Aim:

Flying cars have always been the focus of development and trade throughout the history of automotive and aviation. In this article, the history of flying vehicles is explained, including some ongoing development projects. Technical challenges, particularly those related to elevation and strength, as well as problems related to broader acceptance are presented. Increasingly, people are interested in flying automobiles and the additional electrical infrastructure they require. This article also looks at the challenges and needs of developing a hybrid or pure flying electric car, explosion automotive and aviation strategies, and direct departure and arrival (VTOL)

A good flying automobile will drive like any other car on the road and fly like any other VTOL aircraft. However, numerous firms are actively striving to attain this aim. Transportation will be considerably improved by flying vehicles. They will also revolutionize the transportation sector and enhance living standards in many regions of the globe. Determine whether it can replace helicopters and provide flexible performance at a lower cost to the taxpayer with reduced air consumption, fuel consumption, and financial costs. In order to reduce congestion, a flying automobile would be an excellent choice of transportation. Rapid recovery or quick action is also beneficial to the police and military. To assist protect the environment, flying vehicles will slow down infrastructure development (i.e., building roads and bridges). To reduce the amount of air traffic control difficulties, they will build as many airports as we have. Electrical, mechanical, technical, signals, controls, communications, and many more related areas will be added to the list of aerospace-related industries. The flying automobiles weren't given much of a chance to shine. There have been, however, many independent studies related to land vehicles and aircraft. Since a flying car can be considered a powerful helicopter, much of the work done on the road and in the air can be used on flying cars. With the advancement of technology in the field of electrical power, control, electric engines, signals, and communications, the flying car industry could soon become a reality. Technologies related to electric and hybrid vehicles, electric aircraft, and other electric vehicles can be integrated to improve the efficiency of electric vehicles / hybrid power and low output. Following a brief history, this document outlines the problems with flying car construction, as well as the underlying infrastructure required. Also happening in the construction of aerospace development work and future strategies. In addition, this document deals with the construction of power and hybrid propulsion for land, aviation and VTOL

Design Choice and justification:

Flying cars are significantly more complex to develop than regular cars or tiny planes. The criteria for building a ground vehicle are so different from those for building an airplane that combining the two into a single system is a difficult endeavor. In addition, there must be a seamless switch from airplane mode to global vehicle mode and vice versa for the car to operate properly. An analysis of past designs reveals a compromise in road traffic mode to provide aircraft to fly. These vehicles usually have an unusual shape and size, making them inconsistent with other road vehicles. Many of these vehicles had unsafe design concepts such as proven control areas and avionics sensors. Several other designs endanger the flight mode. This has led to the development of an inefficient flying machine that cannot meet the desired or acceptable flying characteristics. The most common problem was not enough wing space. There have been several attempts to achieve VTOL power by using a powerful elevator. With the apparent increase in the complexity and power required for VTOL vehicles, it is not surprising that all attempts of this type have failed. For safety reasons only, VTOL airlines may be required to operate outside airports as other airlines as well,

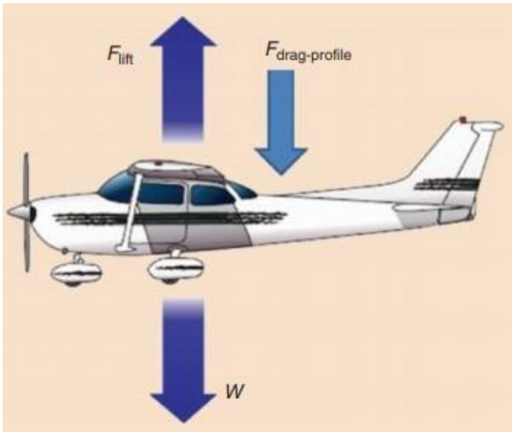


Figure 1: The power is supported by the flying car during lifting.

