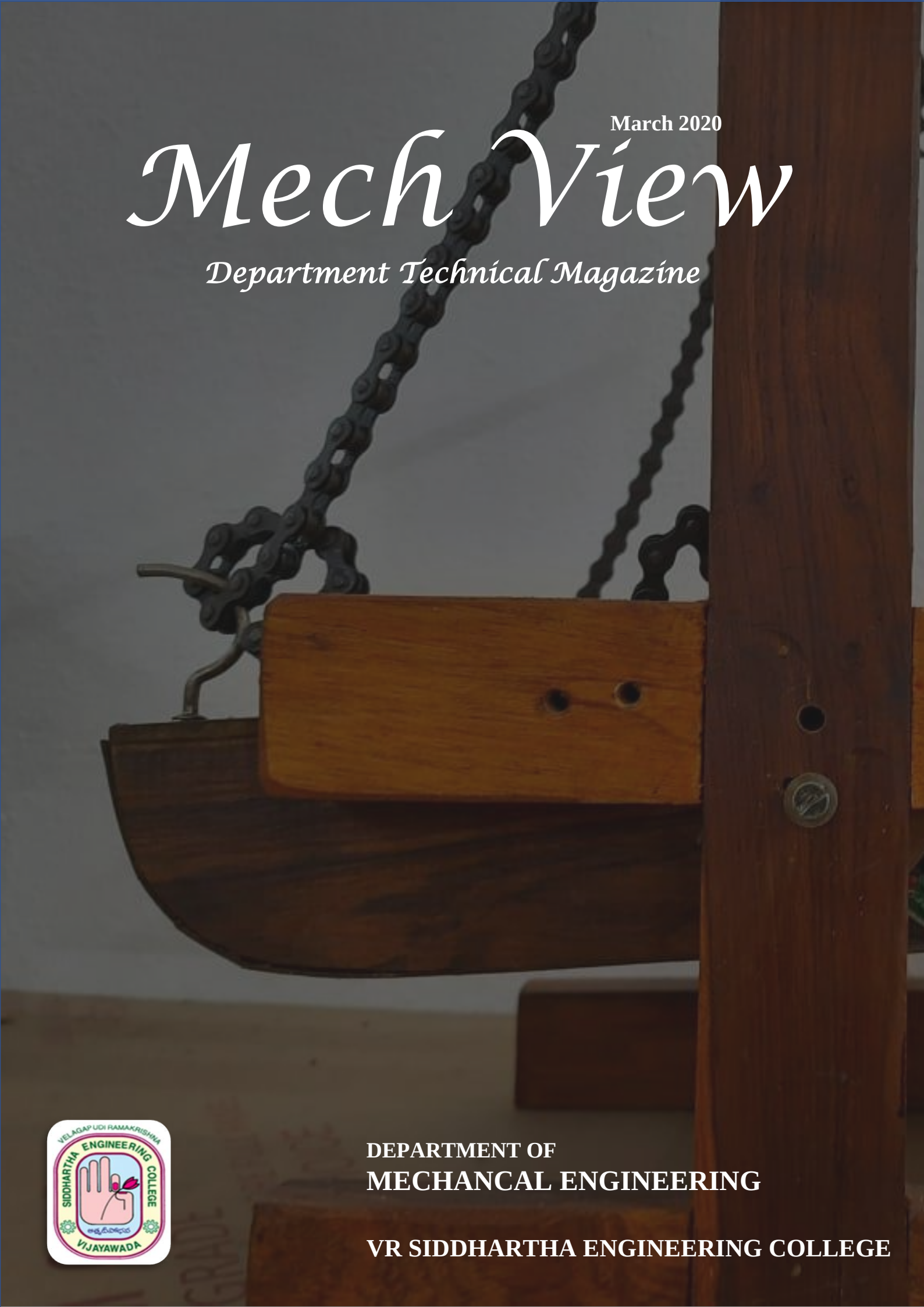

March 2020

Mech View

Department Technical Magazine

DEPARTMENT OF
MECHANCAL ENGINEERING

VR SIDDHARTHA ENGINEERING COLLEGE

INSTITUTE VISION

To nurture excellence in various fields of engineering by imparting timeless core values to the learners and to mould the institution into a centre of academic excellence and advanced research.

INSTITUTE MISSION

To impart high quality technical education in order to mould the learners into globally competitive technocrats who are professionally deft, intellectually adept and socially responsible. The institution strives to make the learners inculcate and imbibe pragmatic perception and pro-active nature so as to enable them to acquire a vision for exploration and an insight for advanced enquiry.

DEPARTMENT VISION

The Department of Mechanical Engineering endeavours to become a centre of academic excellence and research.

DEPARTMENT MISSION

Prepare graduates by providing a comprehensive knowledge and experience in a state-of-the-art mechanical engineering education to become creative, inquisitive and innovative professional in global environment.

PROGRAMME EDUCATIONAL OBJECTIVES

PEO1: Progress in professional career with a solid foundation in mathematics, science and Engineering sciences.

PEO2: Solve real time engineering problems using professional knowledge and skills resulting in significant societal development.

PEO3: Demonstrate multidisciplinary skills to analyse engineering issues in a broader perspective with ethical responsibility towards sustainable development.

PEO4: Demonstrate interpersonal skills, leadership and team building to achieve organization goals and pursue lifelong learning and higher education necessary for successful profession.

MECH VIEW

Department Technical Magazine

March 2020

Mech view is a student run magazine publishes the ideas and projects of the final and third year students. The objective of the magazine is to provide a platform for senior students to publish their projects and an avenue for the juniors to brainstorm the ideas. Currently, the publication frequency of the magazine is one issue per year.

Student Articles

Student Article

Automated Level Crossings (ALC)

J. Karthik*, Sk. Sabeer*, K. Meghana*, K. Rohith*, A. Yashwanth*, Sri. P. Satheesh Kumar Reddy#

Mentor; *B. Tech student

This article presents an overview of Automated Level Crossings (ALC). It discusses the need of ALC, how ALC works and it's advancements in brief.

Introduction

A level crossing is an intersection of a rail line and a road. The very essential and the low cost technological solution for the elimination of MLCs is given through the application of IoT technology. The main aim of this work is to develop an automated level crossing system that would prevent accident between trains and road users. From the railway level crossing point of view, it has to stop all road users before passing of a train.

Fig. 1(a): Accident at Masaipet

Following are the different components and their application used in this project.

