GHOUSIA INSTITUTE OF TECHNOLOGY FOR WOMEN

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SAITARANGA 2024- NATIONAL LEVEL CONFERENCE

Organized by Department of Science & Humanities

SAIRAM COLLEGE OF ENGINEERING, BENGALURU

30 May, 2024

9:30 AM - 1:00 PM

https://www.gitw.in

080 – 25536527

Poster with details of the event

Sai - Taranga Schedule

Sai SAIRAM COLLEGE OF ENGINEERING

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SAI TARANGA 2024- NATIONAL LEVEL CONFERENCE

30.05.2024

Organized by Department of Science & Humanities

PROGRAM SCHEDULE

SL NO	PROGRAMME	TIME
1.	Invocation Song	10:00
2.	Lighting of Lamp	10:05
3.	Welcome Address by Dr.Suvodip Mukherjee - (Asst Prof,Dept S&H)	10:10
4.	Briefing about Sai Taranga by Dr.Harikrishna S –(Head of Dept,S&H)	10:15
5.	Presidential Address by Dr. B Shadaksharappa-(Principle, SSCE)	10:25
6.	Release of Book Engineering the Future- *The Vital Role of Science*	10:35
7.	Address by Dr.Arunkumar R- Management Representative, SSCE	10:45
8.	Introduction and Felicitation of Guests	10:55
9.	Briefing about Innovation Ecosystem by Prof.Harish Babu L- (Asst Prof)	11:00
10.	Launch of Innovathon(1.0) & Solvathon(2.0)	11:10
11.	Address by Chethan MS- IT Lead,Spotnana,Bengaluru	11:15
12.	Address by Manjunath S- Technical Specialist, Honeywell Aerospace,Bngl	11:20
13.	Prize Distribution of Solvathon (1.0)	11:25
14.	Vote of Thanks	11:30

Participants leaving college campus

Group photo of participants inSai-Ram college campus.

@ the bus stand (7:00 A.M)

Participants

SL no	Student name	Guide name	Title of the paper
01.	i. N. Zoya ii. Simran iii. Bindu D Gudlar	Dr.H M Parvez Ahmed	Nanomaterials for Biomedical Applications
02.	i. Sandiya Devi ii. Zainab Taj iii. Ruchitha P	Dr. P Zaheeruddin Saheb	Physics Behind Animation
03.	i. Wajeeha Khan ii. Afiya Zuha iii. Bushra Fatima	Dr. P Zaheeruddin Saheb	Radio Astronomy (Astrophysics)
04.	i. Zainab Taj ii. Ruchitha P iii. Sana Munir	Dr. P Zaheeruddin Saheb	Stellar Evolution
05.	i. Shaik Aatika Kulsum ii. Tasmiya Fathima K	Dr. P Zaheeruddin Saheb	Robotics
06.	i. Bushra Fatima ii. Afiya Zuha iii. Wajeeha Khan	Dr. P Zaheeruddin Saheb	Feminist Representation in Fairytales

Inaugural speech by ChiefGuest

Participants attendingthe Inauguration

Bindu D Gudlar, Simran and N zoya presenting theirpaper on the topic “The roleof nanographene as an Electrode Materialsin Li- Ion Batteries-Synthesis

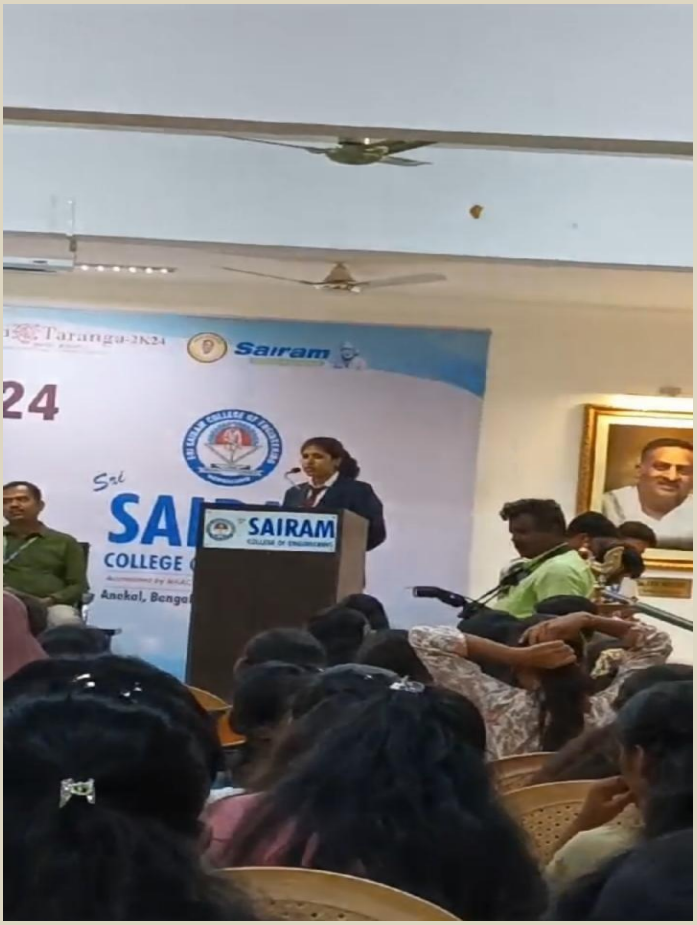

GRAPHENE AS AN ELECTROLYTE

Bushra, Afiya , Wajeeha presenting their paper

Bindu ,Zoya and Simran won 1st prize in Chemistry for their presentation on thetopic "Nanomaterials for Biomedical Applications".

Bushra, Afiya and Wajeeha won 1st Prize in English titled “Feminist Representation in Fairytales”.

Zainab Taj, Sana Munir and Ruchita won 3rd prize in Physics for their presentation on the topic of“Stellar Evolution”.



Bindu D Gudlar gave speechduring the programme's closing ceremony. "Hello everyone , I am from GhousiaInstitute of Technology for women. Recently I gave my presentation on my topic of "Role of propene as an electrode system in an lithium ion battery" .Big thanks to our mentor Dr.Parveez Ahmed, as per his guidance we came acrossthis college and presented here. Thanks to this organizer staff and principal of Sai ram college for giving us this opportunity to present on this occasion. Thank You once again to all."

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ez Ahmed

STP03

The role of Nanographene as an Electrode Materials in Li-ion Batteries-Synthesis, Characterization and fictionalization

Professor Parveez ahmed, Almas Anjum, Simron, Bindu D Gudlar

Students of II Semester, B.E,Ghousia Institute of Technology for women , Hosur Road, Bangalore

Abstract: energy demand increases tremendously all over the world and available fossil fuel energy resources are depleting very fast, the need for alternative energy sources is essential. Batteries are best alternate to meet this challenges.Several portable batteries are available in the market and having varieties of applications in field of communication, medical sciences, Electric vehicles etc. Among the different category, Li-ion battery is one which have wide range of applications. Li-ion batteries composed of graphite and Li intercalated electrodes having an output voltage 3.7V. In our present work, an effort has been made to improve the performance of Li-ion battery by replacing graphite anode with nanographene anode. New developed Graphene anode is characterized with SEM, EDAX, XRD etc. and fictionalized by charging and discharging cycle to study the efficiency of the newly fabricated battery.