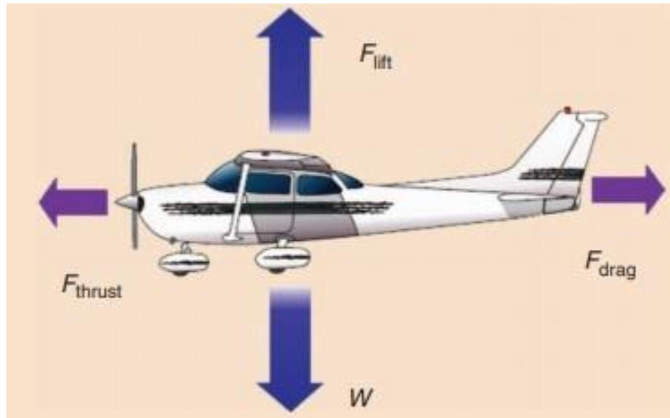


Figure 2: Power is backed up by a flying car during travel.

therefore, they are left with the same problem as conventional airlines. Adequate air traffic control required to manage hundreds or thousands of vehicles in the air is a major challenge. To keep a flying car safe, many advanced technologies are needed, such as automation control systems, hearing obstacles and avoidance, pilot auto-eject function, lightweight materials, reliable electrical power, and high-capacity batteries. Costs, regulations, airlines, air space management, licenses, and other major issues must also be addressed. Challenges include the following:

- Provides the maximum strength required from the vertical position
- Aerodynamic problems as an integrated system: file the challenges are different from a flying car in that of road car
- Basic power sources: engine, battery, or a combination of both for maximum power as well electrical energy
- The advanced properties of a given vehicle
- Control algorithms for stable performance across aircraft and integration with propulsion controllers
- Departure, arrival, and cruise profiles should be optimized for optimal performance
- Altitude: pressure may be required at altitudes higher than 12,500-14,000 ft above sea level, resulting in additional weight, volume, and additional electrical power
- Performance due to extreme weather conditions
- Active motors and control systems to manage stability during flight
- Signal and communication issues
- Meet all road levels as well air travel
- Safety and reliability

Requirements:

As a result, fuel usage or force must be reduced. Promoting flying automobiles requires strong engines or electric motors. Flying cars (UTD) have the following operational criteria, which help determine their energy needs:

- Velocity at sea: 150 mi / h (67.06 m / s)
- Walking: 10,000 ft (3,048 m)

- Vertical elevation time: 10 minutes (3,600 s)
- Motor range: 3,000 lb (1,360.78 kg)
- Width:> 300 mi (482.8 km)
- Maximum ground speed: 80 mi / h
- Operation of electric or hybrid car mode
- 40-mi range in pure electric car mode.

Flying provides power from the direct. For a vehicle with a maximum weight of 1, the entire value of the total note must be higher than 1. An absolute minimum vertical acceleration of at least 0.1g is required. This equation must be met if Newton's second law of motion is followed.

$$F_{lift} - W - F_{drag-profile} = ma,$$

The acceleration and mass of the automobile are directly proportional. In order to meet the official classification of grade H, the V_C climb must be at least 8 meters (assuming the initial vertical speed is zero)

$$V_c \geq \sqrt{2a}H = 3.96$$

According to the required description, the full-time required elevation to 10,000 feet (3,048 meters) > 600 seconds, therefore, the V_c should be the same

$$v_c \geq \frac{d}{t} = 5.08\, m/s$$

Taking the VC as $6\ m\ /\ s$, the required acceleration is the same

$$a = \frac{v_c^2}{2H} = 2.25m\ /\ s^2$$

As you go, from $0\ to\ 8\ m$, the speed is $2.25\ m\ /s2\ from\ 8\ to\ 3{,}048\ m$, the increasing velocity is adjusted at $6\ m\ /\ s$. Total time required by

$$t = \frac{v_c}{a} + \frac{d}{v_c} = 8.49\ min$$

This amount of climbing time meets the need for design purposes. In this case, lifting force (explosive power of the engine) is required

$$F_L = mg + ma = 16.40kN$$

The energy produced is the energy needed to produce height. Assuming efficiency (η) $h\ is$ 0.80,

$$P_{Induced} = \frac{F_L}{\eta} v_c = 123kW$$

When the flying car is in walking mode, the power supported by the flying car, where,

$$F_{lift} = W$$

$$F_{thrust} = F_{drag}$$

From the F_{lift} =W, the C_L coefficient of height can be obtained. The elevator is always larger than the drag in the normal flight mode, thus creating the necessary pressure to overcome the drag. Then the produced elevator. In this category of vehicles, the average coefficient of gravity to drag the coefficient is in the range of 10-15.

