

## Flying Taxi Assembly for Bicycle in India

Shrikant M. Harle<sup>1\*</sup> and Ganesh Deshmukh<sup>2</sup>

<sup>1</sup>Dept. of Civil Engineering, Prof Ram Meghe College of Engineering and Management, Badnera, Amravati, India

<sup>2</sup>Dept. of Civil Engineering, Pankaj Laddhad Institute of Technology And Management Studies, Maharashtra, India

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**Abstract** - As developed countries move towards developing better transportation routes, India may soon become involved. While tech giants such as Google, Airbus, Uber, Volvo and dozens of others are working on driverless cars, some, such as Boeing Company UberAIR and Elon Musk and Hyperloop, are racing on-air or underground. Although technology is at an early stage in India, it certainly has the potential to change the ever-increasing traffic problem in the country, especially in big cities such as Delhi, Mumbai and Kolkata. Mumbai, Delhi and Bangalore are some of the most congested cities in the world, where a journey of even a few kilometers can take over an hour. A few companies offer a lot of potential to help create transportation options that cross traffic congestion. In the present work different company offering the service of flying taxi and the technology behind it is discussed. The present work also consists of air taxi station where foldable electric charge bicycle shall be converted to flying taxi using removable assembly of air taxi.

**Keywords**—Flying taxi, foldable, vehicle, transportation & VTOL

### I. CURRENT STATUS AND CHALLENGES

Passing traffic at rush hour by jumping into a flying taxi may seem like a science fiction, but now corporations and startups are now working on prototypes. Think of sci-fi worlds where the horizon is filled with buildings rising above the clouds and the air is covered with tiny pods that are smart enough to fly to their destination on their own. Although we all once dreamed of living in such a world, the rules, regulations, and engineering barriers prevented us from going up to the sky and missing traffic Monday into the morning rush hour [1,2]. The concept is not entirely new, and recent interest around it has seen Uber want to introduce flying taxis in Dubai, a production model called PAL-V Liberty for sale, and the recent Lilium Jet introduced a mighty similar concept as Airbus Vahana, saving a bit of autonomous taxi [3].

It is the latter that makes this attempt more attractive, intriguing and even practical. Airbus, a manufacturer of aircraft, is working on a Vahana project that aims to make it a reality as early as 2020. The company has taken the hints from existing engineering techniques and advances in automotive management to create a sketch of a self-flying, fully electric air taxi that can take off and land vertically, eliminating the need for runways and therefore ideally suited for congestion. Although the whole concept may seem easier than it is, Airbus has actually taken into account every obstacle and difficulty, and the resulting plan is promising [4,5].

Traffic congestion costs the largest Indian cities of Mumbai, Delhi, Kolkata and Bengaluru \$ 1.5 million a

year (\$ 21 billion) each year. Because air taxis will operate node-to-node instead of point-to-point, utility cases can take people to airports or industrial complexes around the city.

What could be good news for India, IIT-Kanpur has signed a Memorandum of Understanding (Memorandum of Understanding) worth 15 cr with VTOL Aviation India Pvt Ltd, India's private Indian aviation company, to create operational prototypes to be used as flights. More than 100 researchers at IIT-Kanpur have worked to develop a fully functional prototype and the project will be completed by 2023 [6,7].

As we all know, fuel prices, especially gasoline, are increasing every day. Again pollution through vehicles in metro cities & urban areas are constantly increasing. Efforts are being made to address some other alternative sources to overcome these problems energy or return to unconventional energy sources for vehicles [8-10].

Transport is one of the important issues that needs to be addressed in today's situations, such as commuting. From place to place within the city became a tedious and very expensive job. One particular utility is a folding bicycle; The design allows users to easily transport from one place to another, using a smaller bicycle in a compact folded form. When using a An elaborate bicycle trip, it enables people to get on vehicles. A bicycle is one who is recognized as a transport solution that helps to improve various environmental conditions, economic factors and social aspects [11-13].