Key words: Graphene battery, Nanographene, Li-ion battery

Introduction

Energy demand rapidly increasing as the

human being are becoming more and more dependent on each and every

activities. But the natural energy sources

Like fossil fuel resources are depleting very fast and exhausting day by day and may exhaust in another 50 years the need of alternative energy sources is essential to meet this high demand. Apart from solar energy whose efficiency purely depends on seasonal variation, Batteries are best alternate energy sources.

Batteries based on electrochemical reactions are the most widely used devices for storage of electric current.Portable source of energy are the key component in vital sector including electronic devices, power backup, electric vehicles, emergency power supply, microchips, wireless communications devices such 4G mobile phone etc.Hence understanding present key technology of batteries and discovering of new batteries is an impotent for further improving existing technology.

material Graphene is a wonderful change the

Since with the ability to

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world. As bulletproof armor, ultralight airplane and space elevator etc. nanotechnology is bringing to reality to power out the world. Having developed and produced a single layer Graphene of Graphene oxide and used as electrode material for the batteries brings a new era of battery technology.

Why Graphene as an electrode materials?

Graphene has unique physicochemical properties like high surface area, good bio-compatible, strong mechanical strength, excellent thermal conductivity and fast electron transportation.The use of Graphene in the manufacturing of rechargeable batteries could be a great leap towards energy efficiency. Using this material as an electrode for modern batteries would prevent devices overheating, increasing the life time of the battery and decreases the charging time. Graphene is a tougher and lighter material hence suitable materials for manufacturing of drone batteries as well

Preparation of Graphene anode:

Preparation of Graphene slurry:

Graphene slurry can be prepared by dispersing a known quantity of nanographene powder in required amount ethanol in presence water soluble and water insoluble binding agent such as polyvinyl pyrolidone (PVP) and polyvinyl butyral (PVB).

About 1-2 g PVB and 0.5 to 1 g of PVP dissolved in absolute alcohol such as ethanol for which about 5g of nanographene powder was added with continuously stirring by keeping the mixture over magnetic stirrer until a homogeneous slurry is obtained. The commercially available electrolyte copper foil about 10 μm thick is taken to prepare Graphene anode.Both the surface of the copper foil is cleaned with dilute acid followed by with an organic solvents to remove dust, dirt, oily and greasy particles and air dried.The slurry is deposited on both the surface by spray pyrolysis technique uniformly on both the side of the foil. The prepared electrode is air dried and annealed by using muffle furnace.

Fabrication of Graphene battery:

The completely discharged Li-ion battery is carefully opened to separate anode and cathode.The Graphite anode is replaced with the newly prepared Graphene anode. The anode and cathode should be separated with a synthetic separator winch is previously soaked in LiPF6 electrolyte.

The anode and cathode assembly is fold into several layers and rapped with kapton tape.Finally the electrodes is sealed in a PVC sleeve with proper electric wiring.

Result and discussion:

The Electrode prepared by the above procedure is subjected characterized by taking Scanning electron micro graphs and EDAX in order to ascertain the external morphology, chemical composition, crystalline structure and orientation of materials making up the sample.The data are collected over selected area-of the surface sample, two dimensional images are generated.

The average diameter of the nanoparticles was confirmed to range from 50–70 nm. Figure 2b shows that the lateral dimension of the Graphene nanosheets varies from 50 to 150 nm, indicating the relatively low

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quality of the material. However, the thickness of the Graphene sheets is about a few nanometers, which is beneficial for applications that require high specific surface area and electrical conductivity. EDX profile of graphene (Fig. 1C) is exhibited the signals corresponding to C and O with wt. % of 64 and 36 respectively.

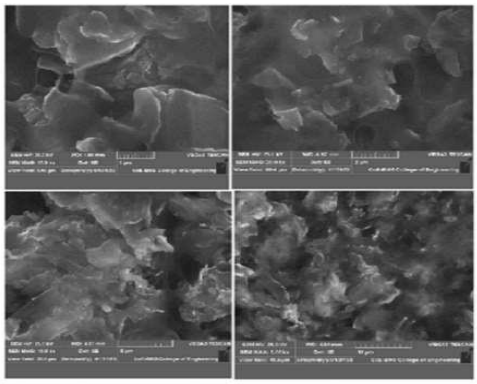

Fig. 4(b) shows SEM images of nanographene of diameter varies from 1-10 micrometer and thickness few nanometer

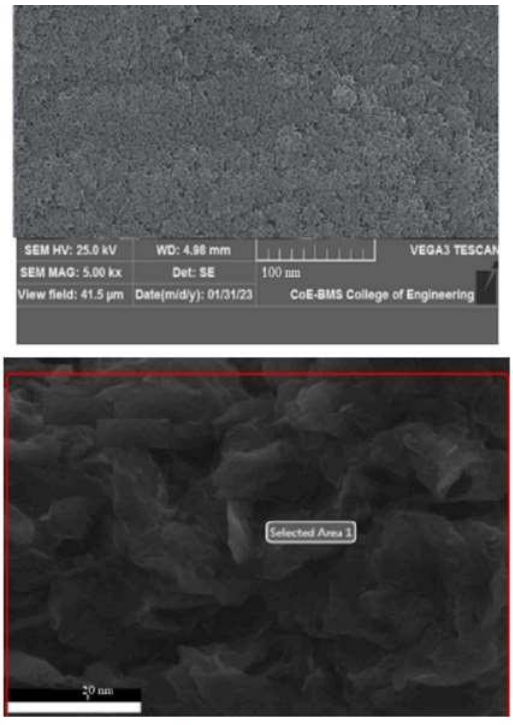

Fig. 4(a) SEM images of nanographene

Charge/ Discharge cycle :

Graphene, the atomic-scale single layer of carbon atoms bound together in a honeycomb lattice arrangement, might become one of the world's most useful materials but they are not fully commercially available. The extensively enhanced performance and life cycle advantages when fabricating Graphene-based batteries over traditional LIBs are surely worth the huge resource investments of last decade.