Assuming $C_L = 12C_D$ we get

$$F_{drag} = 0.5 * C_D * \rho_{air} * V_{cruise}^2 * S$$

where S is the reference area which is the wing area and ρ_{air} air density. The strength of a parasite is the force required to move an airframe into the air. With the strength needed to overcome the drag of germs. The power of HIV

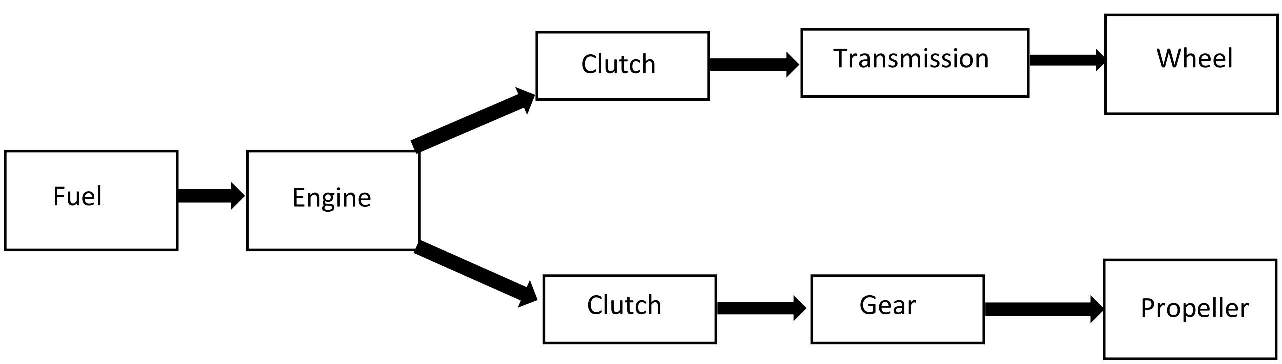
$$P_{parasite} = F_{thrust} * \frac{V_{cruise}}{\eta} = F_{drag} * \frac{V_{cruise}}{\eta}$$

In the example of the selected design, we find $P_{parasite}$ = 134 kW. The power of the rotor profile is the force required to convert the rotors. With the power needed to overcome the power of the rotor aerodynamic pull. Taking the power of the rotor profile is the same as the advertised power, the total power required

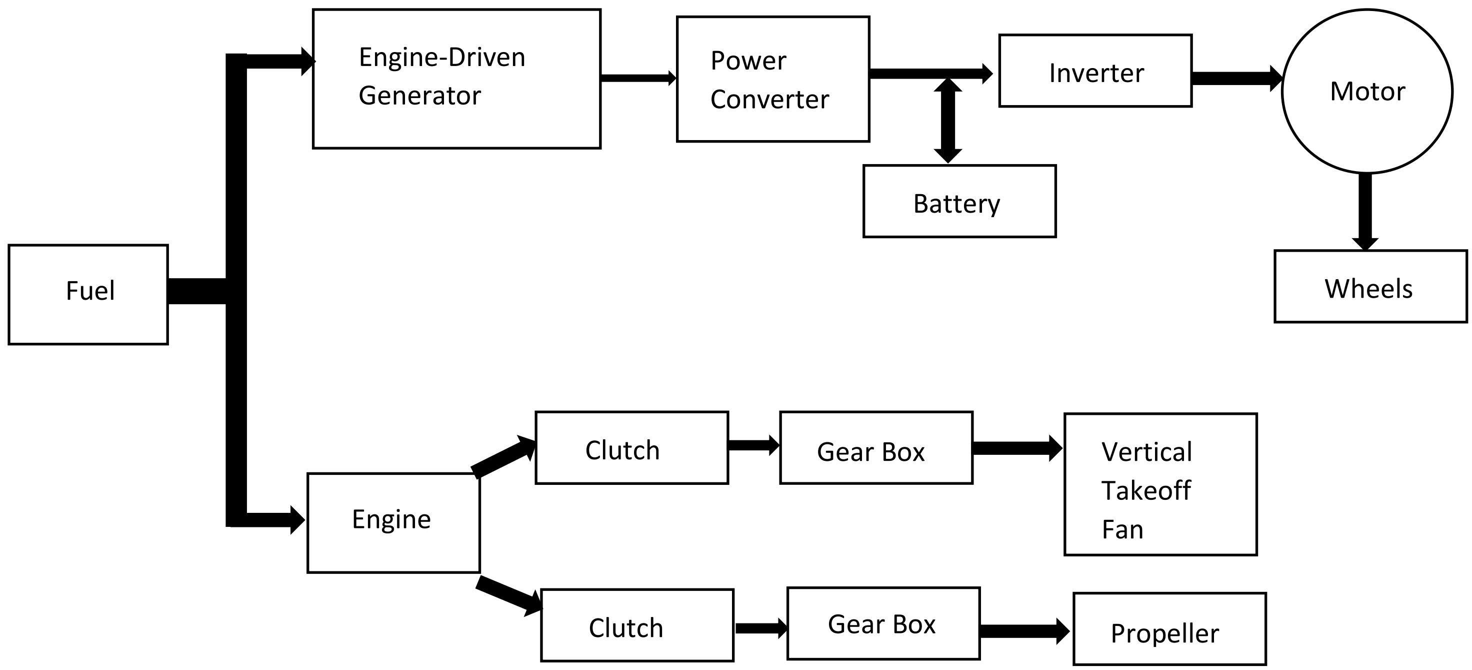
$$P_{total} = P_{Induced} + P_{parasite} + P_{Rotor} = 380kW$$