Table 1: Components used

Component	*Application*
Power Supply	The power to the entire system can be supplied through the solar panel
IR sensor and Wheel sensor	To detect the presence of train
Arduino Nano	To control the electronic components
GSM module	For sending automated messages

Fig. 1(b): Automated Level Crossings

Description of Automated Level Crossings

A pair of Wheel and IR sensors is located before and after the level crossing. When the

train arrives, depending upon the output of the sensors, microcontroller triggers the signal to the servo motors to close the boom barrier and the siren sounds. The boom barrier opens when the train departs. To add more safety to the tress-passers, spikes emerge out of the ground when the train arrives. The motion of the spikes and the boom barrier are tied together.

Any intervention in the system triggers the GSM to send relevant information to the station master nearby and the tress-passers are alerted by a siren meanwhile.

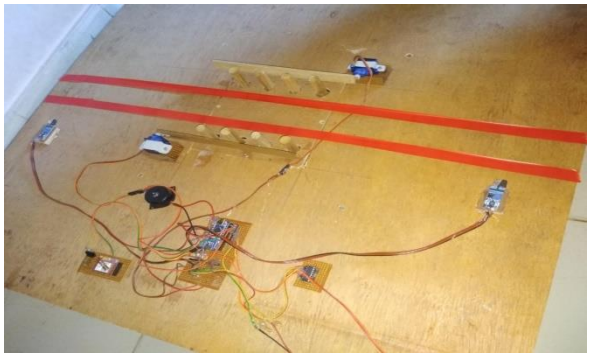

Fig. 2: Automated Level Crossings Prototype

Advancements

We have added some new techniques to the existing ones to make the system more reliable.

- We have established the communication between the whole system and authority nearby and thus if any issue raises, the respective will address the issue.
- No need of power backup or shortage of power for the smooth functioning of system, as the energy is supplied through solar or wind energy, when needed.
- The power supply of 230V AC power is required for functioning of the motor. It can be avoided with the help of a battery charged by a Solar Cell.
- Usage of traffic spikes to ensure more safety for the road users.

Conclusion

The idea of automating the process of railway gate operation in level crossings has been undertaken. The response of which is the reduction of accidents within the gates across rail tracks. Linemen can be eliminated. From this, we can eliminate the 72% of total accidents at Level crossings including both manned and unmanned level crossings. This mechanism works on a simple principle and there is no much complexity involved. Above all, this solution provides a high degree of safety to the tress passers.

.

Student Article

Automated Waste Segregator

G. Hemanth*, A. Sankeerthana*, G. Vijay*, E. Sony*, N. Gangadhar*, A. Venkateswarlu#

Mentor; *B. Tech student

This article presents an overview of Automated Waste Segregator. It discusses design and applications of the automated waste segregator.

Introduction

The rapid growth in the population has also led to the surge in the volume of waste being generated on a daily basis. This increase in the generation of waste due to continuous growth in the urbanization and industrialization has become a severe problem for the local and the national government. It is also posing a serious problem for the local authorities to manage the wastes being dumped everywhere as landfill. To ensure the minimal risk to the environment and human health, it is necessary to take meticulous measures when segregating and transporting waste. Segregation of waste in a proper manner brings to the limelight actual economic value of the waste. The traditional method used for segregating of waste in India is through rag pickers which are time-consuming and can have adverse effects on the health of the people who are exposed to such wastes. Here we propose the use of an Auto Waste Segregator (AWS) which is cheap and also an easy to use solution for segregation of household waste. It is designed to segregate the waste into three categories viz. metallic, dry and wet waste. The system makes use of moisture sensor for the segregation of wet and dry waste and inductive proximity sensor for the detection of metallic waste and an LCD display for displaying the result of segregation. It is evident from experimental reports that segregation of waste using AWS has been successful.

This project contains of proximity sensor for Metal Detection, obstacle sensor for detecting obstacle, Microcontroller, DC motors, conveyor belt and container with two sections for different types of waste. Waste is dumped on the conveyer belt either manually or by some arrangement. The conveyor should be maintained at a low speed with help of Micro controller in order to avoid scattering of waste. There are two sensors in the path of the conveyer, these sensors are placed opposite to one another when object comes in the way of sensors both the sensors start working.

CASE 1: If both sensors get actuated that means obstacle sensor says an object came and proximity sensor says it is a metal object,

so these outputs (1,1) of sensors acts as inputs for the Arduino and it tells the waste bin motor to rotate in metal bin direction.

CASE 2: If only obstacle sensor actuated that means an object came in the way but it's not a metal object and these outputs (1, 0) of sensors acts as inputs for the Arduino and it tells the waste bin motor to rotate in the non-metal bin direction.

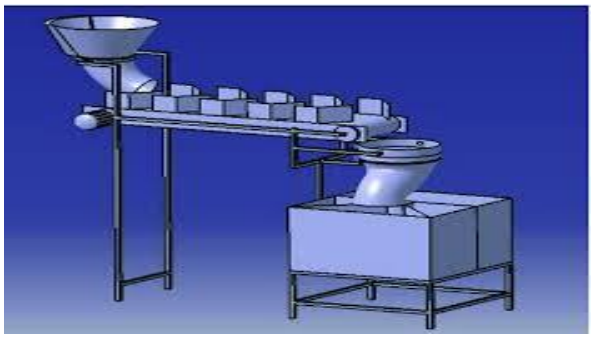

Fig. 1. Schematic of Automatic Waste Segregator

Depending on the signals received from the sensors the Microcontroller and Arduino rotates the waste collection container to segregate the waste. For the further usage like finite segregation, we can add more sensors like plastic detectors, glass detectors etc., If we need, we can send the segregated waste again into the conveyer belt for finite segregation. By doing this again and again we can obtain clear result of segregation of waste.

Implementation of this system at a local level like societies, educational institutes, etc. can reduce the burden on the local authorities. The automatic waste segregator is one small step towards building an efficient and economic waste collection system with a minimum amount of human intervention and also no hazard to human life. Using a conveyor belt makes the system far more accurate, cost-effective and also easier to install and use at a domestic level. Segregating all these wastes at a domestic level will also be time-saving. While implementing our system we came across many problems like the sensing range of inductive proximity sensor, the accuracy of the moisture sensor, adjusting the range of IR sensors and some more, but using some modifications we tried the make the system as reliable as possible but not completely perfect.

.