The Graphene battery after proper fabrication is subjected charging and discharging process by using amicisense battery capacity voltmeter.The results obtained by Graphene electrode battery well compered with ordinary Li-ion batteries.Graphene based Li-ion battery shows Some remarkable results like high voltage when compare to LIB's (4.6V >< 3.7V) and allows for high charge and discharge rates,stable long-term cycling and even economical affordability. Hence this technology is the most promising one for reaching new ground-breaking achievements in the field of lithium ion batteries and to

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develop the next-generation energy storag devices

5.1 Charging /discharging cycle of Graphene battery

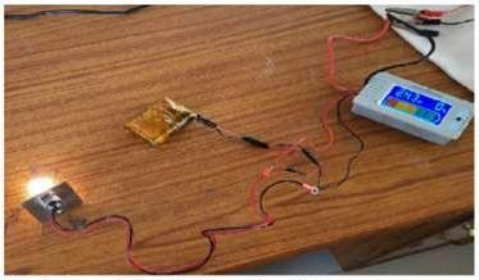


Fig.6, shows discharging of graphene battery

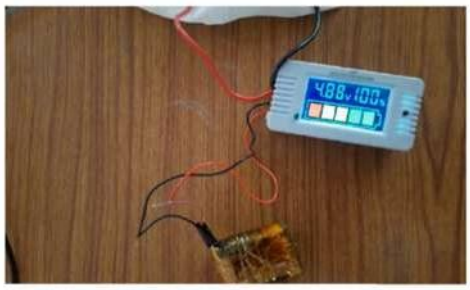
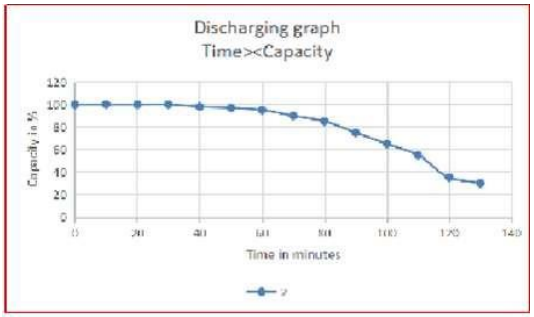


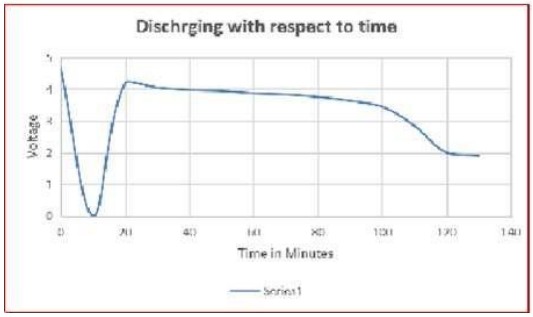
Fig. 6, Shows an voltage of 4.88V for fully charges graphene battery

Sl/ No.	Time in minutes	Percentage of discharge	Volt age
1	0	100	4.6
2	10	100	4.4.
3	20	100	4.2
4	30	100	4.05
5	40	98	3.97
6	50	97	3.94
7	60	95	3.87
8	70	90	3.83
9	80	85	3.75
10	90	75	3.63
11	100	65	3.44
12	110	55	2.84
13	120	35	2.0
14	130	30	1.9

Charging /discharging cycle

discharging





Conclusion:

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We have successfully developed a prototype Graphene battery by replacing the graphite anode with nanographene coated anode.From the result obtained by the experiments it is concluded that Graphene is promising candidate in the construction of modern batteries using as either anode or cathode. In our present studies it is found that the graphene battery is high performance battery when compare to of Li-ion battery. The out put voltage of graphene battery is 4.6 V ><3.7 V,charging and discharged efficiency is comparatively good , capacity of the battery is constant after the voltage reached to 3.8V, will not by die off suddenly when the voltage drop. Charging/discharging cycles are good with good efficiency if about 87% . Hence Graphene battery is the next generation rechargeable battery and the best alternate for electric vehicles

8.

Acknowledgement we the students GITW, Bangalore take this opportunity to express our deep gratitude and genuine regards to our guide **Dr. H.M Parveez Ahmed** for giving us all guidance and support to present this paper apart from being a constant source of inspiration and motivation.

We would also like to thanks our beloved principal, Dr. Faheem Ahmed Khan and Esteemed Management, Ghousia Industrial and Engineering Trust for providing a healthy environment in our college and promoting us to present this paper.

References:

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2. Introduction to graphene,*ACS materials*,LLC, Jun 01 2017.

3. **Y. Zhou et al**.Graphene nanoflakes with optimized nitrogen doping fabricated by arc discharge *Carbon,vol.148*

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13.Ali Hendaoui et.al. Preparation of Nitrogen-doped Holey Multilayer Graphene Using High-Energy Ball Milling of Graphite in Presence of Melamine *Materials,16(1)* (2023),*219.*

14.**Ms.Eleri Anne Worsley et.al.** Application of Graphene Nanoplatelets in Supercapacitor Devices: A Review of Recent Developments,*Nanomaterials, 12*(20),(2022), 3600.

CS2 plasma *Carbon,vol.144,issue 3*

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STP04

PHYSICS BEHIND ANIMATION

Sandiya Devi.v, Zainab Taj, and Ruchitha P
GITW (Bangalore-560029)

Abstract:
"Ever wondered how your favorite animated characters defy the laws of physics? In this report, we dive into the fascinating world of physics behind animation. From gravity defying stunts to realistic motion, we explore the principles of motion, forces, and energy that bring animated worlds to life.
Keywords:- Motion , : Gravity , : Kinematics , : Dynamics , : Force.

INTRODUCTION :

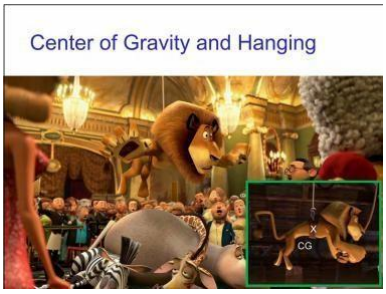
Physics plays a crucial role in creating realistic and captivating animations. It helps animators bring their characters and worlds to life by making them move in a way that feels believable and natural.

Have you ever noticed how objects in animations seem to have weight and momentum? That's because animators use the concept of momentum to create smooth and fluid movements. By understanding how momentum works, they can make their characters'actions flow seamlessly from one frame to another.

So, physics is like the secret ingredient that makes animations feel realistic, dynamic, and captivating. It's the behind scenes magic that gives life to the characters we love and the worlds we get lost in.

Experiment :

How physics principles like gravity, motion and force influence the movement and behaviour of animated characters :-



First up, we have gravity. Just like in the real world, animators use the concept of gravity to make their characters move realistically. Gravity pulls things downward, so it affects how characters jump, fall, and interact with their environment.By understanding gravity, animators can make their characters' movements feel grounded and believable.when a character jumps or falls, they follow the laws of gravity, which gives them a sense of weight and natural

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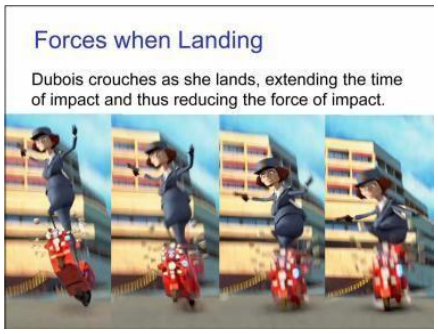
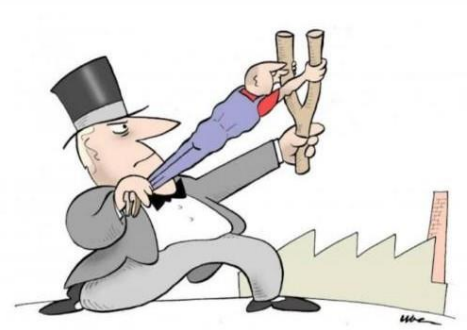
movement.