Block Diagram:

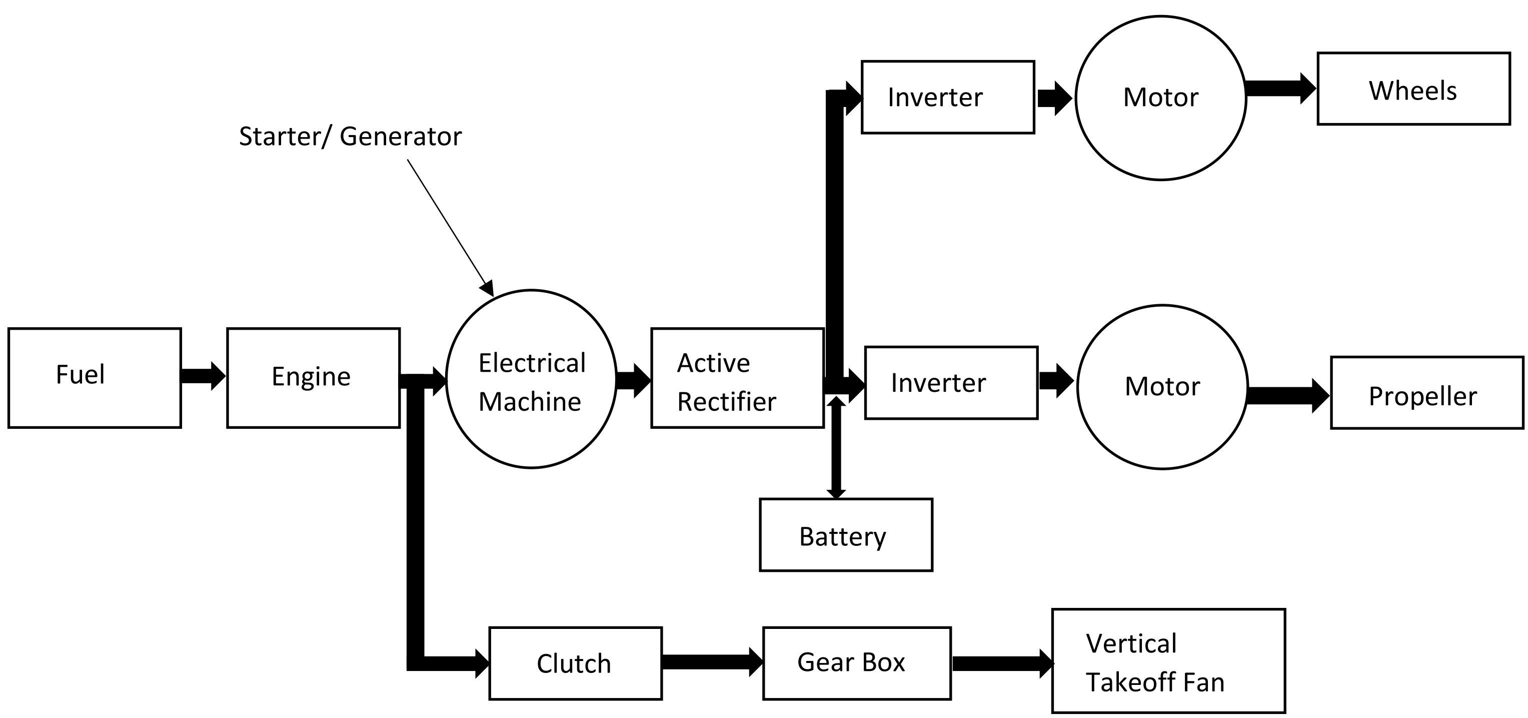
A: Easy construction of a flying car (the only engine without VTOL power).



