Triphibian - an urban future transportation system

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Abstract. The future requires a new concept of saving the energy besides to save the nature for maintain the sustainable resources. A single vehicle can transform into a car, a helicopter, a boat and a submarine by utilizing the parts which taken from used parts. This concept vehicle can be used as a multi utility platform which encompasses latest technologies like image processing and artificial intelligence for motion control. The concept of connected vehicle and handless driving with electric driven is introduced for road ways which helps in reduction in size of the vehicle. Self-driving feature is powered by nexus of electric and solar energy. Proposed concept supports to rescue people in endangered areas and a better alternative for public transports.

Keywords: Multipurpose Vehicle, Save Energy, Waste Utilization, Image processing and Artificial Intelligence, Self-driving and Public transport.

1. Introduction
In modern days the surging consciousness of pollution and energy shortage crises, sectors in automobiles and motorcycles are no longer the best for transportation.[1] As the price of petroleum products raising nowadays, there comes a need for cheaper and more efficient form of transport. In addition, saving energy in order to determine the problem of remnant fuel depletion is becoming increasingly important. Electrical vehicle technology as a step towards fulfilling these goals. An amphibious aircraft or amphibian is an aircraft that can take off on both land and water. In the underwater the vehicle moves as like recent submarine due to the arrangement of fins inspired from the bio mimics like shark fish. The Mono wheel is the weightless device that help the users for travel in local areas [2]. The design vehicle conceptually as well as aesthetically made with better simulation work using Ansys for testing in land, water and air. According to different modes of transformation, this vehicle is transformed into Car, Boat, Submarine, and Helicopter. In the air the vehicle moves as like the helicopter but the systematic arrangements are totally unique [3]. From the stable telescopic setup of a vehicle promotes the up thrust force for upward movement. In the water the vehicle moves as like a boat, the main parts are airbags for floating in the water the propeller along with turbine helps for direction control and speed control the telescopic system come from the side...
surface of the vehicle helps to land the setup to perform those operations. Example, in urban areas like Chennai, Bangalore, Mumbai and Kolkata the usage of automobiles are very higher in these areas the Triphibian make a big change.

2. Existing design
In the era there are lot of vehicles even some special automobiles are design and developed .But they are either possible in land or water or air ways alone. Mixing of all these are very rare cases. The below figure are mixing of some two modes and single mode like land and air ways, air and water ways, or water ways alone in Figure 2.3. Classic landing craft in figure.2.2 are not amphibious vehicles as they do not offer any real land transportation at all, although they are part of amphibious warfare. Ground effect vehicles, such as ekranoplans, will likely crash on any but the flattest of landmasses so are also not considered to be amphibious vehicles. The Harlingue monowheel in April 1914 in figure.2.1. The proportions of the propeller look even more extreme in real life- it doesn't look like a standard aeroplane propeller, it expected to produce thrust at a lower forward speed. The round thing at the rear is a roller- when stationary the machine rested on that and the side skids. Once it starts moving the driver would lean forward to raise the roller from the ground. Those vehicles facing problems on cost, efficiency, usability, ergonomics, less user friendly more and more not accessible by all. The Triphibian is sketched and modelled such a way that possible to well and good at land, air, and water and even in under water.

![Figure 2.1](image1)
![Figure 2.2](image2)
![Figure 2.3](image3)

3. Proposed design
Figure 3.1. shows the Isometric view of the Triphibian. The materials are sourced specifically with varying environment conditions and mechanical strengths like abrasion, torsion and payload. The sustainable consideration that 70% these materials for assembly are directly taken and reused from the stores of old as well as scrub areas and rest are also possible with largest recycling technology. The examples, the propeller from the helicopter, the electrical system like lights, battery, switches even PDM from the damaged super cars with some add-ons in autonomous control with smart python coding are implemented.