Next, we have motion and forces. Animators use Newton's Laws of Motion to create lifelike animations. These laws describe how objects move and interact with forces. For example, when a character runs, the animators apply Newton's laws to make sure the character's movements look natural and follow the laws of physics.By applying these principles, they can make characters run, jump, or fly in a way that feels natural and believable to the viewer**.**

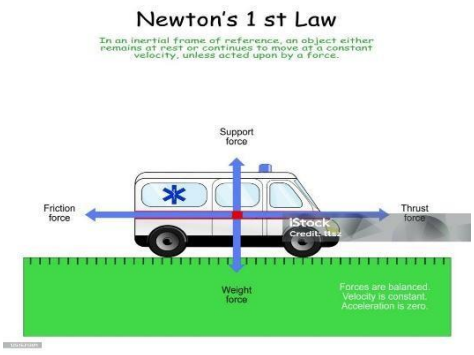


Momentum is another important concept. It's all about how objects keep moving once they're set in motion. Animators use momentum to create smooth and fluid movements for their characters. It helps the animations flow seamlessly from one frame to another, making the characters' actions look more realistic.



And let's not forget about the fun stuff like elasticity! When characters stretch, bounce, or squish, animators use the principles of elasticity. It adds a touch of whimsy and expressiveness to their animations. Think of how a cartoon character's face can stretch in exaggerated ways to show surprise or happiness. It's all thanks to the physics of elasticity!

How Newton's 3 laws applied in animation :-



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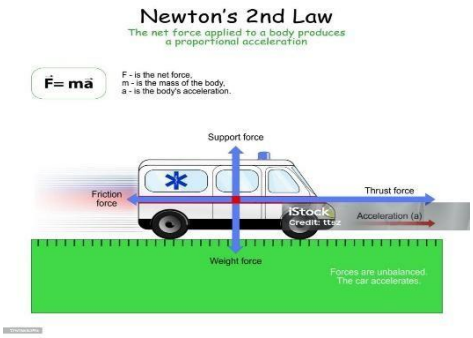
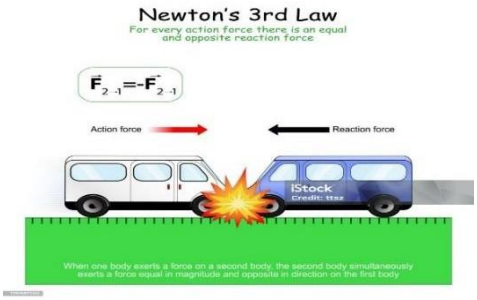
Newton's First Law of Motion, also known as the law of inertia, states that an object at rest will stay at rest, and an object in motion will stay in motion unless acted upon by an external force. In animation, this law is used to create realistic movements for characters. For example, if a character is standing still, they won't start moving unless something like a push or a kick is applied to them**.**

Newton's Second Law of Motion is all about how force, mass, and acceleration are related. The formula is F = ma, where F represents force, m represents mass, and a represents acceleration. In animation, this law helps animators determine how much force is needed to make a character move or change their speed. It helps create those awesome action-packed scenes!



Lastly, we have Newton's Third Law of Motion, which states that for every action, there is an equal and opposite reaction. This law is used in imation to create realistic interactions between aracters and objects. For example, if a character shes a heavy object, they will experience an ual and opposite force pushing back on them. lps animators create interactions between aracters and objects that feel authentic..



- By understanding and applying these laws of motion, animators can create animations that follow the rules of physics and look incredibly realistic. It's like they're bringing the laws of the physical world into the animated world!

- There are plenty of popular animated films that showcase the application of physics in creating realistic and captivating animations. Here are a few examples:

- **"The Incredibles"** - This action-packed film features characters with superpowers, but the physics behind their movements and actions are still taken into account. From Mr. Incredible's incredible strength to Elastigirl's flexibility, the animators used physics

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principles to make their movements feel believable and grounded.

- **"Moana" -** In this adventurous film, the animators paid close attention to the physics of water. From the way the waves crash against the shore to the movement of Moana's boat, the animation captures the realistic behavior of water, making the film visually stunning.
- **"Big Hero 6"** - This superhero film incorporates physics in a fun and exciting way. The character Baymax, a lovable healthcare robot, uses his inflatable body to move and interact with the environment. The animators had to consider the physics of air pressure and elasticity to make Baymax's movements look realistic and entertaining.
- These are just a few examples, but there are many more animated films that showcase the application of physics in creating captivating animations.

RESULT AND DISCUSSION :

- Simulation techniques play a crucial role in physics-based animation. Rigid body dynamics simulations allow for realistic object interactions, collisions, and constraints, making animations feel more dynamic and natural. Cloth simulations enable the realistic movement and behavior of fabrics and clothing, adding a layer of realism to character animations. Particle systems simulate phenomena such as smoke, fire, and explosions, creating visually stunning effects that enhance the storytelling.
- Fluid dynamics simulations are particularly important in animation, as they enable the realistic depiction of fluids like water, smoke, and fire. By incorporating principles such as viscosity, surface tension, and turbulence, animators can create fluid animations that convincingly mimic real-world behavior. This adds a level of realism and immersion to scenes involving water splashes, fiery explosions, or atmospheric effects like fog or mist.

CONCLUSION :

To sum it up, physics is like the secret ingredient that animators use to make their animations come alive. It helps them create movements that feel natural and realistic, whether it’s a character jumping, falling, or interacting with objects. Physics is what gives animations that wow factor, making them visually stunning and captivating for viewers. So, the next time you watch an animated film or show, remember that physics is behind the magic that brings those

ISBN:978-93-340-5353-1

characters and worlds to life!

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ISBN:978-93-340-5353-1

STP05

Design and Development of a multi-purpose low cost mobile robot

AUTHORS , P. ZaheerudeenSaheb, Shaik AatikaKulsum, TasmiyaFathima K GITW-Bengalore-5600

ABSTRACT:

This paper presents the design and development of a low-cost mobile robot, addressing the need for accessible robotics solutions. By leveraging off-the-shelf components and open-source platforms, the platform aims to democratize robotics technology while maintaining performance. The robot's structure, control system, sensor integration, communication, and user interface are detailed, highlighting its adaptability for research, education, and outreach. Results demonstrate smooth mobility, efficient power usage, precise control, accurate perception, reliable communication, and intuitive user interface. Through continued refinement, low-cost robotics solutions offer potential for widespread adoption and application across industries

INTRODUCTION :

This paper embarks on the design and development of a low-cost mobile robot, responding to the pressing need for accessible robotics solutions. By leveraging cost-effective components and streamlined manufacturing processes, our aim is to create a platform that democratizes access to robotics technology without compromising performance. Central to our approach is the integration of off-the-shelf components and open-source platforms, allowing for efficient resource utilization and minimizing development costs. Through this endeavor, we seek to bridge the gap between cost and accessibility in robotics, empowering a diverse range of users to leverage the benefits of mobile robots for various applications. According to Nikolaus Correll, Bradley Hayes, and Amir Deghani: [1] Mobile robots are integral to

ISBN:978-93-340-5353-1

the field of robotics, offering versatility in navigating dynamic environments,

General Design Considerations:

This robotic platform is designed to balance size, cost, and functionality, making it versatile for research, education, and outreach. The size of the robot is optimized to be easily transportable yet capable of accommodating various sensors and processing units. By using off-the-shelf components, we keep costs low while ensuring flexibility in design. The chassis is spacious enough to house a single-board computer and can support additional devices like a laptop or mini PC.