Technology:

Researchers would work on VTOL (vertical take-off and landing) technology, which is primarily used to make planes

for take-off and landing vertically. The proposed "flying taxi" would run on electricity, so the energy used in it would be absolutely clean. For better efficiency and durability, IIT-Kanpur has also developed a prototype of hybrid air-taxi.

Project Vahana:

Having been developed on the advanced design remaining Airbus A3, Project Vahana utilizes maximum lightweight engineering design, upgraded integration of sensors and algorithms, and develops a rechargeable battery. The output obtained is the use of a rotor tilt electric aircraft, which can be cut off and land on, deflecting without the need for a field strip.

Uber:

Large companies such as Uber, Boeing and Airbus have begun to develop this technology. Silicon Valley startups are also passionate about flying taxis. Uber plans to fly out of these taxis by 2023 and has also partnered with NASA.



Figure 1: Flying car (Source: Uber / Safran)

Uber unveiled looks for the taxi network's skyports from architecture and engineering firms Gensler, Corgan, SHoP, Pickard Chilton, and Arup.

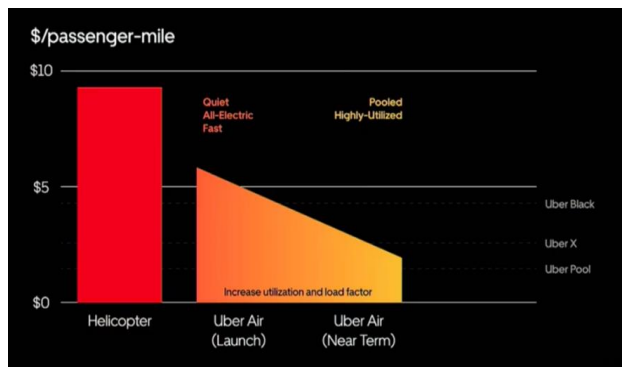


Figure 2: Breakdown of cost (Source: Uber)

**Passenger carrying drone:** The aviation industry is well developed, and various planes are diving in the sky. Helicopters, public aviation and large commercial aircraft are considered safe and considered acceptable modes of transportation.



Figure 3: Launching pad for flying car (Source: Uber)

## II. PROBLEM FORMULATION:

The study related to current updates about the flying taxi is carried out as stated above. There are many companies planning to launch the flying taxis about one passenger to six passengers in upcoming two to three years. Most of the companies are going to launch it in the developing countries in terms of flying taxi station. The stations then are planned to connect with other stations. The flying taxi will take off and land on such stations. In cities like Mumbai, Delhi of India faces problem related to traffic congestion as well as the shortage of sufficient places to create new flying taxi station.

The present technology deals with the services related flying taxi at different stations. A person who wants to take such service has to plan accordingly and plan to go such stations. But if a person get a emergency call then it shall be difficult to overcome the traffic congestion and reach the station within appropriate time.

The mission of the urban air taxi is to transport passengers and luggage from point A to B within a defined urban metropolitan area at a price that is competitive with alternative transportation modes. The requirements for this may includes safety and certification, noise emissions, range, speed, operating costs, number of seats and design for usability. when designing a new aircraft to these standards, we must take into account all aspects of the system, including (but not limited to) product design, crew training, maintenance aspects, manufacturing, air traffic management deployment, etc.

The present work suggests to use the high rise building of the cities as station for flying taxi. Here also suggests the technology with which any person with bicycle (especially electric charge) then he may reach the station and attach the assembly structure to reach destination.

### III. IMPACT ON THE SOCIETY:

The cities of India becoming overcrowded nowadays and therefore the traffic congestion are also a problem. The technology of flying taxi with detachable assembly to electric charge bicycle shall lead to the environment friendly solution. Any person may use such stations whenever requires, because of this the time consumption shall be less. This kind of technology shall also be helpful when the trains at many times don't deliver at right time. Business travelers are more and more concerned of efficient flying. When time and money can be saved when traveling, value is added to their business processes.

