



Nutan Maharashtra Vidya Prasarak Mandal's (NMVPM's)
Under Administrative Support - Pimpri Chinchwad Education Trust (PCET)
Samarth Vidya Sankul", Vishnupuri, Talegaon Dabhade
NUTAN MAHARASHTRA INSTITUTE OF
ENGINEERING AND TECHNOLOGY (NMIET)



Exam No.	Roll No.	StudentName	GFM BATCH	Topic
E1 GFM BATCH (Prof.Aniruddha Dubal)				
	1	Gauri Alhat	E1	The Most Dangerous patch of road
	23	Pooja Jagtap		
	10	Pradnya Chougale		
	5	Mayur Dattatray Balgude	E1	Auto Boot Lifter
	8	Ruchita Sanjay Choudhari		
	11	Anuja Dattatray Dudhal		
	22	Prathmesh Dhanaji Jadhav		
	19	Siddhant Jaywant Gudekar		
	3	Aditya Babar	E1	Tech Trolley
	2	Asif Ansari		
	16	Rushikesh Gawade		
	6	Sanjana Barole	E1	Charging Mobile Holder
	20	Shravani Gulhane		
	13	Vijay Garade		
	7	Arnab Bhalerao		
	9	Atharva Chavan		
E2 GFM BATCH (Prof.Vallabh Shinde)				
	24	JAMBHALE SIDDHARTH RAJARAM	E2	Solar Panel Sensor
	28	KSHIRSAGAR SHREESH UMESH		
	31	MANKAR NISHANT SANJAY		
	40	ROKADE ROHIT MAHENDRA		
	42	SHAH ANILKUMAR SURENDRA		
	44	SUTAR BHUSHAN KISHOR	E2	Safety Earbuds for Driver
	32	MODALE TEJAS SATISH		
	33	MUDGUL SHRIKANT SUNIL		
	35	PATIL TEJAS VIJAYKUMAR		
	36	PATIL VAIBHAV RAVINDRA		
	43	SHELKE DEVANG SANDEEP	E2	IOT based water tap sensor
	26	KOPNAR ADESH SAMBHAJI		
	30	MANE SHRUTI MANISH		
	34	PATIL NILESH DNYANESHWAR		
	39	PODALA SNEHA ESHWARAO		
	41	SALUNKE HARSHADA DEEPAK	E2	Automatic Indicator for Two wheeler
	45	THORAT DNYANESHWARI ADINATH		
	25	KOLEKAR SWAPNIL SACHIN		
	27	KOTKAR PRATIK AVINASH		
	29	MADANE NISHANT TATYASAHEB		
	37	PAWAR JEEVAN SURESH		
	38	PHALKE ABHISHEK BALKRISHNA		
	46	TOPE NIRAJ ROHIDAS		

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Exam No.	Roll No.	StudentName	GFM BATCH	Topic
A1 GFM BATCH (Prof.Pratiksha Tanpure)				
F190550004	1	ADKAR OMKAR DNYANESHWAR	A1	Smart Duster for black board
F190550026	4	BALAJI HARISH HULAPPA		
F190550029	5	BANKAR OM RAJENDRA		
F190550041	9	BHISE TEJAS VITTHAL		
F190550089	17	DHUMAL PARTH RAJESH		
F190550140	23	JAGTAP ATHARVA AUDUMBAR	A1	Suspension C
F190550020	3	BAGADE PRADNYA VIKAS		
F190550126	13	HIMANSHU TUSHAR CHAUDHARI		
F190550050	11	BHUJBAL AKSHATA ANANTHA		
F190550096	18	DURAFE SWAPNIL NAGESH		
F190550299	15	PUNIT SANJAYKUMAR DHANDE	A1	Smart Traffic System
F190550084	16	DHANWANI JATIN SHANKAR		
F190550101	19	GAIKWAD ATHARVA HARI		
F190550103	20	GAJBHIYE HARSHAL MANOJ		
F190550309	22	ROHIT RAMPRASAD JADHWAR		
F190550063	14	CHAVAN ARYAN MALHARI	A1	Mom's Tiffin
F190550032	6	BHADANE GAURAV SUNIL		
F190550039	7	BHISE ANJALI KAKASAHEB		
F190550040	8	BHISE SAMRUDDHI RAJESH		
F190550044	10	BHOR PRATIK PANDURANG		
F190550052	12	BIRADAR ANKITA PRAKASH	A2	Contactless AC voltage Detector
F190550108	21	GAWADE PRAJWAL GANESH		
F190550270	44	PATIL SAHIL KIRAN		
F190550153	25	KALE MADHUR ATUL		
F190550262	42	PATIL MRUNAL MANOHAR		
F190550172	28	KHARAGE PRANAV SANJAY	A2	Gas Leakage Detector
F190550238	36	NAGORE AMIT SHIVDAS		
F190550203	31	LONSANE ONKAR MUNJAJI		
F190550220	32	MARATHE CHETAN JIJABRAO		
F190550236	34	MUNOT AKSHADA RAJENDRA		
F190550254	40	PARATE MRUDULA VINOD	A2	APNA LABOUR
F190550184	30	KORE ANUJA PANDHARINATH		
F190550240	37	NAIR ADARSH BIJU		
F190550241	38	NALAWADE PRATHAMESH SANDEEP		
F190550264	43	PATIL NISHANT VINOD		
F190550271	45	PATIL Sampat Balasaheb	A2	APNA LABOUR
F190550247	39	NIKKAM DHURUVARAJ ANIL		
F190550225	33	MISAL PRADEEP NAMDEV		
F190550173	29	KHILARI SANDESH SONABA		
F190550255	41	PARBHANE SHUBHAM DATTATRAYA		
F190550161	26	KARANJE ARADHYA SATISH	A2	APNA LABOUR
F190550237	35	MUTHE SAAE BALKRISHNA		
F190550162	27	KARANKAL NIMISHA JAGDISH		