Student Article

DESIGNING AND FABRICATION OF MAGNETICALLY LEVITATED VERTICAL AXIS WIND TURBINE

J. Narendra Kumar*, P.S.L.V.S.T. Sanghavi*, A. Raj Kiran*, G. Sree Rajesh*, K. Nikhileswar*, Venkata Kiran Kumar. R#
Guide/ Mentor; * –B Tech Student

The article presents an overview of methodology and technology involved in designing of the magnetically levitated Vertical axis wind turbine. A.C Power will be generated with the axial power generator, and bearings are replaced by magnets thus the starting speed and friction can be reduced by gears are eliminated by using of axial flux generator and levitating magnets.

Introduction

Clean, sustainable, renewable energy is essential to fulfill the potential power needs of India in the coming years. Study the main characteristics wind in the urban areas and obtaining optimal design parameters to fabricate the best working model which generates the power more efficiently is the essentially demanding task. The field of wind energy has tremendous scope for innovation.
This project aims to develop a small wind turbine for the urban environment. The designed system will operate as roof top mounted installation on domestic buildings which is economically sustainable. The outcome is the Power generated by using MAGLEV Vertical Axis Wind Turbine with the help of an Axial Flux Generator. Axial Flux generator is the concept of Rotating magnetic flux that is created due to the rotation of magnets attached under the main body on to the Static Winding coils that lies on wooden base of the model. It is used for lightening bulbs and can be stored in batteries. Theoretical and experimental results are compared and efficiency was calculated.

In our project A.C Power will be generated with the axial power generator, and bearings are replaced by magnets thus the starting speed and friction can be reduced by gears are eliminated by using of axial flux generator and levitating magnets. This generated power can be boosted by using step up transformers and it can be directly used to electrical appliances. In this theoretical result are calculated and these are compared with experimental results.

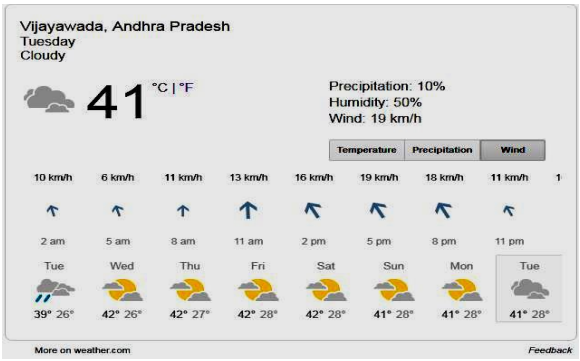

Fig. 1. The temperature and Wind in Vijayawada City during the test.

Fig. 2. Working of Maglev vertical axis wind turbine

As the Velocity of the wind increases, the

speed of the turbine also increases thus produces more emf.

Experimental results depend upon the wind conditions of the climate. On Tuesday, 23/04/2019 performance test was conducted by on roof of building by exposing to natural air.

RPM	VOLTAGE (volts)	CURRENT (milliamps)
50	1	2.15
100	1.8	3.87
150	2.95	6.46
200	3.3	8.6
250	4.8	10
300	5.7	12

CONCLUSION

The maglev vertical axis wind turbine has more advantages than disadvantages, so the usage of it is suggested. Main characteristics of the wind power resource in the urban areas**,** as extracted from the measured data, and optimal building types for wind turbine installation can generate output with maximum efficiencies.

As the speed of wind varies with time, pressure acting varies with difference in altitudes and the design opted according to the wind variations the power generated varies continuously.

The power generation technique of magnetically levitated vertical axis wind turbine is simpler, economical and can also be efficient if the losses occurred can be reduced.

This system is designed to operate as a roof top mounted installation on domestic buildings which is economically sustainable.

Magnetically levitated vertical axis wind turbines are best for the power generations by optimizing the resources available to the human without any harmful effects.

Hover Board

Student Article

Farha Tabassum*, P. Neha*, B. Nissy Flora*, Y. Chandrika*, Nagamalleswara Rao K#
Mentor, * B.Tech Student

The article presents an overview of Hover Board, its applications, and fabrication technology in brief. Mini hover board kart is the portable transmission system. The project can be more efficient than any other E-vehicles compared to other vehicles less maintenance & low-cost to other vehicles of portable transmission.

Introduction

Now-a-days electric vehicles are used for the personal transportation. Among these personal transport vehicles hover boards are used mostly. Hover boards, in fact are the cheapest means of transport available, provided the distance covered is within the scope of walking or cycling, say. Running under the electricity and makes it faster than walking, thought might be slower than riding a bike. (Please refer Figure1).

Fig. 1. Hover Board

Most significant wind turbine applications are summarized in the table 1.

Table 1: Applications of Hover Board

Product type	*Applications*
Air Umbrella	1. a levitating board used for personal transportation 2. Suitable for the urban citizens or people who has a car.

Description of Hover Board

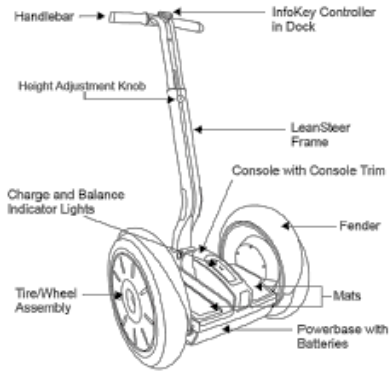

Fig.2. Schematic of Hover Board

Hover board is sort of portable, rechargeable battery powered scooter. It basically consists of two-wheels which is arranged side-by-side, with two small platforms between

which the wheels on which the rider stand Hover boards are often called as Self - Balanced Scooter. These hover boards are becoming trend now to travel for small distance. Uses number of gyroscopes to track alignment of the platform in horizontal plane and gives the command to controller. If the rider leans forward the motor runs within the forward direction to regulate the alignment, similarly for backward therefore the platform. It drives its wheels forward and backward as needed to return its pitch to upright. It has electric motor powered by lithium-ion batteries charged from household current. It does not have any mechanical brakes.

Hover Board Fabrication

Fig. 3. Fabricated Hover Board

Dimensions: Height: 950mm Width: 560mm Length: 1150mm Wheel base: 620mm Ground clearance: 150mm

Item Specifications Parameters

Function	
Max Speed:	12 km/h
Range:	8-10KM
Battery:	24V/4AH/100. 8WH
Gradient About:	15 degrees
Working Temperature:	20-60 degree
Max Load:	100 kgs
Charging Voltage AC:	100-240V/50-60Hz
Charging Time:	120-180 min
Appearance & Weight	
Size:	584×178×186mm
Pedal Distance:	110mm
Chassis Distance:	30mm
Net Weight:	10 kgs

It is a beneficiary to go for electrical energy than any other renewable energy sources.