The normal Lander which is running in the roadways as like every vehicle. In case of some natural calamities like sudden flood or disaster with appropriate water trapped in a city at the time the Triphibian is transforming by the alarming to driver and the airbag comes out with the telescopic arrangement from the sideways and perform the swimming action. The steering system is carried out with the design of propellers inside the airbags. The vehicle also able to submerged by sucking out the air and utilize the fins for proceed inside the water through high viscosity of the liquid.
Other than submerged driving while in top surface the vehicle have to drive smoothly by using the designed air bag out using joystick operation at driver cabin shown in figure 3.2. Based on the surrounding environment the structure modification occur.
While in need of flying, the concept of heliport setup is modeled with beautiful propellers at the side and rear portion. In normal mode the vehicle comes to close setup of propeller at side and rear, two tyre make the point contact with road promotes the land operation. The controller module is embedded with extend reality system make the hologram view for the front, back and side view is processed by image processing technology. The hand/ leg operating arrangement is designed in better ergonomic way.

**Figure 3.1 Isometric view**

**Figure 3.2 Cockpit view**

**DESIGN EXPLANATION**

- High Pollution through more emission from vehicles.
- More wastes from industries
- Plastics wastes
- Over 2 Million species died
- Global warming
- Smart energy and waste to wealth to wonder
- Multipurpose vehicle
- Application
  - Best ergonomics
  - Electric charge
  - Sport
  - Commercial mode
  - Public transport
- Pollution free
- Highly supportive for disabled and old age people

**Figure 3.1.1 Concept of the product**
3.1. Product development
The flowchart in figure.3.1.1 shows that the concept of the product from initial sketch to product
development and applications. Automobile industries get benefitted from pollution and able to quick
recharge facility with Li-Ion battery setup below the driver and passenger cabin. The materials using or
fabricated not requires any special machinery. It is already available in the market more and more the used
parts from truck, buses, helicopter, and ships through 3R(Reduce Reuse and Recycle) policies .It is
employed by reduce the production of materials and reusage the materials from automobiles thereby recycle
the entire process to get environmentally friendly vehicle.

| S.No. | PARTICULARS         | MATERIAL          | QUANTITY |
|-------|---------------------|-------------------|----------|
| 1     | SPHERE              | FIBER GLASS       | 1        |
| 2     | WINDOW              | FIBRE GLASS       | 2        |
| 3     | CHASIS              | STEEL ROD         | 1        |
| 4     | TYRE                | HARD RUBBER       |          |
| 5     | WING PROPELLER      | AL-MG ALLOY       | 2        |
| 6     | WING FRAME          | POLYMER           | 2        |
| 7     | TELESCOPIC SUSPENSION| CHROME ALLOY     | 2        |
| 8     | TAIL PROPELLER      | AL-SS ALLOY       | 2        |
| 9     | TAIL FRAME          | AL-SS ALLOY       | 2        |
| 10    | MAIN TAIL           | STAINLESS STEEL   | 1        |
| 11    | HEAD LIGHT          | LED               | 2        |
| 12    | FINS                | SHEET METAL       | 2        |
| 13    | SEAT                | SPONGE(POLYURETHANE FOAM) | 4 |
| 14    | LCD SCREEN          | LIQUID CRYSTAL    | 1        |
| 15    | JOYSTICK & PEDALS   | PLASTIC           | 2        |
| 16    | SWITCH              | BUTTON            | 10       |
| 17    | MOTOR               | DC & BRUSHLESS(TITANIUM) | (2)(2)(2) |
| 18    | GEAR                | CAST IRON         | 6        |
| 19    | DRIVEN SHAFT        | STEEL ROD         | 2        |
| 20    | BATTERY             | ULTRA CAPACITOR(LI-ION) | 10000   |

4. Dimensional details
The multiutility vehicle consists of outer body made up of fiber reinforced polymer and airbag ,propeller,
telescopic system requires high elastic material for closing and opening of the side support for flying as
well as movement in water. The tyres which are attached with rim by force fit with spherical body at the
mid plane of the vehicle thereby support the entire vehicle to withstand the overall weight and also helps to
balancing the vehicle .The LED (Light Emitting Diode) and headlights designed during dark, warning and
under the water conditions, then the passengers and driver seats can be changed according to the
requirement, transparent solar panel and circuit connections which are interconnected with one another.