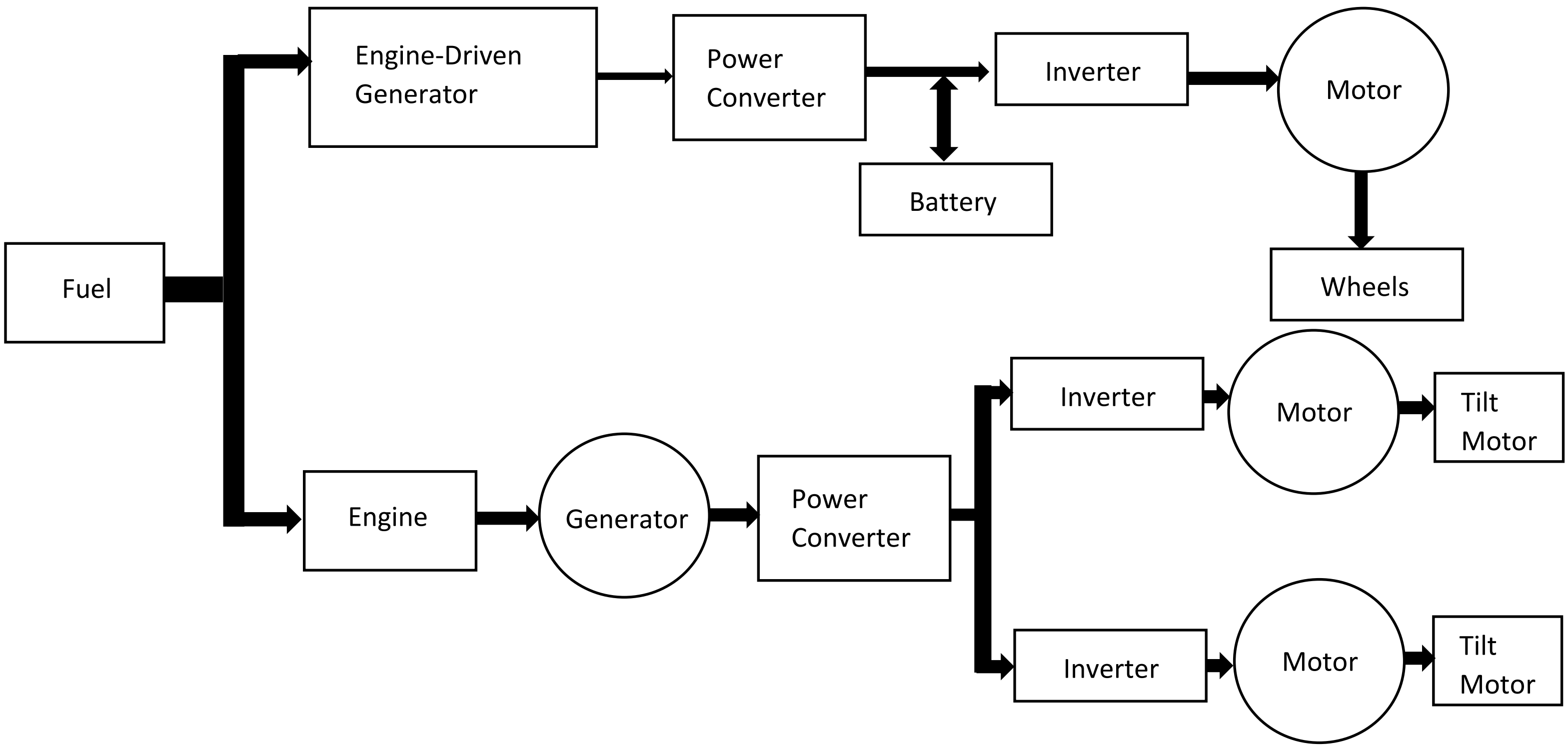
B: Hybrid operation with electric drive down.