Cost-effectiveness is paramount, aiming to be approximately one-tenth the cost of commercial counterparts. Achieving this involves leveraging inexpensive sensors, actuators, and pre-built bodies, while developing the electronics internally. The use of small, affordable sensors and the option to utilize a laptop as the main processing unit further reduce costs.

Functionality is tailored for multipurpose use across different domains. The robot supports a wide array of sensors and processing units, allowing easy reconfiguration for specific tasks. It is designed for both indoor and outdoor operation, with removable sensors catering to various applications. According to Peter Corke: Mobile Robot Control provides essential algorithms for controlling mobile robots, vital for their effective operation. This approach ensures adaptability and versatility in tackling diverse research, educational, and outreach activities.

FIG-1:Monitoring and Controlling the Multi Mobile Robot in Outdoor

BASIC STRUCTURE FOR THIS

According to Howie Choset, Kevin M. Lynch, Seth Hutchinson, George Kantor, Wolfram Burgard, Lydia E. Kavraki, and Sebastian Thrun [3]. Mobile Robot Control Architectures delves into the fundamental concepts shaping the control strategies of mobile robots. The robot structure revolves around its chassis, akin

ISBN:978-93-340-5353-1

to a skeleton providing the framework for other components. This chassis accommodates wheels or tracks for locomotion and houses the internal parts securely. Power is sourced from a rechargeable battery, supported by a charging circuit to maintain its charge, and a power distribution system ensures all components receive adequate power.

At the heart of the control system lies a microcontroller or single-board computer, akin to the robot's brain, overseeing movement and behavior. Motor drivers regulate wheel or track movement, while a sensors interface connects various sensors to the microcontroller, facilitating environmental perception.

The robot employs an array of sensors for environmental awareness: ultrasonic sensors for obstacle detection, cameras for visual input, LiDAR for mapping, and an IMU for motion and balance sensing. According to Alonzo Kelly and Vladimir Sukhoy [4] Sensors play a pivotal role in mobile robotics, Communication is facilitated through wireless modules like Wi-Fi or Bluetooth, enabling interaction with other devices or remote control. Software, including an operating system and robot control software, interprets sensor data for informed responses.

FIG-2 : Finding metal ore

A user interface allows human interaction, ranging from simple button-and-light interfaces to smartphone apps or remote controls. Additional features, such as LEDs for status indication, buzzers for auditory feedback, or supplementary sensors, augment the robot's capabilities based on its intended application. Together, these components synergize to enable the robot to navigate, perceive, and execute tasks efficiently while maintaining cost-effectiveness.

FIG-3:WIFI Mobile Robot

RESULTS

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ASPECT	RESULT
Mobility	Smooth navigation on various terrains
Power Efficiency	Extended battery life with efficient charging
Control System	Precise control over movement and behaviour
Sensor Integration	Accurate perception of surroundings
Communication	Reliable wireless communication
Software Performance	Efficient execution of navigation algorithms
User Interface	Intutive interaction for users

CONCLUSION

In conclusion, the development of a low-cost mobile robot offers promising prospects for expanding access to robotics technology. By prioritizing affordability without sacrificing functionality, this project has successfully demonstrated the feasibility of creating versatile robots capable of navigating diverse environments. Through the integration of cost-effective components, efficient power management systems, and advanced sensor technologies, the robot exhibits robust performance in mobility, perception, and communication. Moving forward, the continued refinement of low-cost robotics solutions holds tremendous potential for empowering individuals and organizations to leverage the benefits of robotics technology across various applications and industries.

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ISBN:978-93-340-5353-1

STP06

RADIO ASTRONOMY

Wajeeha Khan, P. Zaheerfudeen Saheb, Afiya Zuha, Bushra Fatima, GITW, Bengaluru – 560 029

Abstract

Astronomy is a fascinating subject because it helps to probe the wonders of universe such as black holes, exploding stars, and colliding galaxies. New discoveries are being made at a rapid pace due to the advanced technology and probes available. While it is possible to appreciate astronomy with images and qualitative descriptions, it helps to gain access to the deeper level of beauty and understanding it using astrophysics with the application of laws of physics to comprehend celestial phenomena it can provide. This not only gives a greater appreciation for the wonders of the universe, but also allows for the perception of hidden regularities and connections among phenomena of the universe.

Introduction

Radio astronomy is a branch of astrophysics that explores the universe through the observation and analysis of radio waves emitted by celestial objects. It detects radio emissions, which can reveal unique information about the cosmos. These emissions come from a variety of sources, including stars, galaxies, black holes, and even the remnants of the Big Bang. The development of radio astronomy began in the 1930s with the work of Karl Jansky, who discovered radio waves emanating from the Milky Way. Since then, radio telescopes have become indispensable tools for astronomers, providing insights into some of the most fundamental questions about the universe's structure, composition, and evolution. One of the key advantages of radio astronomy is its ability to penetrate cosmic dust clouds, which can obscure visible light. This allows astronomers to study regions of the universe that are otherwise hidden from view. Radio waves are not affected by Earth's atmosphere, making it possible to observe celestial objects day and night, regardless of weather conditions. In this paper, an effort is made to delve into the principles of radio astronomy, the technology behind radio Telescopes, and

ISBN:978-93-340-5353-1

the ways in which radio observations have transformed the understanding of the cosmos.

Principles of Radio Astronomy

Radio astronomy relies on the detection of radio waves emitted by celestial objects. These waves can arise from a variety of physical processes, including thermal radiation from stars, synchrotron radiation from high-energy particles, and molecular transitions in interstellar gas. The primary instrument used in radio astronomy is the radio telescope, which consists of a large, dish-shaped antenna that collects radio waves and focuses them onto a receiver. The receiver amplifies the signals and converts them into electrical currents, which can then be analyzed to produce images and spectra of the observed objects. One of the key concepts in radio astronomy is spectral line emission. Certain atoms and molecules emit radio waves at specific frequencies, known as spectral lines, which can be used to identify the chemical composition and physical conditions of the emitting gas. For example, the 21-centimeter hydrogen line is commonly used to study the distribution and dynamics of interstellar gas clouds. Radio interferometry is another important technique in radio astronomy, which combines signals from multiple telescopes to achieve higher resolution images. By correlating the signals from different telescopes, astronomers can overcome the limitations of individual telescopes and obtain detailed images of celestial objects

Galactic Magnetic Field

The origin of galactic magnetic fields is explained by two opposing concepts Enrico fermi put forward the hypothesis of relic magnetism which arose shortly after the big bang. In 2006 Japanese astronomers

supported this concept after conducting series of studies. According to fermi galaxy

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captured and amplified these magnetic flows resulting in the field we observe today.