Mini hover board kart is the portable transmission system. The project can be more efficient than any other E-vehicles compared to other vehicles less maintenance & low-cost to other vehicles of portable transmission. The fabrication of hover board kart is made simple & will give more efficiency pickup, speed, torque, etc. The vehicle can be used both indoor & outdoor. Mini hover board kart is used to transport people from one place to another.

CONCLUSION

In this paper working model of Hover Board is fabricated and demonstrated.

Student Article

Hydraulic Arm

M. Pavan Kumar*, M. Nithin*, S. Anand Kumar*, J. T. Ravi Kumar*, Sk. Khaleel Safin*, K. Ramanaiah#

Mentor; *B. Tech student

This article presents the Hydraulic drive system that is used to drive the earth mover arm. In the present article, the design and the idea were demonstrated with manufactured model.

Introduction

Hydraulic arm is used as arm for handicapped people to do their own and regular work without depending on others. These arms are used in earth movers to pick up heavy weight and keep them where required place.

Pascal's law is the basis of hydraulic drive systems. As the pressure in the system is the same, the force that the fluid gives to the surroundings is therefore equal to pressure x area. In such a way, a small piston feels a small force and a large piston feels a large force. The same principle applies for a hydraulic pump with a small swept volume that asks for a small torque, combined with a hydraulic motor with a large swept volume that gives a large torque.

In such a way a transmission with a certain ratio can build. Most hydraulic drive systems make use of hydraulic cylinders. Here the same principle is used a small torque can be transmitted into a large force. By throttling the fluid between the generator part and the motor part, or by using hydraulic pumps and/or motors with adjustable table swept volume, the ratio of the transmission can be changed easily. In case throttling is used, the efficiency of the transmission is limited. In adjustable pumps and motors are used, the efficiency, however, is very large. In fact, up to around 1980, a hydraulic drive system had hardly any competition from other drive systems.

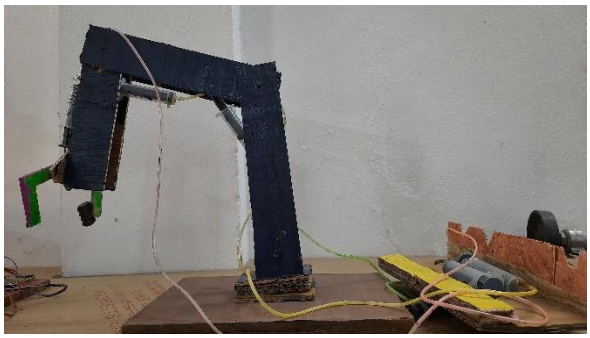

Fig. 1. Articulated arm manufactured using hydraulics.

Nowadays, electric drive systems using electric servo-motors can be controlled in an excellent way and can easily compete with rotating hydraulic drive systems. Hydraulic cylinders are, in fit, without competition for linear forces. For these cylinders, hydraulic systems will remain of interest and if such a system is available, it is easy and logical to use this system for the rotating drives of the

cooling systems, also. An important advantage of a hydraulic drive is its high-power density: the mass of a hydraulic drive is several times smaller than the mass of an electric drive of the same power.

Fig. 2. Joint powered by hydraulic pressure from syringes.

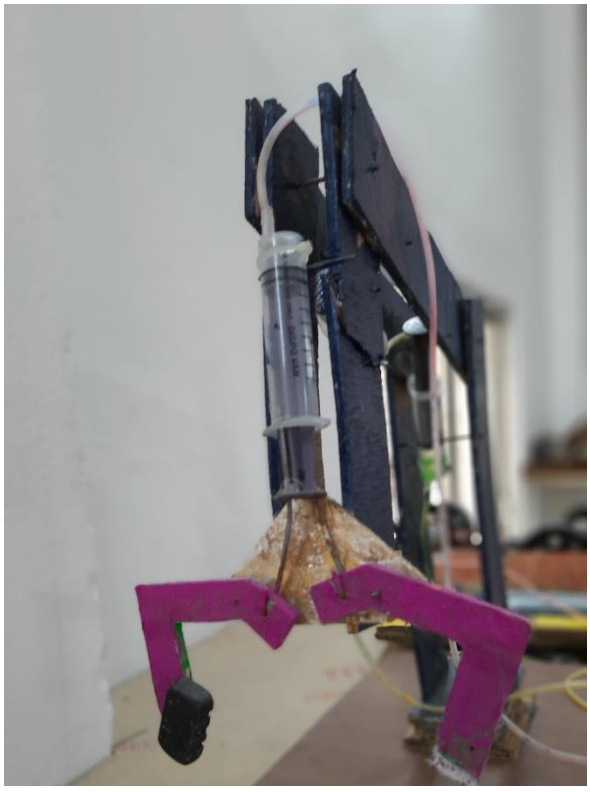

Fig. 3. Gripper of Hydraulic arm.

In the present project, the hydraulic arm was made using hydraulic power. The hydraulic power was achieved by connecting syringes with pipes. The syringes were filled with water. If the controller syringe is pushed, the water in the syringe will move to the responder syringe and cause the motion to the hydraulic arm. The motion achieved can be reversed by pulling the controller syringe. Three joints were made with these syringe connections. The base joint, shoulder and gripper joint. The range of all the three joints is similar as same size of syringes were utilized.

Student Article

Magnetic Levitation

A. Sana Mumthareen*, A. Nithya Sri*, P. Anjana Sai*, B. Anusha*, G. Naga Sai Pranay*, M. Gnana Deepthi*, A. N. Phani Deepthi#

Mentor; *B. Tech student

In this project you will build a magnetic levitation ("maglev" for short) train that floats above a magnetic track. In the case of a maglev train, this magnetic force is used to push against the train's weight. Weight is the force that pulls an object down toward the earth because of gravity. If the magnetic force is strong enough, it can overcome the train's weight and push it up into the air. The train has two magnets on the bottom of it. These magnets push against two magnets that form the tracks. If the force from the magnets is strong enough, the train will float in the air above the tracks. In this project you will add weights to your train and measure the distance between the bottom of the train and the tracks.

Introduction

Magnetic levitation is a way of using electromagnetic fields to levitate objects without any noise. It employs diamagnetism, which is an intrinsic property of many materials referring to their ability to temporarily expel a portion of an external magnetic field. As a result, diamagnetic materials are repelled by strong magnetic fields. This repulsive force, however, is very weak compared with the attractive force due to magnetic fields. The maglev system is divided into two types attractive systems and repulsive systems, which are referred to as electromagnetic suspension and electro dynamics suspension.