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F190550276	46	PATIL TANISHKA DAYANAND	A2	Auto cleaning of escalator
F190550149	24	KADAM PARTH MOHAN		
A3 GFM BATCH (Prof.Harshal Sanjay Chaudhari)				
F190550291	50	Sakshi phand	A3	Auto-Stepper
F190550336	61	Pratiksha shinde		
F190550355	66	Hrishikesh Taware		
F190550357	67	Yogesh Thadke		
F190550301	52	Deven Randhir		
F190550292	51	1.Vikas Phatangare	A3	Alum Based Rotary Water Purification
F190550310	55	2.Rohit saini		
F190550348	65	3.Om Suryawanshi		
F190550302	53	4.Atharva Rane		
F190550285	47	Kshitij pawar	A3	Mouse Chappal
F190550287	48	Parth pawar		
F190550335	60	Pranjali shinde		
F190550338	63	Shravani shitole		
F190550384	69	Harshwardhan Yadav	A3	Vehicle Door Opening Vigilant System
F190550325	56	Sameer Shaikh		
F190550327	57	Riya Shedge		
F190550380	68	Srushti Waghmare		
F190550345	64	Kunika Sirpor		
F190550337	62	Siddhi Shinde	A3	Electo-AI
F190550329	58	Aditya Shelar		
F190550288	49	Rutuja Pawar		
F190550314	54	Vishakha Sable		
F190550334	59	Sujal Shimpi		


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A Project Based Learning on
“AUTO-STEPPER”

By

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CERTIFICATE

This is to certify that following students have successfully completed the Project Based Learning entitled "Auto-Stepper" under my supervision, in the partial fulfilment of Bachelor of Engineering (First Year Engineering) of Savitribai Phule Pune University (SPPU)

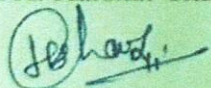
Mr. Hrishikesh Rajendra Taware
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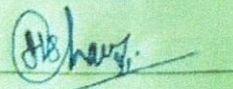
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Exam Seat No.: -F190550336

Date: 15 / 06 / 2023

Place: Pune.

Prof. Harshal Chaudhari

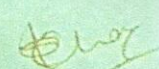

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ACKNOWLEDGEMENT

With all respect and gratitude, I would like to thank all people who have helped me directly or indirectly for the completion of this dissertation work.

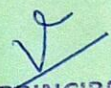
I thank my project guide **Prof. Harshal Chaudhari** for helping me to understand the project topic conceptually in every phase of work. He offered me so much advice, patiently supervising and always guiding in right direction. I have learnt a lot from him and he is truly a dedicated mentor. His encouragement and help made me confident to fulfil my desire and overcome every difficulty I encountered.

I express my heartily gratitude towards **Dr.S.K.Rahane**, Head of department of First Engineering for guiding me to understand the work conceptually and also for providing necessary information and required resources with his constant encouragement to complete this dissertation work.

With deep sense of gratitude I thank our Principal **Dr. Vilas Deotare** and Management of the NMIET for providing all necessary facilities and their constant encouragement and support.

Last but not the least, I thank to all the Teaching & Non teaching staff members of first Engineering Department for providing necessary information and required resources. I am ending this acknowledgement with deep indebtedness to my friends who have helped me.

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Abstract

Investigations on the study of automated side steppers came to the realization that:

Investigations on the study of automated side steppers came to the realization that:

- The objective of the auto stepper is to make footrests more convenient to rest feet.
- Using a motor mechanism for self-opening and closing of foot rest, as per the rider's will.
- Automatic working of footrests without manual efforts is useful for all age group riders and passengers.
- Auto-stepper makes it more comfortable for disabled passengers to open footrest.
- It is not hygienic to open footrests manually. The dust particles and viruses get in direct contact with passenger and rider.
- Due to the automatic working of the Auto-stepper, there are no issues with passenger's and rider's health.
- Avoiding repeated work of opening and closing of foot rest.


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1. INTRODUCTION

We use two wheeler very often in day to day life. It is important part of traveling places, to transport from place to place.

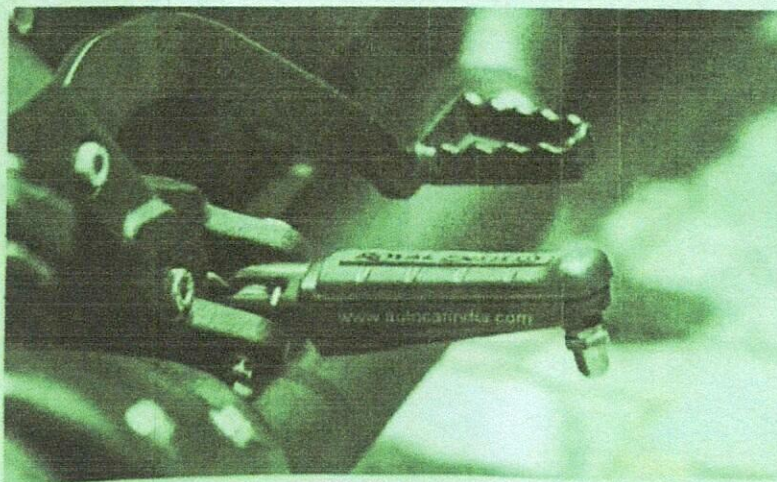
Footrest plays a crucial role for every rider, because keeping our legs on steady footrest ensures our road balance while riding. The automatic footstepper works on the simple mechanism and no need to take extra power.


For instance, A Footrest opening and closing required manual push and Pull by Feet and it seem to be hassle. old people, children, or those whose height is short, those who are weak and not physically fit find this task difficult to push and pull with their Feet. so they open the Footrest by hands before sitting on the two-wheeler. so, their hands get dust or dirt. It is bad for health. But they have no choice.