### IV. DESIGN APPROACH AND NOVELTY:

The concept of electric drive in aviation is almost as old as aviation itself. The first electric-powered aircraft debuted in 1917 (tethered PKZ-1) and Electric aviation has been an alternative for fans in recent years. Now, with advancement in the distribution systems of electric motors distributed between several engines, and sophisticated controls to control them have finally become an electric actuator a viable alternative to hydrocarbon based systems.

When above mentioned air taxi is to be used then the problem shall remain how to go at the air taxi station and then from destination station to home or office. In that case if a person is using a bicycle then it shall not only lead to environment friendly option but also same can be used as flying taxi to the destination. If the foldable bicycle is used then the space shall be minimum to accommodate the assembly and advantageous for overall structure.

An electric bicycle, also known as an e-bike, is a bicycle with an integrated electric motor which can be used for propulsion. A folding bicycle is a bicycle designed to fold into a compact form, facilitating transport and storage. When folded, the bikes can be more easily carried into buildings and workplaces or on public transportation and more easily stored in compact assembly of flying taxi. Such bicycles shall be used for the assembly purpose to minimize the space required.



Figure No. 4: Foldable electric charge bicycle

Global warming is becoming a major problem in world the current scenario. So people try to move towards it clean energy. transport is one of the sources of pollution or global warming through the operation of a bicycle or any type of vehicle fuel (gasoline, diesel) it burns and produces harmful gases in the air as a result of this pollution increases with this source energy imitates, so today you need to move others a clean source of energy for transportation which is free from pollution and it is easily accessible. An electric bicycle is one of the way to reduce this type of problem. An electric bicycle is called like an e-bicycle.

The sophisticated bike is a modified and rated version cycles. This is the type of cycle that inherits cycles to new heights. These are the characteristics and properties such as light weight, easy to carry, portable, less space that require low maintenance, do more popular and the first choice of cyclists, climbers and more. The most important things in assembling a bike are the joints, the material used and the type of connecting techniques such as welding, brazing, etc. is carried out for the manufacture of folding bike.

Any general bicycle can be converted to flying taxi with the help of removable assembly which can be available at flying taxi station. In countries like India there is a problem traffic congestion in cities like Mumbai, Delhi. The flying taxi station can be made available at the roof of any high storey building. The assembly structure can be removable from a bicycle to another. Any person may use this assembly on his own bicycle. Any person may use his bicycle to reach at flying taxi station and fly to his destination (other station) with attached assembly, it may then detach and person may go with his bicycle to home / office. This will lead to saving in time and to avoid road traffic congestion in city.

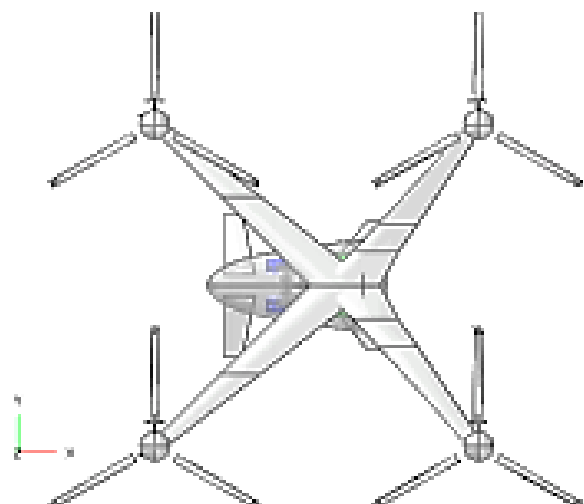


Figure No.5: Assembly structure

The assembly shall be specifically designed to exclude high-maintenance systems that drive the maintenance cost of legacy helicopters. Direct-drive electric motors and fixed pitch rotors shall be chosen and high-maintenance tilting

mechanisms shall be avoided. For the same reason, a skid-based landing gear system shall be chosen over a wheeled solution with active brakes. The carbon composite air frame shall be designed to enable high-volume production using established aerospace manufacturing techniques. All of this helps keep periodic inspection and maintenance to an absolute minimum. It shall be specifically designed for short-haul missions in which the vertical take-off and landing phases contribute heavily to the overall energy consumed. With a range of around 30 km, it can service the all-important route in the cities. A cruise speed of 80–100 km/h enables this assembly to offer significant time savings compared to ground transport.