Description

Maglev is the means of floating one magnet over another. According to a theorem attributed to Earnshaw it is impossible to achieve static levitation using any combination of fixed magnets and electric charges. There are, however. ways to levitate by getting round the assumptions of the theorem. Magnetic levitation employs diamagnetism.

There are two types of maglevs.

Electromagnetic levitation (EML) uses the attractive force between electromagnets on the levitated object and the circuit on the ground. Electrodynamic levitation makes use of the reserve force between magnets (superconductive magnets) on the levitated object and induced current in the secondary circuit on the ground

Thus, we may classify magnetic levitation systems into two groups: attractive Systems and repulsive systems The former is referred to as electromagnetic suspension while the Layer is referred to as electrodynamic suspension. In an attractive system, the moving component, or carrier, is suspended

under the fixed component, or guide track. The attractive system uses feedback control, is complicated, and requires power to levitate a carrier. The repulsive system utilizes permanent magnets and air core electromagnet coils running constant current to provide repulsive force.

Any maglev system consists of the following three subsystems: a magnetic suspension, a propulsion motor, and a power system. The magnetic suspension is supposed to ensure a stable MASTER SERIES suspension of a vehicle in its own magnetic field. The propulsion motor should produce a propulsion force sufficient for a continuous flight of the vehicle along an assigned track with a given speed. The power system provides uninterrupted power supply. A source of energy an engine or a battery, at least is always required to keep an object afloat.

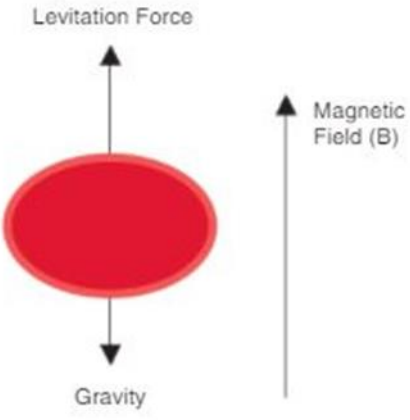

Fig. 1. Magnetic Levitation Model.

Maglev has been successfully implemented for many applications in research and industry. Levitating trains and levitating displays are but two examples of electromagnetic levitation. The need for fast and reliable transportation is increasing throughout the world, particularly in developing nations. High-speed rail has been the solution for many countries Trains are fast, comfortable, and energy efficient. Conventional railroads, however, operate at speeds below 300 km while maglev vehicles are designed for operating speeds of up to 500 km. A maglev train is a train like vehicle that is suspended in the air above the track and propelled forward using the repulsive and attractive forces of magnetism, as shown in Fig. 2 A major advantage of maglev systems is their ability to operate in almost all-weather conditions, they are prepared for icy conditions because they do not require overhead power lines that are subject to freezing on conventional railroads. The epoch-making technology would change the train control system from conventional manual control to ground based control.

Student Article

Ocean Wave Energy – A Step Towards Recharging Batteries

Ravi Teja Ch.*, V. Syam*, E. D. Kumar*, S. K. Raju*, N. Ravi Kumar#, M. B. Chennaiah#, G. Srivalli#

Mentor; *B. Tech student

The article presents an overview of Ocean Energy Converter and one of its applications to recharge batteries.

Introduction

Renewable energy is a natural reserve which can restock by means of time through organic reproduction and other naturally persistent processes. These reserves are a part of the atmosphere and the major components of earth's ecosphere. The transfer of energy from waves and is captured to do work is called wave power which includes generation of electricity, desalination of water, and water pumping into reservoirs. The Equipment that is able to capture and exploit wave power is called an Ocean Wave Energy Converter (OWEC).

Most of the wave energy is nearer to the ocean surface. There are separate designs for each range that are used in capturing the energy of waves. These energy capturing devices are designed in such a way that they are set in the bottom of water and some are set like floating devices on the ocean surface which are used for capturing kinetic energy of waves in which each range of energy is converted into electric power through the usage of a generator.

Methodology

Present approach comprises of basic structure of our Wave Energy Converter (WEC), operation/mechanism, power generation setup along with energy transfer from wave to electrical through mechanical energy and its storage in rechargeable batteries

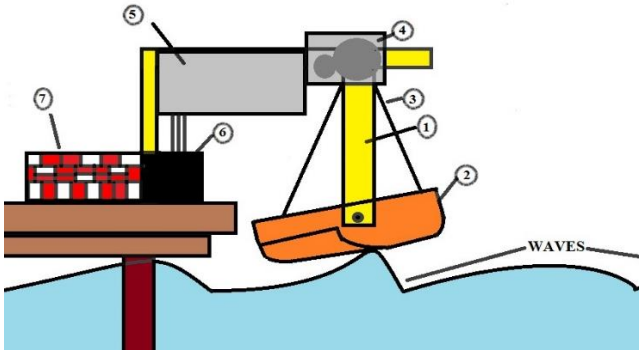

Fig. 1. Schematic of the Ocean Wave Energy Convertor.

The Specifications of the components used in the model are shown in Table 1

Table 1: Specifications of Prototype

COMPONENT		SPECIFICATION
1	Vertical Member	960X660X910 mm
2	Float	990X460X90 mm
3	Sprocket	Ø12.7PitchDiaX3.17WidthX18teeth mm
4	Chain	60inches (1inch per link)

5	Spur Gear (Driven)	ø6(ID)XØ2.5(PitchDia) mm
6	Spur Gear (Driver)	ø12(ID)XØ5 (PitchDia) mm
7	Shaft	ø12X800mm
8	Generator	12VoltsX10Amps
9	Rectifier	Bridge wave rectifier
10	Capacitor	22microFaraday, 25V
11	Rechargeable Battery	9V(Charge 2hrs, Discharge 2hrs)

The driver gear is fixed to one end of the shaft and the driven gear is fixed to the shaft of the generator. Installation is shown in Fig. 1. The rotating driver gear engaged to driven gear of the generator shaft also gets rotated which converts energy from mechanical to electrical shown in Fig 2. Generator is the device that is used in converting mechanical action into electric power. There are coils present inside which produces an induced emf in the armature conductor.

Fig. 2. Prototype Setup

Conclusion

The power generation from the ocean wave is still in the developing stage, much advancement in the technology leading to many innovations in this field.