Nowadays automation has come in almost everything. Automation has reached a high level in two wheeler & Four wheeler so why is there no automation in the two wheeler For the Footrest which is very useful

To overcome this problem, we invented automatic Foot-stepper. An automatic foot -stepper is a device that works on the principle of electric motor mechanism

IN Working of Auto stepper a server motor is used to rotate the Foot stepper as the will of operator. For this purpose, Arduino board is used. Firstly, code is set in it to open and close footrest by 90° which will eventually open and close the footrest.




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1.1 Problem Statement

- Riders can face some problems while riding two wheelers which are related to footrest.
- The person sitting on the backseat of a two wheeler especially a senior citizen finds it difficult to open the footrest by their feet. Also it is difficult for children and weak people. It is difficult for the disabled people to open the footrest before sitting. The person sitting on the backseat of a two wheeler, finds it difficult to open and close the footrest and they feel uncomfortable and awkward to open the footrest by hand in public. Also It is unhygienic to touch the footrest as we step up on it.
- Often, after using the footrest, we do not close it and it remains open even when there is no need and it can cause an accident.
- Also some footrests are horizontally closed and some are vertically closed. So users may find it difficult to use sometimes.
- Many people have back-pain and knee -pain, so it is difficult for them to open the footrest by their hands before sitting on two wheelers and this bending also causes an increase in their pain.
- To prevent this it would be useful to give the access of opening and closing of footrest direct to rider by automatic mode.

1.2 Objectives

Objective:

- 1.To avoid danger of accident.
- 2.To make use of footrest as per the will of operator whenever necessary.
- 3.To open footrest while riding the vehicle which is not possible in current system.
4. To make the mechanism of footrest easy and comfortable for disabled people.
- 3.To make the automatic footrest comfortable for everyone .it provides more comfort to passengers sitting on the back side of the rider
- 4.To reduce manual efforts. (Especially of children and old people)
- 5.To make operation of footrest easy.
- 6.To increase the automations in two wheelers
- 7.To avoid unhygienic touch to footrest. Old passengers get it difficult to open foot rest due to health issues.
8. To improve the riding experience of rider and remove the distraction of opening and closing of footrest manually.

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1.3 Scope

Scope of our project involves:

- Design and implement an automatic footrest system for two-wheelers using a servo motor and Arduino board.
- Create software code to control the servo motor, for better adjustment of footrest.
- Optimize power consumption to ensure efficient operation and minimal impact on the vehicle's electrical system.
- Conduct various tests and validation to make sure the accurate footrest adjustments and overall system performance.
- Evaluate the benefits of the automatic footrest system, including enhanced rider comfort, improved safety, and customization options.
- Document the project, including design specifications, implementation details, testing results, and any recommendations for future enhancements.



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1.4 Proposed Methodology:

The flow chart shown in Figure explains the work methodology for this work.

Proposed Work Methodology (Flow Chart)

As we are aware of Footrest in two- wheeler which we open & close manually; seems quite difficult for old people, children and also weak people. The person seating on backseat of two- wheeler feels uncomfortable while opening the footrest in public. Some people have back-pain & knee-pain so it is difficult for them to open the footrest & this bending also increases their pain. Also it is unhygienic to touch the Footrest as we step up on it.

To make the mechanism of Footrest easy & hygienic for every one we invent the "Auto Stepper" ie. automatic Footrest in two wheelers. Auto Stepper is a Footrest which can open & close automatically as per the requirements by giving access of opening & closing of Footrest directly to rider. For automation of our project we refer multiple research paper such as "Automatic Side Stand & Foot Rest Retrieval System", "Design and Fabrication of Automatic side Stand for two wheeler", etc.

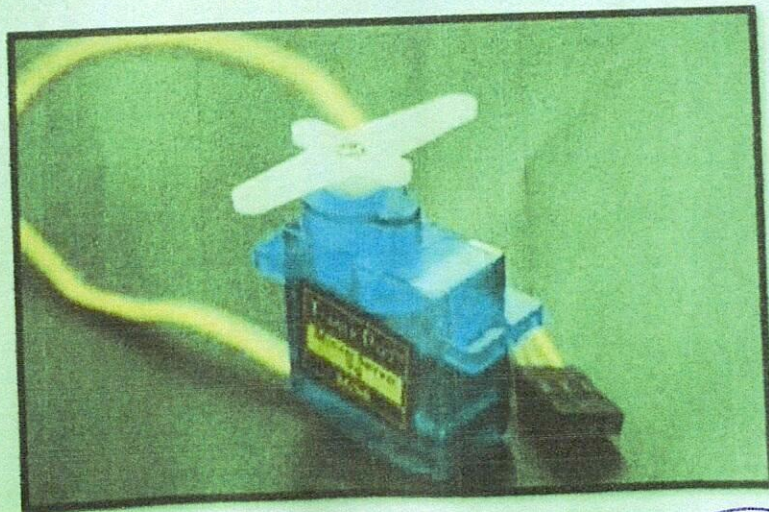
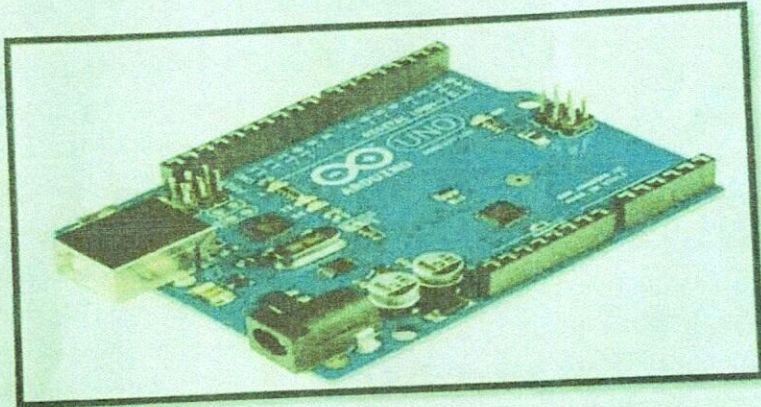
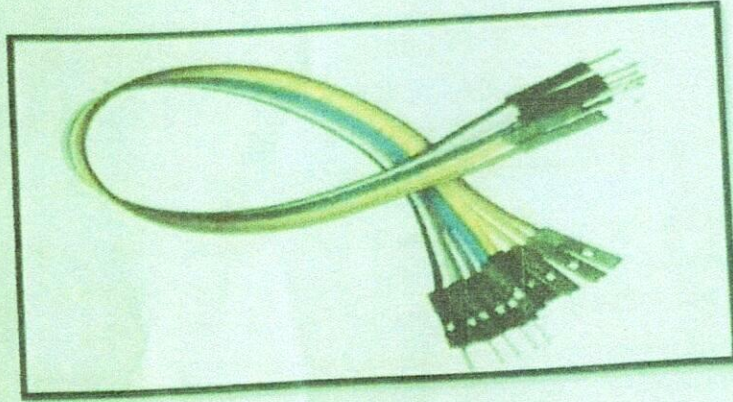
Our project works on electrical and programmable motor. We attach motor near the Footrest of vehicle. The motor which we use is basically a Servo motor. Other Components are Arduino Nano Board, Jumper Wires & a wooden plank. Firstly we set code in the motor to rotate the Footrest in 90° to open & close it. Then we connect the jumper wires and Arduino nano board to the motor. This assembly is then attached to the Footrest & given the access to rider's hand. Wooden plank is attach to Footrest at the downward side to resist the load of person's foot. As the button is pressed by the rider, signal goes to the motor through wires and arduino nano board and then motor will open the foot rest .