Fig.1: Galaxy NGC 5775 and its Magnetic Field are seen together

Astrophysicist Eugene parker explained galactic magnetism by the circular motion of the plasma and galaxies in their clusters later this model of galactic dynamo was developed by other scientists.

Basic properties of NGC 5775 (from LEDA

names	NGC 5775
	UGC 9579
R.A.$_{2000}$	$14^h53^m57^s.6$
Decl.$_{2000}$	$03°32'40''.0$
type	Sbc
incl.	$86°$[b]
pos.angl.	$145°$
distance	26.7 Mpc[a]
	$1' \simeq 7.8$ kpc

[a] Dahlem et al. 1995
[b] Irwin 1994

Fig.4: Data of NGC 5775 Galaxy

The interpretation of these observations has severe limitations: weak polarized signal at 1.49 GHz excludes a reliable determination of Faraday rotation. This work we present the reanalysis of the data in the context of new VLA observations at 8.46 GHz, which allow us to account for the Faraday rotation.

The North Polar Spur appears to cause large positive RMs in the region l between 0 and 60 deg and b between 0 and 60 deg, and thus causes a systematic bias in modeling if the pulsars in the region are not flagged. Estimates for the scale, geometry and strength of the magnetic field in the galactic system can be derived from observations of polarization properties of radio emission from the Galaxy, extragalactic radio sources and pulsars, and polarization of starlight. Within distances of about 500 parsecs from the solar system the magnetic field is directed towards galactic longitude l≈ 45, while at distances extending over a few kilo parsec its average direction is towards l≈ 90. Seen on a large scale the magnetic field in the Galaxy may be directed parallel to the galactic plane and along the spiral arms. The field may consist of a regular component and a random component with small scale variations of about 50 parsec in size. A new, much-improved model of the Galactic magnetic field (GMF) is presented. We use the WMAP7 Galactic synchrotron emission map and more than 40,000 extragalactic rotation measures to constrain the parameters of the GMF model, which is substantially generalized compared with earlier work to now include an out-of-plane component and striated-random fields. The new model provides a greatly improved fit to observations. Consistent with our earlier

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analyses, the best-fit model has a disk field and an extended halo field. Our new analysis reveals the presence of a large, out-of-plane component of the GMF; as a result, the polarized synchrotron emission of our Galaxy seen by an edge-on observer is predicted to look intriguingly similar to what has been observed in external edge-on galaxies. We find evidence that the cosmic-ray electron density is significantly larger than given by GALPROP or else that there is a widespread striated component to the GMF.

Cosmic Evolution

Radio astronomy also plays a crucial role in studying the evolution of the universe over cosmic time scales. By observing distant galaxies and quasars, astronomers can probe the early stages of galaxy formation and the growth of supermassive black holes.

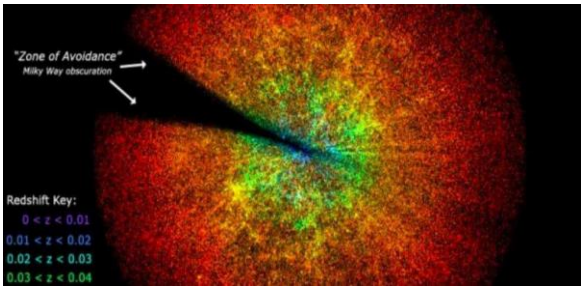

Fig.3:Astronomical Redshift

Furthermore, radio observations of distant galaxies allow astronomers to study the evolution of galaxies over billions of years. By measuring the redshift of radio emissions, astronomers can determine the distance and age of galaxies, providing clues about their formation and evolution. The cosmic microwave background (CMB) provides another remarkable result that is not only consistent with the idea of inflation, but is also highly suggestive that the universe itself could have arisen from nothing via quantum mechanical fluctuations in empty space The largest regions that can have collapsed significantly due to local gravitational attraction at early times are those that are the size of the horizon the distance across which light can have traveled over the time available since the Big Bang. This provides a "ruler" that can be used to determine the geometry of the universe by observing how "big" such regions appear to our measuring apparatus here on earth. If light travels in straight lines, such regions should appear to be about one degree across today. If light were to bend outward as it goes back toward the source, such regions would appear to be smaller than a degree, and if light were to

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converge as it goes back to the source, such regions would appear to be bigger than a degree across.

Conclusion

Radio astronomy is a powerful tool for studying the universe's magnetic fields, cosmic evolution, and fundamental physical processes. By combining observational data with theoretical models, astronomers continue to unravel the mysteries of the cosmos, and understanding.

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ISBN:978-93-340-5353-1

STP07

STELLAR EVOLUTION

Zainab taj, Ruchitha P and Sana Munir
GITW (Bangalore-560029)

ABSTRACT:

"Embark on a journey through the life stories of stars, from their humble beginnings in gas clouds to their dramatic endings. Explore how stars are born, evolve, and eventually fade away, leaving behind remnants that shape the universe. Delve into the fascinating world of stellar evolution. Join us as we uncover the mysteries of the cosmos, one star at a time."

INTRODUCTION:

"Stellar evolution is the process by which stars undergo changes throughout their lifetimes, from birth to death, driven by the interplay of gravitational forces and nuclear fusion reactions within their cores." Let's delve into its key aspects:

Birth of Stars:

Stars are born within vast clouds of gas and dust called molecular clouds. These clouds, composed mostly of hydrogen and helium with traces of heavier elements, are the stellar nurseries of the universe. Within these molecular clouds, regions of higher density, known as stellar nurseries or nebulae, give rise to the birth of stars through a process called star formation. The birth of a star is known as Nova means New. Gravity plays a crucial role in the birth of stars. As regions within the molecular cloud become denser due to gravitational collapse or external triggers like shockwaves from supernovae or the compression caused by nearby stars, the gravitational force becomes stronger, pulling gas and dust inward. Over time, this gravitational collapse leads to the formation of a dense core known as a protostar.

As the protostar continues to accumulate mass from its surrounding disk of material, its core temperature rises. When the temperature and pressure at the core reach a critical point, nuclear fusion ignites, marking the beginning of the star's main sequence phase. This phase is characterized by a delicate balance between inward gravitational forces and outward thermal pressure generated by nuclear fusion in the core, which fuels the star and provides the energy necessary to neutralize gravitational collapse. [6]

Death of Stars:

ISBN:978-93-340-5353-1

Stars are not eternal; they undergo a transformation as they exhaust their nuclear fuel. The fate of a star is determined primarily by its initial mass.