- This system is of simple design and easy in operation
- Requires low maintenance cost and utilizes Renewable energy
- There is power generation through crests and troughs of ocean waves. That is the power generation is in two directions.
- The efficiency is predictable and there is no need for skilled labor.

As there is >25% rate of increase in power usage by 2050 revealed by some surveys and Ocean Wave Energy could be a focused way for simple power generation sources.

Student Article

Ploughing Robot

Sk. Khalid Hussain*, M. Kamal Kumar*, T. Jahnavi*, K. Kavya*, P. Ganesh*, A. N. Phani Deepthi#

Mentor; *B. Tech student

In the field of agriculture, plantation begins with ploughing the land and sowing seeds. The old traditional method plough attached to an OX and tractors needs human involvement to carry the process. The driving force behind this work is to reduce the human interference in the field of agriculture and to make it cost effective. In this work, a part of the land is taken into consideration and the robot introduced localizes the path and can navigate itself without human action. For ploughing, this robot is provided with tentacles attached with saw blades. The sowing mechanism initiates with long toothed gears actuated with motors. The complete body is divided into two parts the tail part acts as a container for seeds. The successor holds on all the electronics used for automating and actuation.

Introduction

The Plough arm made of screws moves down and ploughs the soil and is lifted up after completion of ploughing. The first and foremost step in the farming is Ploughing. The assembly is attached to the off-road bot used for drilling and seeding. This process is done in order to loosen the soil and create a path or tracks on the farm land in order to sow the seeds uniformly. The structure and the design of the plough tool depends on the various constraints such as the type of soil to be ploughed and the depth required based on the type of crop that has to be grown and so on. There are many types of Ploughing mechanisms that has been adopted which can be broadly classified into two categories; one is the manually driven Ploughing tool and the other being machine driven. We have designed the plough tool using Solid Works software. The design and dimensions of the plough tool are in accordance with the size of the bots. The angle of inclination and length of the tool are calibrated by considering the depth required for ploughing the soil and it varies with the type of crops and soil. The tool is operated by using a 12V dc motor having 10 rpm. The initial and final positions of the plough tool are controlled by coding it in a required manner.

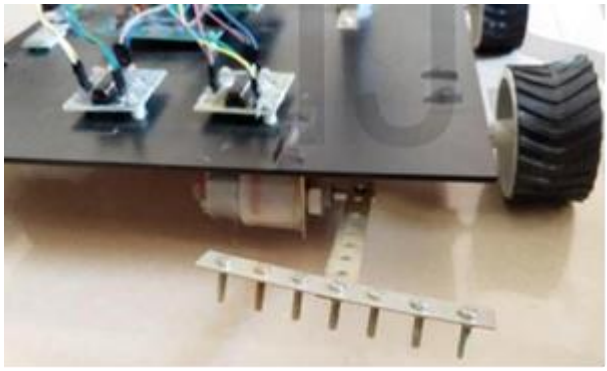

Fig.1. Ploughing Mechanism

Seeds are dropped from the funnel using the open-close movement of values at equal

intervals. The assembly is attached to the off road bot used for drilling and seeding. The next major step in the process of farming is seeding. Seeding usually depends on the type of crops being grown and the type of seeding varies over a variety of crops. In case of robots, utmost care has to be taken to ensure uniforms pacing and controlled flow of the seeds from the bot; wherein the seeds required for sowing is stored in a container and is mounted on the bot at the suitable position as shown infig.4. The robots take wheat seeds from a station and sow them as even as possible on the area.

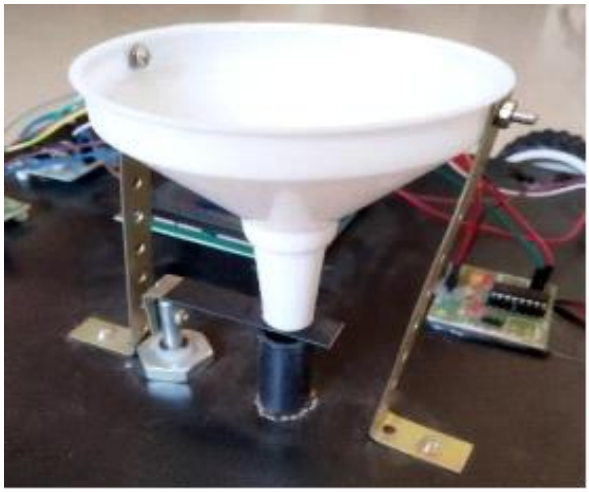

Fig. 2. Seeding Mechanism

Conclusions

The project is designed using structured modelling and is able to provide the desired results. It can be successfully implemented as a Real Time system with certain modifications. Science is discovering or creating major breakthrough in various fields, and hence technology keeps changing from time to time. Going further, most of the units can be fabricated on a single along with microcontroller thus making the system compact thereby making the existing system more effective. To make the system applicable for real time purposes components with greater range needs to be implemented. The mode of operation of this machine is very simple even to the lay man; this design is made for multipurpose use for the farmers in a single machine-like ploughing, seeding and grass cutting. The wastage of seed will be reduced by using these machines and the depth of ploughing will be fixed. It can operate both manually and automatic. By using this mechanism, the loading and the unloading time get reduced.

Student Article

Design and Development of Multi-Functional Quad Bike

Tayyab Khan Pathan*, M. Taruni*, B. Sravani*, Y. Leela Venkata Rama Sai*, B. Kiran Kumar Naik*, M. Balaji#

Mentor; *B. Tech student

Quad bike consists of four-wheel drive. The main purpose of the project is conversion of four stroke two-wheeler petrol engine to four strokes four-wheeler petrol engine for various applications discussed. In this suspension system will be more compared with normal bikes. It can run in most of the terrain (mud, rocky surface) depending upon its design. This project includes petrol engine having 4 gear transmission and it carries about 300 kg load(approx.) The Project is modelled in Auto Cad and Creo software and fabrication is done with required dimensions.

Introduction

The Quad bike is mostly called as an All-Terrain vehicle. An All-Terrain Vehicle (QUAD BIKE) is defined by the American National Standards Institute (ANSI) as a vehicle that travels on low pressure tires, with a seat that is straddled by the operator, along with handlebars for steering control. In some vehicles steering wheel similar to passenger cars is also used. As the name suggests, it is designed to negotiate a wider variety of terrain than most other vehicles. Although it is a street-legal vehicle in some countries, it is not legal within most states and provinces of Australia, the United States and Canada and definitely not in India. By the current ANSI definition, it is intended for use by a single operator, although a change to include 2-seaters is under consideration.