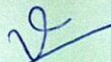
The "Auto Stepper" is the best solution on the problems arises due to Footrest of two wheeler. All problems related to the footrest can be completely solved . As the mechanism of Footrest become automatic it become hygienic & helps to maintain good health.

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2. LITERATURE REVIEW

1. Author Name: Zhan, Lei & Sun, Ji & He, Jin.

"The Design of the Footrest for the Auto Seat Based on the ergonomics"

The design of the footrest used in the auto seat was investigated based on the ergonomics. According to the results, the design path along with the type of the footrest could be described as: i) an adjustment mechanism is necessary for the footrest to meet the requirements of the different groups; ii) the adjustor of the footrest could be realized by using a ratchet mechanism and iii) the hand-operating should be avoided for the using of the footrest and the footrest should be self-closing when it was free of use to realize the passenger protection.

2. Author Name: Roberta LS

"Footrest Electronic an of Development and Research"

This study investigated and developed a prototype, with an emphasis on the ergonomic and inclusive design, aimed primarily at wheelchair users, called Electronic Foot Support. The objective of the prototype is to reduce the problems of the sedentary wheelchair user, and the health problems that may be created. The experimental research consisted of the 14 participants (n = 14) wheelchair users, to verify if the involuntary movements induced by the prototype, would result in a decrease of edema of the feet. Participants used the equipment for 50 minutes, and in 2 (two) of them the water volume remained the same in only one limb, the remainder showed decreased edema. With this study it was possible to confirm the contributions of ergonomic design in the reduction of problems for the product user, and to improve the quality of life for people with physical disabilities.

3. Chia Hoo CHANG, New Taipei City

"REMOTELY ACTUATED VEHICLE FOOTREST"

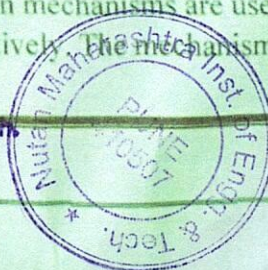
In this paper, An actuatable foot rest system includes a foot rest member pivotably displaceable between a first position to a second position. The actuatable foot rest system may also include a biasing member that biases the foot rest member about the at least one pivotable connection, at least from the first position to the second position. The actuatable foot rest system may further include a remotely actuated retention mechanism that includes an actuator disposed remote from the foot rest member and which maintains the foot rest member in the first position and, when remotely actuated using the actuator, releases the foot rest member from the first position Malika Gawande.

4. Automatic Side Stand and Foot Rest Retrieval System"

In this paper, Accidents in two-wheeler vehicles can be fatal. The main reason which increases the risk of accidents is people forgetting to lift up the side stand of their vehicles. Also it is very common for the pillion rider to forget to unlock the footrest before taking his seat and trying to do that while the vehicle is in motion is a risky affair as it disturbs the balance of the vehicle. The main objective of this project is counter these problems. Electrically operated servo motor driven mechanisms are used to do the end job of lifting and unlocking the side stand and the footrest respectively. The mechanism works

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on the signals sent to it by a microcontroller circuit, which generates these signals based on the user code feed to it. By integrating this mechanism to the vehicle,

the side stand will automatically left off when the ignition is turned on and the footrest will automatically unlock when an adult passenger is seated on the vehicle's pillion

seat. To conclude, this project was designed to reduce the risk of accidents and to make two wheelers more fun and convenient for the rider and passenger and it does a good job accomplishing that.

5. Shri Vikram Tandon

"Automotive Vehicles - Requirements of Footrests for Two-wheeled Motor Vehicles" In this paper, the Government of India felt the need for a permanent agency to expedite the publication of Standards and development of test facilities in parallel when the work of preparation of Standards is going on, as the development of improved safety critical parts can be undertaken only after the publication of the Standard and commissioning of test facilities.

To this end, the erstwhile Ministry of Surface Transport (MOST) has constituted a permanent Automotive Industry Standard Committee (AISC) vide Order No RT-11028/11/97-MVI, dated September 15, 1997. The Standards prepared by AISC will be approved by the permanent CMVR Technical Standing Committee (CTSC). After approval. The Automotive Research Association of India. (ARAI), Pune, being the secretariat of the AIS Committee, has published this Standard. For better dissemination of this information, ARAI may publish this document on their website.