For low to medium-mass stars, like our Sun, the peak of their life cycle involves the transition into a *white dwarf*. As these stars deplete their hydrogen fuel in their cores, they undergo a series of evolutionary stages, including expansion into a *red giant phase* and shedding their outer layers into space, forming beautiful planetary *nebulae*. Eventually, the core collapses into a compact, dense remnant known as a *white dwarf,* supported against gravitational collapse by electron decay pressure.

In contrast, massive stars, those several times more massive than the Sun, follow a different path. Once they exhaust their nuclear fuel, their cores collapse under their immense gravity. This collapse triggers a catastrophic explosion known as a *supernova*, which can briefly outshine entire galaxies. The remnants of these explosions may form *neutron stars* or *black holes*, depending on the mass of the parent star. [7]

Note: The birth and death of stars are fundamental processes that not only shape the evolution of galaxies but also contribute to the enrichment of the universe with heavy elements and the formation of new stellar systems, planets, and potentially life itself.

ANATOMY OF A STAR:

Stars consist of several layers: the core, where nuclear fusion occurs, generating energy; the radiative zone, where energy is transported outward by radiation; the convective zone, where energy is transported through convection; the photosphere, which is the visible surface of the star; and the outer atmosphere, which includes layers like the chromosphere and corona. [3]

TYPES OF STARS:

Stars come in different sizes, masses, and spectral types. They are classified based on their luminosity, temperature, and spectral characteristics. Main sequence stars like our Sun fuse *hydrogen* into *helium* in their cores. Giant and supergiant stars are larger and more luminous, while white dwarfs are small, dense remnants of low to medium-mass stars.

Stars can be categorized into **seven spectral types** according to the temperature of their surfaces, ranging from the hottest to the coolest: O, B, A, F, G, K,

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and M. O stars are the most luminous and hottest, while M stars are the least luminous and coolest. [3] As discussed in the table below: **"Understanding Stellar**

	Surface Temperature (Kelvin)	Color	Luminosity	Typical Lifespan (years)
O	>30,000	Blue	High	Few million
B	10,000 - 30,000	Blue-white	High	Few million to 100 million
A	7,500 -10,000	White	Moderate	Few hundred million
F	6,000 - 7,500	White-yellow	Moderate	Few billion
G	5,200 - 6,000	Yellow	Moderate	Few billion
K	3,700 - 5,200	Orange	Low to Moderate	Few billion to 20 billion
M	<3,700	Red	Low	Trillions

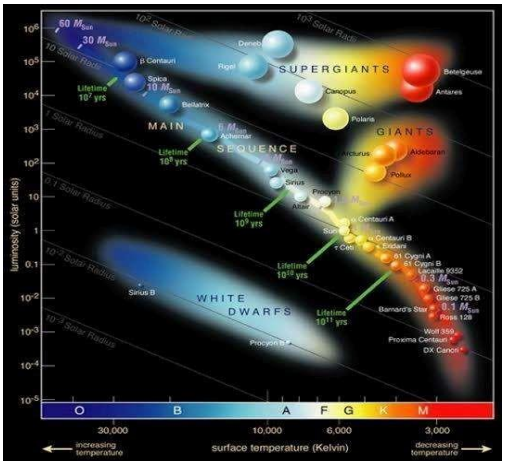
Evolution through

Hertzsprung-Russell Diagrams and Color-

Magnitude Diagrams"

A Hertzsprung-Russell diagram (HRD) is one of the most useful tools that astronomers use to study the evolution, particularly life cycle and characteristics of stars. Stars are classified based on their luminosity, temperature and evolutionary stage.

Typically, HRDs can be plotted as the temperature of the star against its luminosity. [2]



An alternative way to present the same information is via a color-magnitude diagram (CMD). Here, the color index of a star (typically B-V) is plotted against its absolute magnitude (typically in the V filter). The brighter a star is, the more negative its magnitude.

For example, a star with M=-2.5 is brighter than a star with M=+2.5.

In the HR diagram, the hottest, brightest stars lie in the **upper left**, and the coolest, dimmest stars lie in the **lower right**. Stars in the upper right of the diagram are extremely bright despite having low surface temperatures. This requires the stars to have large surface areas; these are

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the *red giants* and *super giants*, with radii many times that of the Sun. Stars in the lower left of the diagram are extremely faint despite their high temperatures; these stars are small, with radii much smaller than that of the Sun, and are known as *white dwarfs*. The most common stars are those on the *main sequence*, the region where stars spend the majority of their lives. Main sequence stars burn *hydrogen* into *helium*, via **nuclear fusion**, in their cores. The position of a star on the main sequence depends on its **mass**. The lower mass stars (from the mass of the Sun down to about 0.08 solar masses) are cooler and dimmer, and occupy the lower right of the main sequence. The higher mass stars (from about 2 to 50 solar masses) are hotter and brighter, and occupy the upper left of the main sequence.

Main sequence:

Most stars, including the Sun, plot in a band which runs from the top-left to the bottom-right of the chart. Stars in this area of the chart are in the main-sequence stage of their lives. We can use the chart to see that the temperature of main-sequence stars increases with brightness. This is because the star's mass controls both its temperature and brightness at this stage.

Red giants:

Red giant and red supergiant stars fall in the top-right of the chart. This tells us they are brighter than main sequence stars but also redder and cooler. This is because they expand and cool as they reach the final stages of their lives. However, because of their large size, they remain very bright. [5]

White dwarf:

These are the remnants of low to medium mass stars, including our Sun, after they have exhausted their nuclear fuel. They are located in the lower left corner of the diagram, with high surface temperatures but low luminosities.

Stars tend to spend about 90% of their life in the main-sequence stage. After this, they evolve into giant stars for the remaining 10 % of their lives. Finally, they will either explode as a supernova or become white dwarf stars.

Note: stars' surface temperatures are plotted on the x-axis (horizontal axis). Stars' luminosity is plotted along the y-axis (vertical axis). Be aware that the x-axis of the H-R diagram does not always use the temperature. It can also use spectral class (OBAFGKM), or color. However, all show the same relationship with a star's luminosity. We can use class, color, or

ISBN:978-93-340-5353-1

temperature because stars are considered blackbody sources.

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ISBN:978-93-340-5353-1

STE02

Feminist Representation In Fairy Tales

Afiya Zuha, Bushra Fatima, Wajeeha Khan

Abstract:

The stereotype that emerges from some classic fairy tales is a princess who has a beautiful face and an angelic heart, a prince on a white horse who is handsome and charming, and a happy ending forever. These three sweet things are generally always the main menu served in bedtime fairy tales, including the classic fairy tales Snow White, Cinderella, and Sleeping Beauty. Besides sounding beautiful, the plot and characterization presented in the classic fairy tale represent a woman through feminine standards packaged through stereotypes.