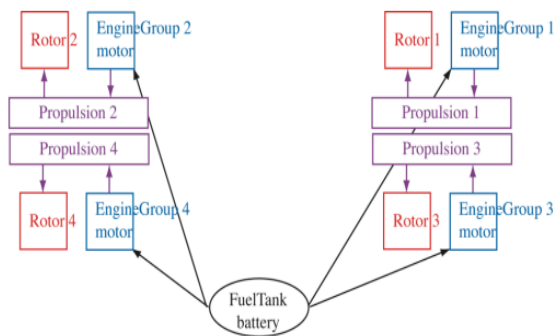


Figure No.6: propulsion system for assembly structure

For small range, the electric and turboshaft engine shall give the smallest assembly weight. This type of design can fly the assembly structure at 130 kmph approximately. Minimizing the assembly total drag is important for efficient cruise and low energy requirements. The assembly may look as shown in the figure given below.

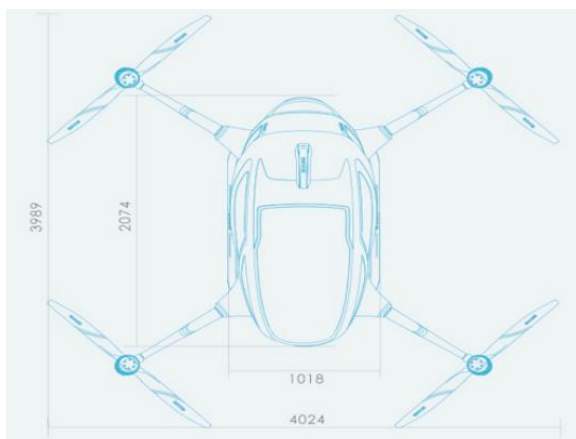


Figure No.7: Dimensions in the top view are in millimete

In the assembly the parameters to be considered shall be maximum total power 152 kW, Number of motors 8, Total battery energy 14.4 kWh, Propeller diameter 1.6 m, Net weight 260 kg, Total flight time 25 min & Rated payload weight 100 kg.

In first step assembly shall be attached to bicycle as having average weight of 10 kg and then it may be applicable to bike (having average weight of lightweight bike as 140 kg). This technology shall help any person who wants to save his time and avoid road traffic generally or in emergency.

## V. RESULTS

The 7 km mission completed by the air taxi was 4.9 min, 30 km extra urban mission completed by the prototype in 18.7 min. energy consumption for 7 km mission and 30 km extra mission was 3.0 kWh and 10.9 kWh respectively. Total hover time of 20.5 min, flight time of 25 min and practical range of 42 km was also observed (Alessandro Bacchini 2019). Payload of around 113 kg is suggested for the air taxi assembly. Therefore this type of assembly can be suggested for the work.

## VI. CONCLUSION

Considering the operational problems of flying cars, especially in terms of safety and integration into urban environments, the long-term creation of flying cars depends on the public's reaction to the potential hazards that users may face. In particular, the perception of security implications (such as interaction with other vehicles; loss of communication, navigation or communication with control systems) or possible safety barriers (eg, tracking of navigation by unauthorized persons) usually have a strong impact on decision-making process of users. Since the bicycle can convert to any flying taxi in that case any common person may use this technology and take the benefits. The high rise building may be converted to such flying stations. Therefore there is no need to construct separate flying stations for such flying taxi. This technology is useful for congested cities in India and time will be greatly saved which results in cost savings.

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