6. Niranjan D Kandhare

"A Review Paper: Optimization of Two-Wheeler Foot Rest Using Composite Natural Fiber Reinforcement"

In this paper, the sisal fiber used to increase the strength of any component. The actual two-wheeler foot rest study will be carried out. The sisal fiber layer will be provided to

the actual foot rest and then the study will be carried out between the original and sisal fiber model of foot rest. The main aim of our project is the optimization of composite

two-wheeler footrest using natural fiber reinforcement. The foot rest will be composed of natural fiber reinforcement.

The 3D model will be drawn with the help of CATIA software. The analysis will be carried out by using ANSYS software. The three-point bending experimental testing will be carried out with the help of Universal Testing Machine. The result & conclusion will be drawn by making the comparison between the experimental & analytical results. After making the result & conclusion the suitable future scope will be suggested.


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7.J. Naveen

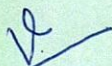
Mechanical and physical properties of sisal and crossover sisal fiber fortified polymer composite in this sisal fiber might be a potential safeguard for polymer composites, past its antiquated applications ropes mats and so on sisal fiber includes potential applications inside the flying machine and vehicle divisions the physical and mechanical practices of sisal fiber rely upon the supply age and area in any case in like manner on their fiber measurement primer temperature check length and strain rate Fiber surface modification or treatment improves surface relationship between the deliquescent sisal fiber and furthermore the hydrophobic substance compound network. this prompts a markdown in wetness absorption Associate in Nursing an improvement of mechanical properties. Surface modification wires: one peroxide impels change of respectability responses a couple of silane treatment deliquescent attributes are frequently modified by indicating long chain structures onto the sisal fiber three stomach area dying down specialist and salt treatment shaping a brutal sisal fiber surface that improves the contact a district of the fiber with the framework and four warmth treatment.

The mechanical and physical practices of sisal fiber-based synthetic compound composites are hard to the gathering approach fiber length fiber introduction fiber

volume division and sort of lattice utilized either thermosetting or thermoplastics sisal fiber-based cream composites take pleasant states of their individual constituents. dead all the split mechanics and break strength of sisal fiber-based composites ought to be thought of altogether. The relationship between the mechanical properties and furthermore the social event methodology ought to be created to utilize sisal fiber successfully in various applications, glass sisal fiber cream composites were conveyed and their mechanical.

2.1 Concluding Remark

By using above literature review we can conclude that, the solutions which we have discussed above is convenient and cheaper. And more advance easy to use and more convenient The technique used is very easy to implement and it can be fit to any two wheelers at cheaper price. Also, it is beneficial for both the passengers. Thus we can overcome all the problems related to footrest which are currently unresolved with the help of automatic system.


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3. PROJECT OVERVIEW

- Basically this project is done to improve the mechanism of footrest of a two-wheeler vehicle. This is achieved by using electronics devices like servo-motor, Arduino board, pcb board and few more.
- The motor is set rotate by 180 Degrees. When it rotates also move the footrest which is attached to it.
- The main goal of this project is to fully automate the working of footrest and to reduce human efforts. Automating the footrest also helps in other ways such as prevention of accidents, helpful for people with short height and old people.
- This design is selected to minimize the cost of project and to give more efficiency

The project aims to develop an automatic footrest system for two-wheelers using a servo motor and Arduino board. The system enhances rider comfort and safety by automatically adjusting the footrest position based on real-time riding conditions. By eliminating the need for manual adjustments, it minimizes rider distraction and allows for a more focused riding experience.

Key features of the system include automatic operation of footrest, allowing riders to use footrest while riding to ensure comfortable riding experience.

The project involves designing and implementing a mechanism that connects the servo motor to the footrest, ensuring smooth and accurate adjustment of footrest. It also includes developing the necessary software code to send desired signals to servo motor and control its rotation.

Many tests and validation are conducted to see the system's performance under various riding conditions. Factors such as footrest position accuracy, response time, power consumption, and user experience are taken into consideration so that system meets the desired objectives.

The project's benefits include enhanced rider comfort, improved safety by reducing distractions. The system can be integrated into existing two-wheeler models, providing a versatile solution for manufacturers and riders alike.

Documentation of the project, including design specifications, implementation details, and recommendations for future enhancements, is an important aspect to enable replication and further development.

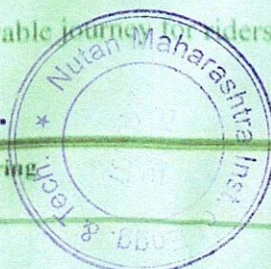
Overall, the automatic footrest system for two-wheelers offers convenience, safety, and customization, enhancing the riding experience and providing a more enjoyable journey for riders.