The transformation of the vehicle are given below:

4.1. Construction details of car
Software used - CAD/CAS-2D Sketch, 3D model, simulation, rendering, flow simulation, electric works,
visualization all done using SolidWorks.
4.1. Construction details during land

For the land motion consists of two number of coaxial tyres for moving forward and backward even in 360degree shown at Figure 4.1.2. This movements can controlled by either hand lever or pedal arrangement. The vehicle balancing is controlled by hover ring attached at the back (Air dynamic adjuster).

4.2. Construction details during float

In The water the vehicle moves as like a boat, the main parts are airbags for floating in the water the propeller along with turbine helps for direction control and speed control the telescopic system come from the side surface of the vehicle helps to land the setup to perform those operations as shown in Figure 4.2.1.
4.3. Construction details during submerging

![Figure 4.3.1 Backview](Image)

![Figure 4.3.2 Side view](Image)

In the underwater the vehicle moves as like recent submarine due to the arrangement of fins inspired from the bio mimics like shark fish in Figure 4.3.2. While moving in the underwater the total weight of the vehicle is balanced and controlled by propeller which gives the thrust for moving. This is shown the two rings located at the Figure 4.3.1.

5. Construction details during fly

In the air the vehicle moves as like the helicopter but the systematic arrangements are totally unique. From the stable telescopic setup arise from the sides of a vehicle promotes the up thrust force for upward movement shown in Figure 5.1.

![Figure 5.1 Isometric View during float](Image)

6. Result and discussion

The result of the proposed solution provides the alternative solution for driving the vehicle at their wish not to worry in any cause at flood, or any situations. It make more advantage in the field of military areas to rescue the people from endangered areas. The seating capacity can be increased and can be used like public
transport with smart mobility systems. It adds the further advantage of the outer body is made with the solar powered glass able to absorb the solar energy thereby saving it and can be used for the instant or later usage.

7. Conclusion
Thus the three mode of transportation vise land, air and water even in underwater is satisfied by saving energy in eco-friendly manner as well as using the best transmission with electrical system. The design criteria of time efficient cost, by saving the fuel and pollution free are defined. While consider for usability the vehicle can be used for across the year not seasonally, here the ultimate way of mounting and dismantling is cleared. Significantly, passenger safety is more considered here. In traffic as well as parking, the dimension of the vehicle is optimized. It is completely new medium of transportation with versatility.

8. Future scope
The future scope of utilizing the all energy from the renewable sources thereby reducing the fuel power and cost to make everyone accessible. The technology of artificial intelligence and image processing is going to be interlinked with Extend reality to experience the customer satisfaction before buy this can test the ride and feel the comfort with free of cost.

9. References
[1] Anup M Gawande, Akshay P Mali 2016 Amphibious Vehicle International Research Journal of Engineering and Technology Vol 3 Issue 10
[2] ADM Klunder, Prewitt R 1945 Submarine technology with undersea warfare Basic Factors of Helicopter Design SAE Technical Paper 450215
[3] Xiaolin Xie, Feng Gao, Chuan Huang, Wen Zeng Design and development of a new transformable wheel used in amphibious all-terrain vehicles (A-ATV) Journal of Terramechanics Vol 69 February 2017 Pages 45-61
[4] A P Khode, K Senthilkumar, Bhushan S Patil, Nagaraj Kulkarni, M W Trikande Shape 2017 Optimization And Weight Reduction Of Seat Structure For Wheeled Armoured Amphibious Combat Vehicle Materials Today: Proceedings Vol 4 Issue 2 pp 1917-1926
[5] Sebnem Helvacioglu, Ismail Hakki Helvacioglu, Burak Tuncer Improving the river crossing capability of an amphibious vehicle Ocean Engineering. Vol 38, Issues 17–18 2011 pp 2201-2207