time System for Monitoring the Storage of Urban Storm Drainage" by Yin Hailong Xu Zuxin.

X. "Semi-Automatic Drain for Sewage Water Treatment of Floating Materials" by Gnash.U.L mentioned in IJERT, Vol-5, Jul-2016

- Some of the links of the website URL's that helped me get a better idea on "Automated Drain Gutter Cleaner Using An Alerting System" have been provided below for reference:

1. www.chennaicorporation.gov.in
2. https://learn.sparkfun.com
3. https://nevonprojects.com
4. https://interestingengineering.com
5. https://myengineeringprojects.in
6. https://chennaimetrowater.tn.gov.in

CHAPTER 8: FUTURE SCOPE

This project definitely serves the many needs that humans have and presents a brighter future for advancements in this particular field. With technological advancements popping up everywhere, this mechatronics project can be remodeled to make use of existing and future technologies like AI, Robotics, etc. to make the functioning of the Municipal Corporation in certain cities less encumbered. This project could be incorporated as a new "Automatic Dustbin Lifting System" which can reduce the workload of garbage men by multiple folds and hence the project can be technicalized for future generations.

CHAPTER 9: CONCLUSION

Our project fed us with an amazing opportunity to experience and use the knowledge that we gained to create something innovative. We gained a lot of "hands-on" command over fabrication, assembly and many other aspects of engineering while doing this project work. We think that our project is a good solution to affix the gates between the institutions and the industries. We keep our head up high as we have completed the required work within the stipulated time successfully. Thank you for reading and learning about this paper report that we were passionate about and still are as we had dedicated a lot of time and energy to this. We believe that this idea can bring us closer to "Waste Disposal and Sewage Cleaning" and we hope that you think so too.