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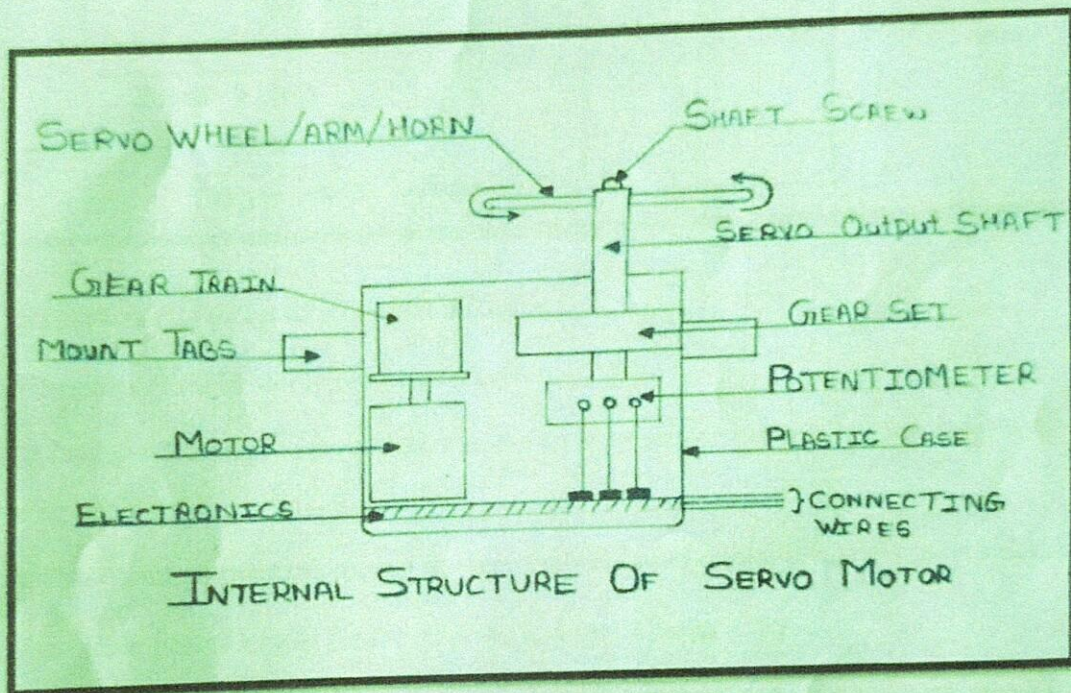


4. EXPERIMENTAL SET-UP

4.1 General View/photos of Experimental Set-Up

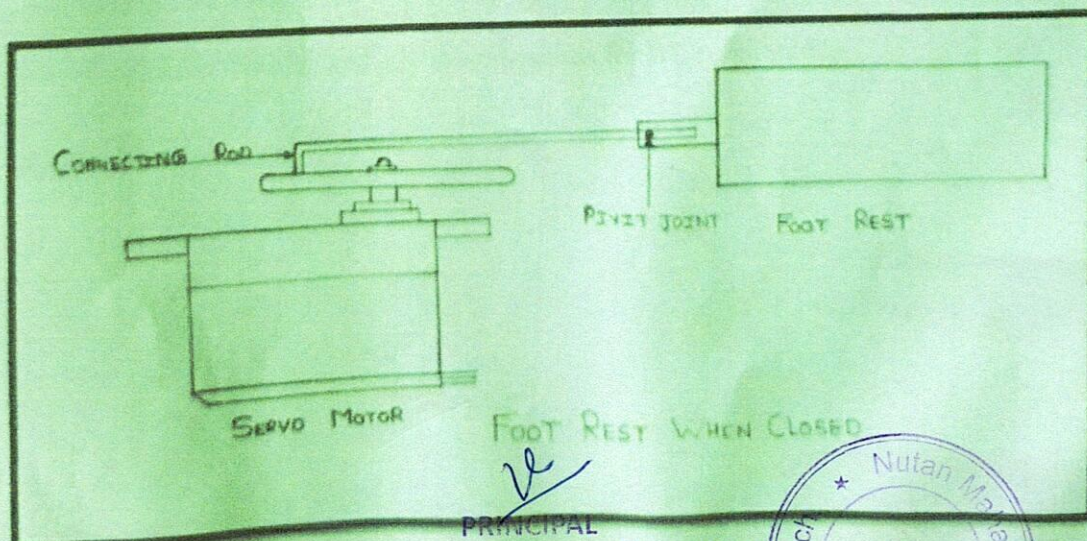
And assembly is as shown in figure

1. Internal Structure Of A Servo-Motor



2. Working Mechanism

i. Footrest When Closed:



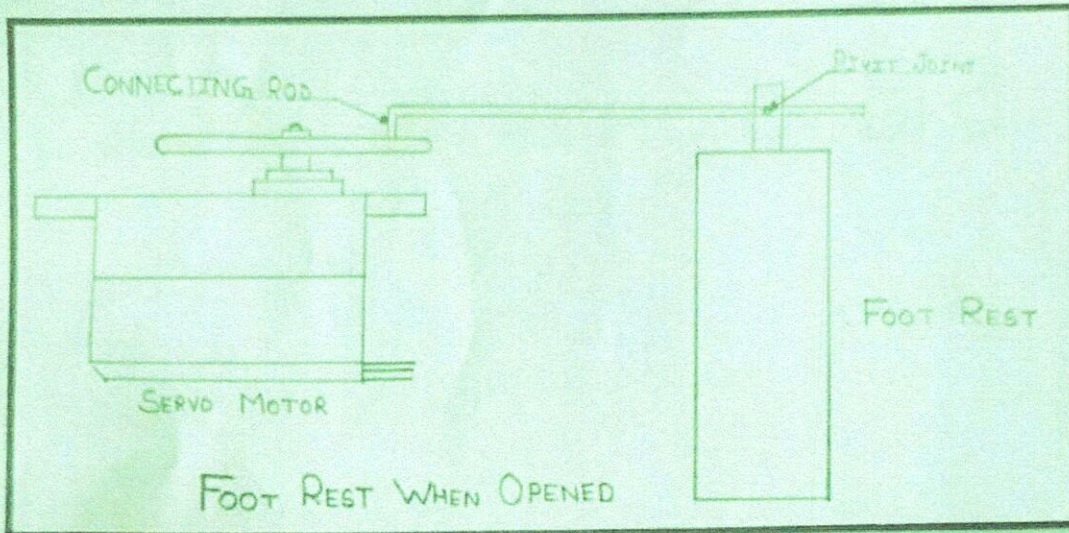
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ii. Footrest When Opened:



• Experimental setup of a project includes :

1. A setup of an adjustable footrest of two wheeler.
2. Connect a digital highspeed servo motor to the footrest setup via a mechanism for smooth opening and closing of footrest.
3. Use a Nano Arduino board to control the servo motor based on the inputs given by rider.
4. Ensure a stable power supply for the Arduino and servo motor setup.
5. Develop software code for footrest adjustment including manual override and customisable position.
6. Fine-tune software parameters for accurate footrest adjustments.
7. Conduct extensive testing under various riding conditions to validate system performance.
8. Document the setup, results, and any modifications for future reference.


