# THREE WHEEL BULLOCK CART

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*College : G Madegowda Institude Of Technology, Maddur*
*Branch : Department of electrical and Electronics Engineering*
*Guide(s) : Mrs. Aruna N S*
*Mr. Chethan R*
*Student(s) : Mr. Srinivas N*
*Mr. Chinna B S*
*Mr. Kirankumar K*
*Mr. Sachin Cs*

**Keywords:**

Transport Goods, Carry Heavy Load, Agricultural Produce, Fertilizers, And Other Essential Items.

**Introduction:**

The bullock cart is one of the oldest modes of transportation in the world, deeply rooted in agrarian societies where motorized transport was either unavailable or impractical. Traditionally comprising a simple two-wheel wooden structure drawn by one or two oxen, the bullock cart has played an essential role in rural economies across Asia, Africa, and parts of South America. Over time, as needs evolved and innovations emerged, variations of the bullock cart began to appear—one such innovation being the three-wheel bullock cart.

The development of a three-wheel bullock cart represents a practical adaptation of the conventional two-wheeled version. While two-wheeled carts are easier to manoeuvre and lighter, they can be unstable on uneven terrain, particularly when carrying heavy or unbalanced loads. The addition of a third wheel, typically at the front or under the central axle, increases stability and load-bearing capacity. This modification made the cart more versatile and better suited to rough rural terrains.

A typical three-wheel bullock cart consists of a strong wooden or metal frame mounted on three wheels—two large rear wheels and a smaller, often pivoting, front wheel. This configuration balances the cart more effectively and allows for easier control, especially when navigating slopes or uneven roads.

The rear wheels are usually larger in diameter, often made of solid wood or reinforced with iron rims for durability. These wheels bear most of the load and are connected to the cart's chassis through a strong axle. The front wheel is often smaller and either centrally placed or slightly offset, mounted in a way that allows for limited turning capability. In more advanced versions, the front wheel may be mounted on a fork-like frame that can pivot, providing a steering mechanism that mimics modern tricycles or rickshaws.

**Objectives:**

- To transport goods, such as agricultural produce, fertilizers, and other essential items, from one place to another.
- To carry heavy loads, typically up to 1-2 tons, depending on the design and construction of the cart.
- To provide mobility and access to rural areas, where traditional four-wheel vehicles may not be feasible due to narrow roads or rough terrain.
- Secondary Objectives:
- To provide a low-cost alternative to motorized vehicles, reducing transportation costs for rural communities.
- To promote a sustainable and eco-friendly mode of transportation, reducing carbon emissions and reliance on fossil fuels.
- To provide employment opportunities for rural youth and farmers, who can use the bullock cart as a means of earning a livelihood.
- To improve the quality of life for rural communities, by providing access to essential goods and services, and enhancing their overall well-being.

**Methodology:**

- Identify the specific needs and requirements of the users, including the type of goods to be transported, the terrain, and the desired load capacity.
- Develop a conceptual design of the three-wheel bullock cart, considering factors such as stability, balance, and ergonomics.

- Create a detailed design of the cart, including the frame, wheels, axle, and braking system.
- Select suitable materials for the construction of the cart, considering factors such as durability, strength, and weight.
- Use CAD software to create a digital model of the cart, allowing for simulations and testing of the design.
- Construction Methodology:
- Construct the frame of the cart using the selected materials, ensuring that it is strong, durable, and able to withstand the desired load capacity.

**Results and Conclusion:**

**Figure 1:** Supporting Wheel


**Figure 2:** Three Wheel Bullock cart

The three-wheel bullock cart has proven to be a practical and efficient solution for rural transportation needs, offering improvements over the traditional two-wheel design. The addition of a third wheel significantly enhances the cart's stability and load-bearing capacity, reducing the risk of tipping and allowing for safer and more balanced transport, especially on uneven or rough terrain. This design enables farmers and villagers to carry heavier loads such as crops, water, firewood, and building materials with greater ease. Economically, the cart is highly affordable and cost-effective, as it is constructed using local materials and does not require fuel or complex maintenance. Environmentally, it supports sustainable practices by operating entirely on animal power, producing zero emissions. Furthermore, it preserves cultural heritage and traditional craftsmanship, remaining an essential part of rural life in many regions. In conclusion, the three-wheel bullock cart stands as a valuable innovation that blends traditional knowledge with practical design enhancements. It not only supports rural livelihoods and promotes environmental sustainability but also holds potential for further improvement through modern materials and humane practices, ensuring its continued relevance in the evolving rural landscape.

**Project outcome and Industry Relevance:**

The three-wheel bullock cart project aims to improve the traditional two-wheel bullock cart design by enhancing stability, load distribution, and manoeuvrability. The addition of a third wheel helps balance the cart more efficiently, reducing the strain on the bullocks and making the cart easier to control, especially on uneven terrain. This innovation has the potential to significantly benefit rural transportation, where bullock carts are still widely used for agricultural and goods transport. In terms of industry relevance, this project supports the development of sustainable and cost-effective rural logistics solutions. It also promotes animal welfare through ergonomic improvements and can contribute to rural innovation initiatives supported by agricultural and mechanical engineering sectors. Overall, the project aligns with the goals of eco-friendly transport and rural development.

**Working Model vs. Simulation study:**

In terms of working, a Working Model operates as a real, physical prototype that demonstrates the actual mechanical functions of the design. It includes moving parts and is constructed using materials that represent or closely replicate the final product. For a three-wheel bullock cart, the working model shows how the wheels move, how the load is distributed, and how the bullocks pull the cart under real or simulated load conditions. On the other hand, a Simulation Study works through computer-based software, where the entire system is modelled virtually. The software calculates physical behaviours such as stress, strain, balance, and motion using input parameters. While it doesn’t involve physical movement, it accurately mimics the real-world behaviour of the system under different scenarios, allowing engineers to test and refine the design efficiently before building anything physically.

**Project Outcome and Learnings:**

The outcome of the three-wheel bullock cart project was a more stable and efficient alternative to traditional two-wheel carts. The third wheel significantly improved balance and reduced the physical strain on the animals, making it easier to transport loads over longer distances and uneven terrain. The design also enhanced safety and usability for rural communities. Through this project, key learnings included understanding mechanical design principles, load distribution, and the importance of

ergonomics in animal-drawn vehicles. Additionally, the project offered hands-on experience in model-making, testing, and simulation techniques, while also emphasizing the value of sustainable and low-cost engineering solutions tailored for rural applications.

**Future Scope:**

1. Offers a sustainable alternative to fuel-based vehicles in villages, aligning with green transportation goals.
2. Scope for improving design with features like rubber tires, lightweight metal frames, better bearings, and brakes.
3. Can be adapted to support small-scale organic and eco-farming operations where minimal mechanization is preferred.
4. Can be used in rural studies, exhibitions, and cultural heritage programs to teach younger generations about traditional life.
5. Future designs can focus on better yoke systems and weight distribution to reduce animal strain and improve welfare.
6. Can be combined with minimal mechanical or electric support (e.g., solar-assistedcarts).