For simplicity and keeping into consideration the requirement and fabrication constrains, the fabrication process of this quad bike will incorporate a general engine of about 100cc which is usually used in small quad bikes. The selection of engine has been influenced by the parameters like the functionality and performance with respect to torque, acceleration, traction, manoeuvrability and endurance of the vehicle.

Quad Bike Design

Engine used in Quad bike is TVS 100CC FOUR STROKE PETROL ENGINE. The TVS XL 100, as the name suggests, is powered by a 100cc single-cylinder four-stroke engine, which delivers 9.46bhp and 9.4Nm of torque.

A Double Wishbone independent suspension system is used in this project for front wheels. Wishbone suspension give more movement of the tyres and hence the vehicle, for the same movement of the spring. In double wishbone suspension, force is distributed at 5 points on the roll cage unlike in Mac-Pherson strut where force acts at only

one point.

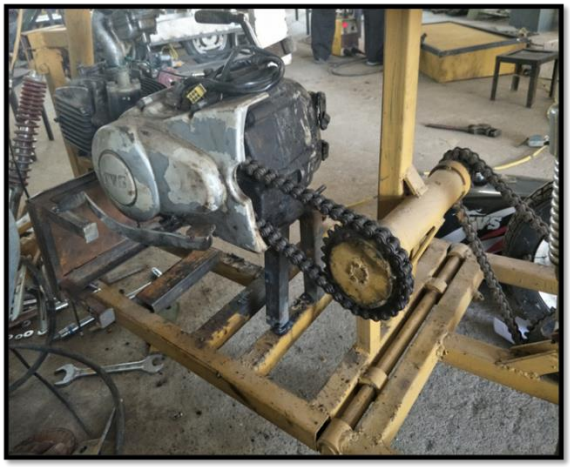

Fig. 1. Transmission System of Quad Bike.

Fig. 2. Double wishbone suspension system

The braking system is composed of both internal expanding drum brakes and disc brakes. The drum brakes are installed at the two front wheels and a single rotor is mounted on the rear axle to satisfy the braking requirements of our quad bike such as terrain of the track, speed limits, driver ergonomics and other rulebook constraints.

The front drum brakes are mounted on each wheel of internal radius 2.5 inches having a brake lining width of 3 mm. The distance between the pivot point of both the brake shoes and the cam is 3.93 inches.

Fig. 3. Drum brake used in the Quad Bike.

At the rear axle we are using disc brake due to fact that we require a effective braking at the rear. It is also to our advantage that even if the front brakes fail in the worst-case scenario, braking power is still available to the driver. The Rear brake is composed of 5-inch diameter disc and dual piston 1.5-inch diameter calliper.

Conclusions

A successful and reliable method for generating an ALL-TERRAIN VEHICLE incorporating various automotive and mechanical concepts and tools.

A detailed description of the segment suspension system fabrication and the method of choosing and fabrication the desired suspension assembly, the braking system and the selection of desired rotor and drive safety, steering system and the control over the vehicle and other building factors are taken into account in detail.

Student Article

Design and Fabrication of Rice Transplantina Machine

V. Sai Babu*, B. Gulab Singh*, K. S. Krishna Sathwik*, B. Pravallika*, K. Ramanaiah#
Supervisor, *B.Tech Students

The article presents the design and fabrication of rice transplanting machine. It discusses the need, design calculations and fabrication technology in brief

Introduction

Agriculture is the backbone of Indian economy. Though, with the growth of other sectors, the overall share of agriculture on GDP of the country has decreased. Still, Agriculture continues to play a dominant part in the overall economic scenario of India. The transplanting mechanism is most important component in rice transplanter upon which its performance depends and it consists four bar links with different lengths like crank or driver, follower, coupler and fixed link. The member connects the crank and the follower is known as coupler link and fixed link is the frame. The crank is the shortest link and makes complete revolution. The aim of this research is to develop the transplanting mechanism for power operated single row rice transplanter and tested in laboratory as well as in the field conditions.

DESIGN AND FABRICATION:

The following materials are required for successfully assemble and development of rice seeding machine:

1. Sprockets and Chains, 2. Tray and handle, 3. Planting Fork and 4. Frame

The big sprocket wheel is provided with a bush fit so that it can be moved later for the purpose of alignment with small sprocket of chain mechanism (Figure1).

Fig. 1. Shaft with Toothed Iron Wheel

The floaters cut from the sheets of mild steel are provided with bush fit to correct any future unanticipated errors.

The parameters that are considered while designing the floaters are:

- Place of catching
- Number of plant per catching
- Distance of travel
- Releasing Point
- Angle of Planting

Design calculations

Pushing force required

Total mass =18 kg

Force (skimming) $F_s = \mu * m * g$

$F_s = 0.57 * 18 * 9.81 = 100.65$ N

Resistance force (drag on mud)

$F_d=1/2*\rho*C_d*A*V^2$

$=0.5*1236*1.28*0.06*0.2 = 8.89N$

Fig. 2. Floater

Net force for pushing

$F=F_s+F_d=100.65+8.89 = 109.54$ N

Torque required for transmitting wheel

$T=F*R=109.54*0.13 = 14.24$ N-m

Power required to drive shaft

$P = 2\pi*N*T/60$

$=2*\pi*N*14.24/60 = 11.9W$

When machine is operated the sprockets get damaged by bending the teeth. So, it is better to have motorcycle chains and sprockets to power transmission. But that will result an increase in weight. Therefore, instead of chain and sprocket speed reducing mechanism, a gear system should be used. In this machine ground wheel supplies the power to operate transplanting arm and tray mechanism. Pulling the machine will rotate the ground wheel. Increasing the size and number of lugs (fins) around ground wheels will increase contact area of the ground wheel with the field and make it easy to operate. Ergonomically it is better to push weight rather than to pull. So, it is better to turn the handle and the power supplying mechanism to push the machine instead of pulling it. Use of aluminum and alloy for construction will help to reduce the weight of the machine. The machine (Figure 3) used to plant in two rows simultaneously.

Fig. 3. Working Model of the Rice Transplanting Machine

CONCLUSION

In this study it was concluded that high labour demand during the peak periods adversely affects the timeliness of operation, thereby reducing the crop yield. Mechanization not only changes the structure of labour in agriculture, but also influences the nature of the workload. In India since an average farmer possess land of small size in are thus a mechanized rice transplanter would be highly helpful in the rice transplantation. Transplanter helps to acquire lesser cost of production with higher yield and production, moreover the quality of produced rice is also good.