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Code for arduino board

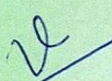
```
```cpp
#include <Servo.h>

// Create a servo object
Servo servoMotor;

void setup() {
 // Attach the servo to pin 9
 servoMotor.attach(9);
}

void loop() {
 // Rotate the servo to 0 degrees
 servoMotor.write(0);
 delay(1000);

 // Rotate the
```

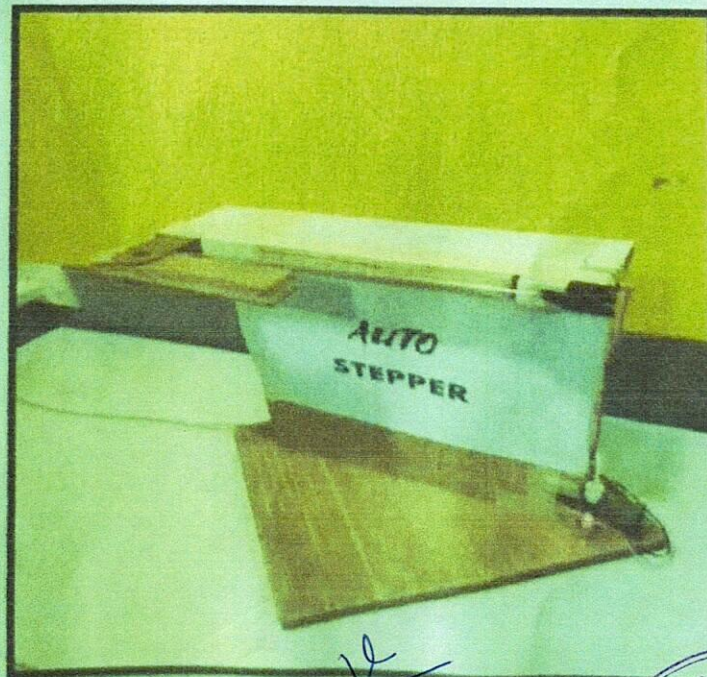
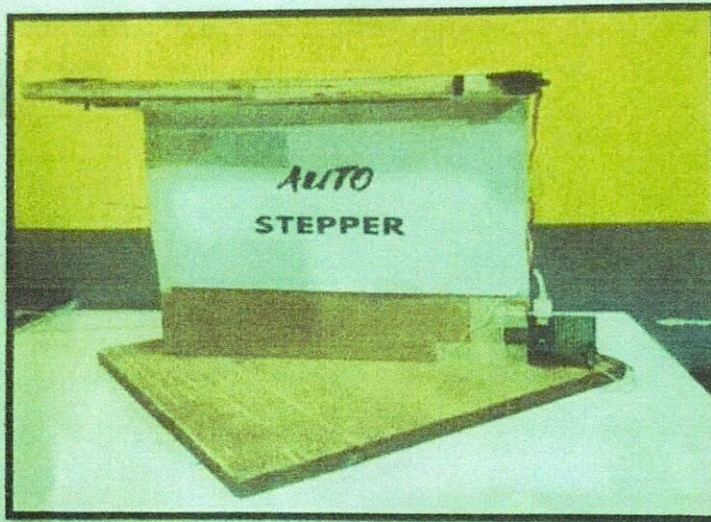
  
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#### 4.2 Test and trial on the roll forming machine-(procedure)

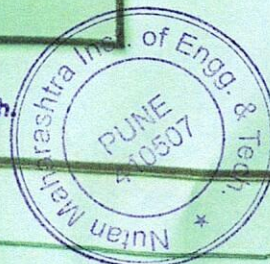
Testing is done on the Arduino Nano Board by adding various codes to get the proper measure of rotation required to rotate the footrest. Then the mechanism to attach the footrest to the motor shaft was tested to get The rotation of footrest in proper order. Then designs for the place to keep the Arduino board and the Motor was decided.

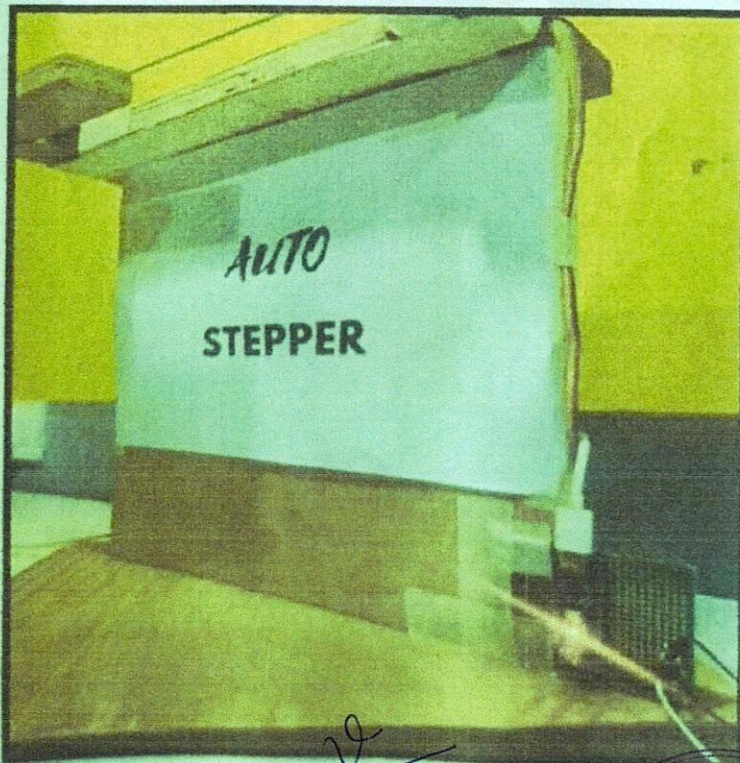
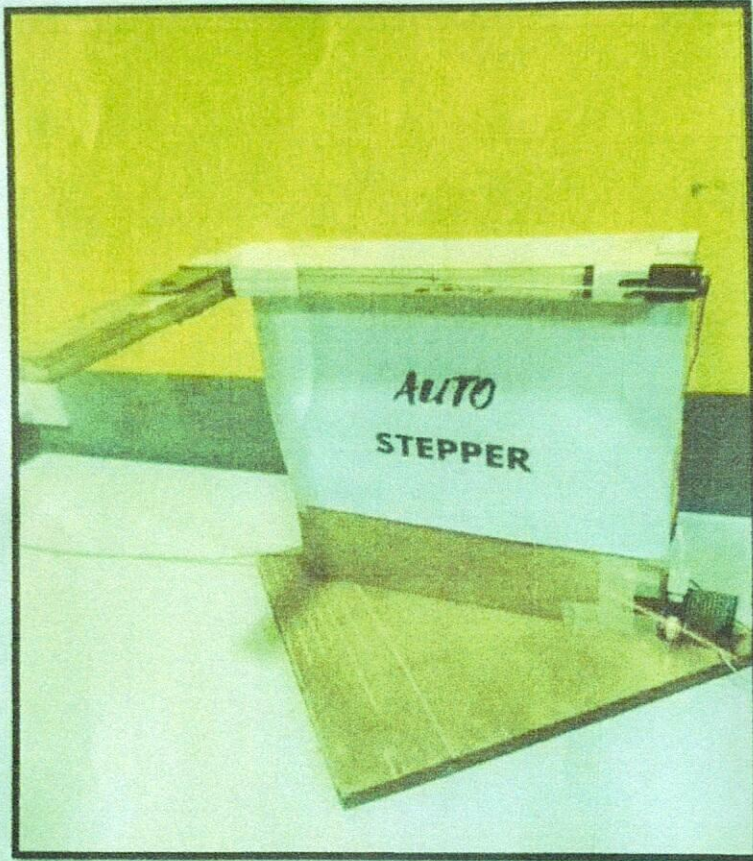
Model Prototype:



  
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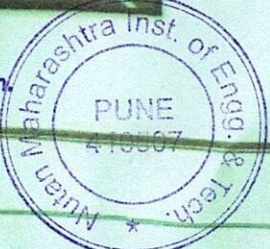




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## 5.COST ESTIMATION

TABLE VI  
COSTING

Sr.No.	Components	Quantity	Cost/Unit	Total Cost
1	Servo Motor	1	330	330
2	Arduino Nano Board	1	330	330
3	Male To Female Connectors	10	2	20
4	PCB Board	1	40	40
5	Female Connectors	2	20	40
	<b>Grand Total</b>			<b>740/-</b>

  
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## 6. CONCLUSION

After studying the above literature review, we concluded that the mechanism which we have used is convenient, cheaper. It performs all the functionalities which are not in current version of footrest and make footrest easy and more convenient to use, Although being cheaper it gives us the required efficiency required.

The Auto stepper has simple and easy functional set up, Which allows it to fit on all two wheeler Bikes

It's simple Mechanism and structure makes it easy to use. It is for all two-wheeler vehicles. Thus, we can successfully overcome problems related discussed above related to footrest which are unresolved by automating the footrest.

In conclusion, the development of an automatic footrest system for two-wheelers using a servo motor and Arduino board has been successfully accomplished. The project aimed to enhance rider comfort, and improve safety of rider while riding bike.

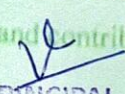
