EV Mobility Trike to Solve Last Mile Transportation Problem Inside Gated Campuses
Nandakishore. Y\textsuperscript{1}, Kiran. G. B\textsuperscript{2}, Madan Kumar. S\textsuperscript{3}, Anirudh Sai Virupaksham\textsuperscript{4}, K. Niranjan Rao\textsuperscript{5}
Department of Mechanical Engineering
East Point College of Engineering and Technology, Bidarahalli, Bengaluru, India

Abstract:
The rapid growth of technology and infrastructure has made our life easy. The advent of technology has also increased the expectations of humans to make every possible minute useful, easier and eco-friendly. The bicycle has gone from being an old-fashioned recreational product to a less polluting means of transport and a compact ultra light personal mobility tool. There is a growing demand for electric vehicles all around the world as there will be less air pollution, lower maintenance cost and reduced noise by electric kits installed to already existing vehicles or with a new electric vehicle. Similarly we have transportation medium for using in and around as our first mile transport but even with technology and accessibility around, there is a gap for transportation at the last mile i.e. gate to block in college campus, gate to house in a gated community or apartments or even as a surveillance vehicle etc, where the person has to walk with their luggage’s which will exhaust physical and mental health with wastage of time. Our project will provide an optimum solution to this drawback by fabricating a simple, cost effective, feasible yet highly adaptable EV mobility prototype for last mile transportation to use this for their convenient usage inside a gated community or other similar places with intelligent control system for easy access and position to ride with a basket to carry their belongings with them powered by electric motor. The front cycle frame is fabricated and assisted with two more rear wheels to self-balance with electric hub motor, lithium ion battery pack, controller are connected to make a complete electrical system to serve the purpose. As a scope for improvement and future implementation, we can make this a self rechargeable mobility with solar panels assisted to it and as well an autonomous vehicle controlled by an app.

Keywords: electric tri-cycle, gated campuses, load carrying, last mile transportation, self balancing.

I. INTRODUCTION
Around 93% of today’s automobiles run on petroleum based products, which are estimated to be depleted by 2050. Moreover, current automobiles utilize only 25% of the energy released from petroleum and rest is wasted into the atmosphere. Despite recent efforts to improve fuel efficiency and reduce toxic emissions in cars, emissions have continued to increase steadily in the past two decades.

For preservation of gasoline for future and increasing the efficiency of vehicles an electric vehicle has become a major breakthrough. The demand for electric vehicles all around the world is growing as there will be less air pollution, lower maintenance cost and reduced noise and this is achieved either by electric kits installed to already existing vehicles or making a new vehicle.

The legacy of electric vehicles are made to become popular through government by providing subsidy schemes and promotions with added advantages and industries by making them more economical and powerful as existing petroleum automobiles with more features making them more attractive and innovative with promising efficiency and electric ecosystem with charging stations to solve the problem of recharging during long distance travel.

Similarly with many options of transportation available for a common person to travel from one place to another within a city or within a certain radius either it might be a public transport, rented vehicles, pooling with colleagues or friends which can reduce the pollution, traffic congestion and some accidents, the common-person due to their busy schedule wants to make most of their time productive and uses their private vehicle because the person has to walk from their apartment building to the gate and vice versa similarly at the destination such as workplace, visiting place etc.

Even though some people use common transportation as first mile mode by walking to reach the initial destination, it’s not the same while returning back, the person might not have the same enthusiasm, energy or time at the last mile. Our project is based on the gap in the last mile transportation and tries to solve the problem with some added advantages.

PURPOSE OF THIS PROJECT:
To make a EV mobility trike which would solve the last mile transportation problems inside a gated community, campuses which are simple, cost effective than already existing electric vehicles, feasible yet highly adaptable with different speeds modes, comfortable riding position and easily accessible assisted with a carriage to carry the load.

II. LITERATURE SURVEY
The various models already available in the market such as two wheel segway, three wheel segway, pedelec bicycle prototype, solar assisted bicycle etc were studied by researching and taking references with standards and available components we came up with a adaptive draft sketch which would be more suitable to serve the exact purpose at campus, factories, office, apartments, amusement parks etc.
III. METHODOLOGY

| Planning | Gathering sources | Research and study | Assessing the working | Procurement | Fabricating the frame and chassis | Assembling the electric hub motor | Connection of batteries | Testing | Summarizing the result | Conclusion |

IV. COMPONENTS FOR TRIKE

- BLDC hub motor
- Lithium ion battery
- Controller
- Battery charger
- Fork with suspension
- Wheel rim
- Tyres
- Brakes
- Handle bar
- Battery management system
- Accelerator
- Display board
- Material

The above components were selected considering the cost, feasibility of components, and other factors for fulfilling the purpose of vehicle.

V. DESIGN AND WORKING OF TRIKE

SKETCH OF EV TRIKE:
We had the objectives set and some ideas of the model, so we started sketching out the model how it should look and the adaptive sketch is as shown below;

WORKING:
The EV mobility trike has a front hub electric motor, lithium ion battery, controller, battery management system, necessary throttle and display connected together using electrical wires which makes the complete circuit. When the key is turned ON the circuit gets engaged and is ready to drive with the help of throttle. The battery gives the power to the front wheel hub motor through the BMS and controller to run the mobility. The mobility runs on, power on demand direct drive principle. This mobility runs smoothly with less noise compared to conventional petroleum vehicles. Imagine when a person has to reach the destination of his house from gate inside the gated community the person goes to the nearby mobility, switches it ON, stands on the mobility, puts his load into the carriage if any and rides comfortably to his house and vice versa solving the last mile mobility problem inside the gated community. Similarly within university campuses, office campuses, factories, apartments, amusement parks, airports etc

VI. MERITS

- Lesser noise level while running on an electric motor.
- Decreased emission.
- Electric mobility can reduce dependency on fossil fuels.
- Simple, cost effective than already existing electric vehicles.
- Last mile transportation problems inside gated communities, college and office campuses are solved.
- Carriage is provided to carry their luggage and loads.
- Comfortable riding position.
- Can be used as surveillance vehicles by principal, head of the departments, wardens, security guards and supervisors inside college campus, gated communities and job floors etc.

VII. DEMERITS

- Lesser speed of electric motors compared to conventional vehicles.
- Charging points of electric mobility are complicated.
- Effects in reducing healthy activities such as walking.

VIII. CONCLUSION

The EV mobility trike fabricated came from a business idea which we had so the objectives were set to solve the last mile
transportation problem inside a gated community and the same is achieved. The mobility is simple, cost effective than existing vehicles in the market with less noise and pollution with comfortable riding position. Ultimately this mobility will save time and energy which used to be wasted during the busy schedule of individuals and we believe this will become a new trend in their daily usage. This will in turn promote use of public transport, sharing vehicles and pooling together which will also reduce traffic and accidents in major cities if used in large numbers.

III. REFERENCES


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