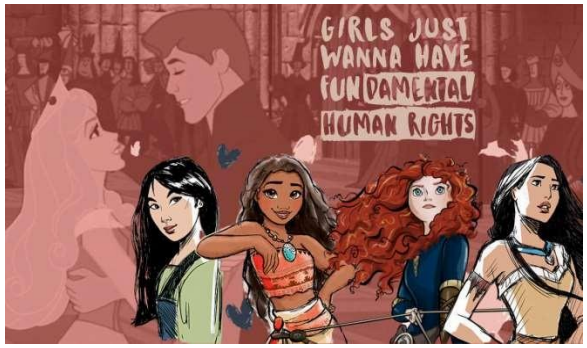
Snow White and the Seven Dwarfs, Cinderella, and Beauty and the Beast are fairy tales that children are told, teaching them that good always wins over evil. Most fairy tales have common gender stereotypes in which the female characters must follow traditional roles.Fairy tales are claimed by some researchers and critics to help children learn valuable lessons about life. On the other hand, they are also claimed to perpetuate negative stereotypes and gender norms Zipes,2015. According to Jung, fairy tales teach children how to resolve common human issues, desires, and positive relationships; mastering these abilities will bring an impact on the children‘s health, and qualified life, or even shape their future values and beliefs VisikoKnox-Johnson,2016.Children‘s stories are censored to remove the suffering that is inherent in the human condition Loder, 2015. This isolates kids and fosters an atmosphere that fosters shame and the idea that they aren't good enough because they can't live up to the standards portrayed in these stories. The significance of fairy tales goes beyond their artistic worth. The subtle orientation offered by the fairy tale genre is significantly more effective than other types of teaching, and literature plays a significant part in socialization. Children are introduced to social ideals and conventions through fairy tales. The traditional gender roles of the princess as passive, lovely, and

ISBN:978-93-340-5353-1

in need of rescue and the male characters as active, powerful, and heroic are both reinforced in Grimm's Snow White and the Seven Dwarfs. In keeping with gender roles and stereotypes that have been repressive for ages, Kirsch 2012 observes that the Grimm's' Snow White promotes the image of a woman in need of male protection and affirmation. In the story, little Snow White by Jacob and Wilhelm Grimm, the emphasis on beauty standards is present throughout. It reflects on modern day beauty standards in which women feel insecure and feel they need to do life risking surgeries and follow unhealthy diets just to be deemed "beautiful" in our society. Stereotypical gender roles are also prevalent in the story. This is demonstrated through the agreement that is made between snow white and the dwarf. This displays the wrong message to children. It promotes inequality towards women, essentially promoting that man should go out to work and a women should perform household tasks. The story also demonstrates the idea that a woman needs a male savior, which can be demonstrated by Snow White being saved by a prince. After being poisoned by a poison apple .It displays the typical "prince charming" scenario, where the women get saved by a man and they fall in love .It encourages the idea that a women must be dependent on a man, instead of her providing and supporting herself. It also promotes the inequality present in gender roles and the hope of a male savior.

The primary female character is either born naturally flawless and the most beautiful or later acquires beauty through magic. The other bad female characters are primarily presented as ugly and do not have a happy ending. Beauty is dependent on physical appearance, according to Etcoff et al 2004:4, who defines beauty as traits agreeable to the eye, intellect, aesthetic, and moral sense.

In Cinderella story, there are numerous misrepresentations of feminine roles, beginning with the stepmother and her daughters being portrayed as evil and merciless, the father as being passive about his daughter, Cinderella appearing content



with her fate, the magic power helping her, and the beauty, grace, and expensive dresses

ISBN:978-93-340-5353-1

being what catch the attention of a royal matron. The beauty is not confined only to the facial features and fair skin of Cinderella, rather her small feet also symbolizes the feminine eminence. Where the step sisters possess bigger feet which make them more masculine. As Bettelheim 1903 writes

"To have such big feet that they don't fit the slipper makes the stepsisters more masculine than Cinderella therefore less desirable."

Cinderella is portrayed as a lady who is longing for her so called prince charm who will rescue her from all her sufferings. The tale ends up with happily ever after ending where the heroine gets the chance to become the maiden of the prince.It contradicts the idea of freedom of a woman, where the woman should be self-dependent, rather the event of royal marriage exemplifies Cinderella's dependency on the prince to become financially and socially free. Though, ironically it creates an opposite picture of dependency where Cinderella is now dependent on the prince, the event proves that it is better to be dependent on a rich man than on a rich woman. According to the study's findings, Snow White and Cinderella both feature traditional gender stereotypes, however, Beauty and the Beast presents a more progressive view of gender roles.

Different from Snow White and Cinderella, De Beaumont's Beauty and the Beast is more feminist since it represents more modern gender roles. He portrays Belle as a hero and an active agent of change. On the contrary, she portrays her male character as passive and needing someone to rescue him. He has challenged the traditional gender stereotypes that have existed for a long time. Beauty is bold and fearless in addition to being smart. Belle is the only girl in the community who can read and she is very intelligent . She gives reading lessons to the local girls, and as a result, the villagers chastise her. She is responsible for rescuing both her father and the Beast from their situations. Belle is not portrayed as a stereotypical domesticated woman. She is sharp and energetic. He creates Belle as an independent and does not rely on her life on men.This story also challenge conventional notions of beauty. The protagonist, Belle is not conventionally attractive in the way that many heroines of fairy tales are frequently portrayed. Instead, she is frequently referred to as plain, and those who are close to her do not instantly notice her attractiveness. But Belle's character traits from the inside are

ISBN:978-93-340-5353-1

what make her attractive that the Beast admire and love, including kindness, intelligence, bravery, and compassion. Beauty and the Beast teach readers that true beauty rests in one's values and inner traits. The narrative questions the conventional wisdom that a woman must be physically attractive to find happiness and love. Initially, Belle is drawn to the Beast's gentle and compassionate demeanor rather than his outward looks. She gains an appreciation for his genuine nature by interacting with him and learning to look past his outward appearance.As children literature, Beauty and the Beast is different from the previous two fairy tales. It teaches better lesson to children since it portrays the female character different from the previous ones.

The female character is depicted as a character that has courage, active and strong. She has her own right in directing her future and life. She is not dependence on the male character. This tale tells its readers, children, that females and males have the equality in directing their future and life. Females are not weaker, neither are more inferior than males.

Conclusion:

Fairytales served as a means of teaching children about national societal norms as well as a means of comforting and uplifting. Children adore the character they relate to the most, whom they can most easily identify with, and whom they try to imitate in behavior. Children discover and learn proper etiquette and the role they should play in society through these fairy tales. Children can be manipulated and brainwashed using this method of teaching through stories. Additionally, the viewpoint, conduct, and way of thinking of a group can alter according to the depiction of a certain group. When the representation of women must follow the patriarchal system, it will make children have negative stereotypes of females. Children will have misperceptions of gender roles in their societal life. It is harmful to the children‘s conception of gender representation.

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ISBN:978-93-340-5353-1

Report Prepared

by

Ms. BUSHRA FATIMA

Second Year B.E. Student

(Computer Science)

"If we educate a man, you educate an individual, but if you educate a woman, you educate a Nation"

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