Through careful design and implementation, a mechanism was created to connect the servo motor to the footrest, allowing for smooth and accurate opening and closing of footrest.

The software code developed for the Arduino board effectively open and closes the footrest on the riders will to improve riding experience.

Various testing and validation were conducted to check the system's performance under various riding conditions. The system demonstrated accurate footrest adjustments, responsive behavior, and improved rider comfort. The benefits of the automatic footrest system, including reduced distractions and enhanced safety were achieved.

Documentation of the project, including design specifications, and implementation details has been prepared for future reference and replication. The project serves as a successful proof-of-concept for the implementation of an automatic footrest system in two-wheelers, providing a foundation for further development and improvements in the field.

Overall, the automatic footrest system has proven to be a valuable addition to two-wheelers, offering convenience, and safety. It provides riders with a more comfortable and enjoyable riding experience, while also promoting safer riding practices by reducing distractions. The project successfully achieved its objectives and contributes to the advancement of two-wheeler technology.

  
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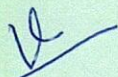


## 7. FUTURE SCOPE

- The current mechanism used in the project may face some difficulties in different vehicle. Slight modifications will be required based on the design of the vehicle.
- This version of auto-stepper is made by optimizing the budget to make it consumer friendly. However, if the budget is increased, there are few modifications that can be done in the design to reduce human efforts.

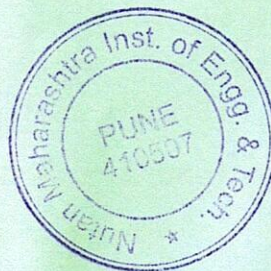
### ❖ Few Future Modification Ideas:

1. First modification that can be done is by removing the current button mechanism but instead adding a pressure sensor under the rear seat which will sense the weight of the person sitting on the rear seat (if any) and activate the motor to bring out the foot rest.
2. Another way to modify the mechanism is by automating the bike-stand. Just as the footrest, we can also automate the stand and give a button at the driver UI to access the stand. This will be helpful for people with short height as they find it difficult to reach their foot till the stand.



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