Student Article

Remote Controlled Lawn Mower

S. Geetanjali*, S. Surya Phani Teja*, B. Vinny Treesa*, Sk. Amanulla*, S. Srilekha*, G. Jamuna Rani#

Mentor; *B. Tech student

The article presents an overview of a remote-controlled lawn mower. It encompasses the constructional details, electrical connections, advantages and applications of a remote-controlled lawn mower. It is a wired device with a robust outlook structure so as to carry good loads like garden equipment, sprayer, tool carriers etc. The objective is to design a lawn mower with easy usage, of low cost and with a good life capacity.

Introduction

A lawn mower, also known as mower, grass cutter is a machine utilizing one or more revolving blades to cut a grass surface to an even height. The height of the cut grass may be fixed by the design of the mower, but generally is adjustable by the operator, typically by a single master lever, or by a lever or nut and bolt on each of the machine's wheels. The blades may be powered by manual force, with wheels mechanically connected to the cutting blades so that when the mower is pushed forward, the blades spin, or the machine may have a battery-powered or plug-in electric motor. The most common self-contained power source for lawn mowers is a small (typically one cylinder) internal combustion engine.

Smaller mowers often lack any form of propulsion, requiring human power to move over a surface. "Walk-behind" mowers are self-propelled, requiring a human only to walk behind and guide them. Larger lawn mowers are usually either self-propelled "walk-behind" types, or more often, are "ride-on" mowers, equipped so the operator can ride on the mower and control it. A robotic lawn mower or "lawn-mowing bot" or "mowbot" is designed to operate either entirely on its own, or less commonly by an operator by remote control.

Construction

Components utilized for the present model are

(i) PVC Pipe
(ii) PVC elbow joints
(iii) 150 rpm motors (2)
(iv) 1000 rpm torque motor (1)
(v) Cutter Blade
(vi) Robot Wheel with Hex Brass Coupling
(vii) 12-volt battery
(viii) ON/OFF Switches
(ix) Electrical wires

The components are assembled firmly and all the required electrical connections are set up.

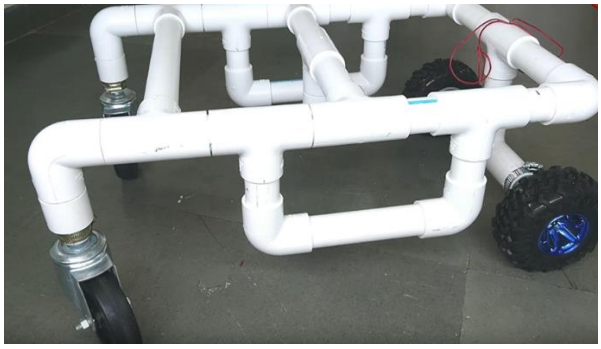

Fig.1. Outer structure of the remote-controlled lawn mower.

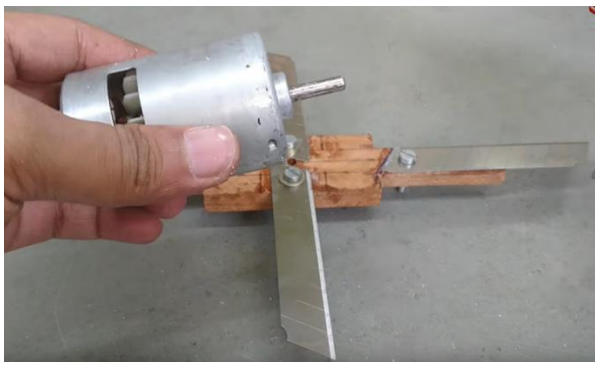

Fig. 2. Cutting blades along with the motor used for the prototype.

Fig. 3. Controller Switches of the remote operated lawn mower prototype

The figure 1 above shows the robust outer structure of the remote-controlled lawn mower. The figure 2 above shows the fixture of cutting blades attached with a high torque blade which is required to cut the grass at high speeds. The figure 3 above shows the electrical connections of the wired lawn mower to be controlled by means of a remote with ON/OFF switches.

Conclusions

A wired remote controlled lawn mower has been successfully constructed with good cutting speeds and with a body of good weight carrying capacity to carry garden equipment like tools, carriers, sprinklers etc. This device is safer to use, economical, very easy to use and doesn't need much skill to operate. Also, as there are less relatively movable parts associated and as the structure is robust, the life of this device is quite long. It has easy maintenance and just needs a battery change whenever required.

suspension system fabrication and the method of choosing and fabrication the desired suspension assembly, the braking system and the selection of desired rotor and drive safety, steering system and the control over the vehicle and other building factors are taken into account in detail.

PROGRAMME OUTCOMES

PO1 Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and engineering specialization to the solution of complex engineering problems.

PO2 Problem analysis: Identify, formulate, research literature, and analyse engineering problems to arrive at substantiated conclusions using first principles of mathematics, natural, and engineering sciences.

PO3 Design/ development of solutions: Design solutions for complex engineering problems and design system components, processes to meet the specifications with consideration for the public health & safety, and the cultural, societal, and environmental considerations.

PO4 Conduct investigations of complex problems: Use research-based knowledge including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5 Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6 The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal, and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7 Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of and need for sustainable development.

PO8 Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9 Individual and team work: Function effectively as an individual and as a member or leader in teams, and in multidisciplinary settings.

PO10 Communication: Communicate effectively with the engineering community and with society at large. Be able to comprehend and write effective reports documentation. Make effective presentations, and give and receive clear instructions.

PO11 Project management and finance: Demonstrate knowledge and understanding of engineering and management principles and apply these to one's own work, as a member and leader in a team. Manage projects in multidisciplinary environments.

PO12 Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAMME SPECIFIC OUTCOMES

PSO1: Apply their knowledge in the domain of thermal systems to solve engineering problems using modern technological tools.

PSO2: Develop and implement new ideas related to product design and manufacturing for societal and industrial needs using modern CAD/CAM/ CAE tools.

DEPARTMENT OF MECHANICAL ENGINEERING

VELAGAPUDI RAMAKRISHNA
SIDDHARTHA ENGINEERING COLLEGE

(Sponsored by Siddhartha Academy of General & Technical Education)
(An autonomous Institution affiliated to JNTU-Kakinada, Kakinada)
Kanuru, VIJAYAWADA – 520007, Andhra Pradesh
www.vrsiddhartha.ac.in