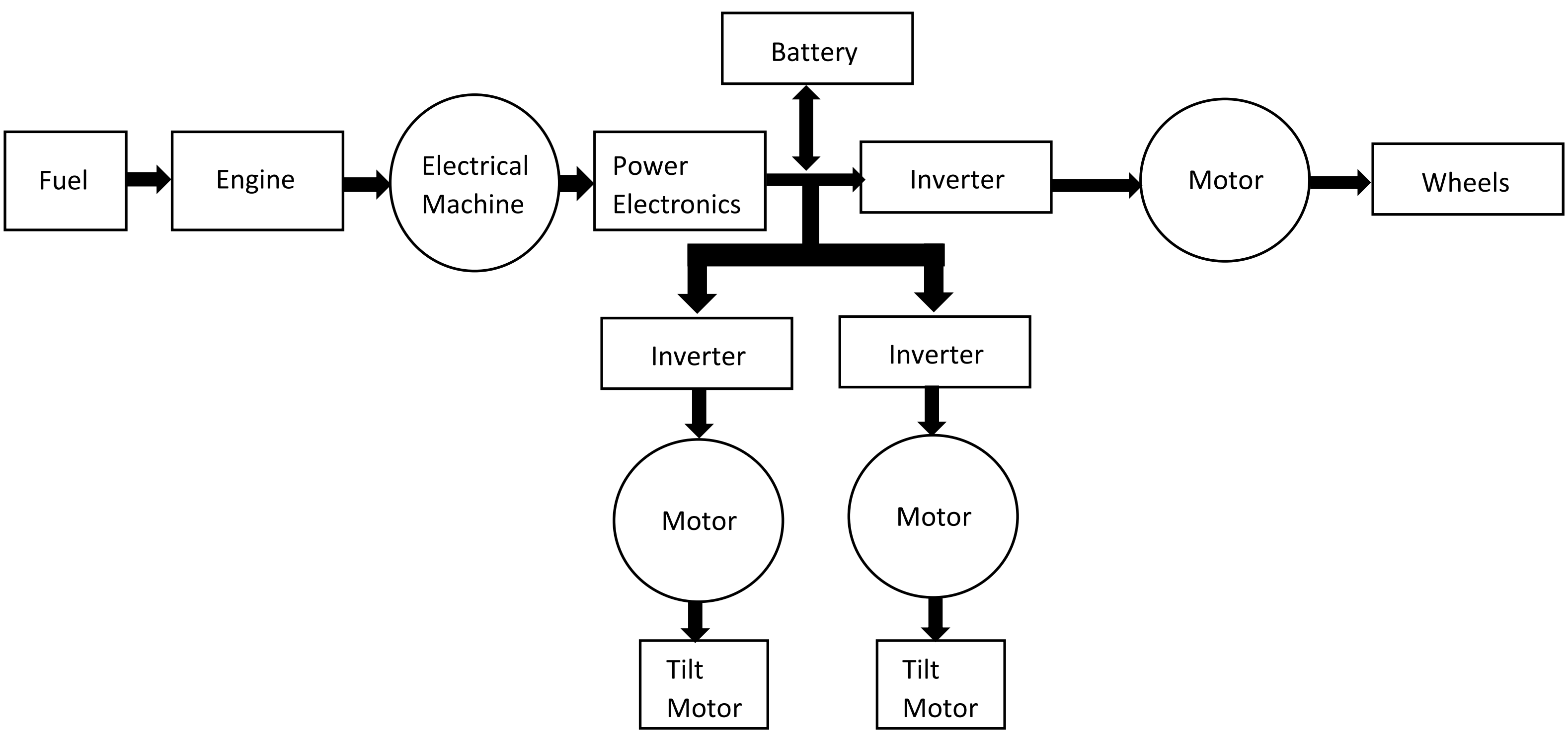
C: Electric flying and ground motors and lift engine only



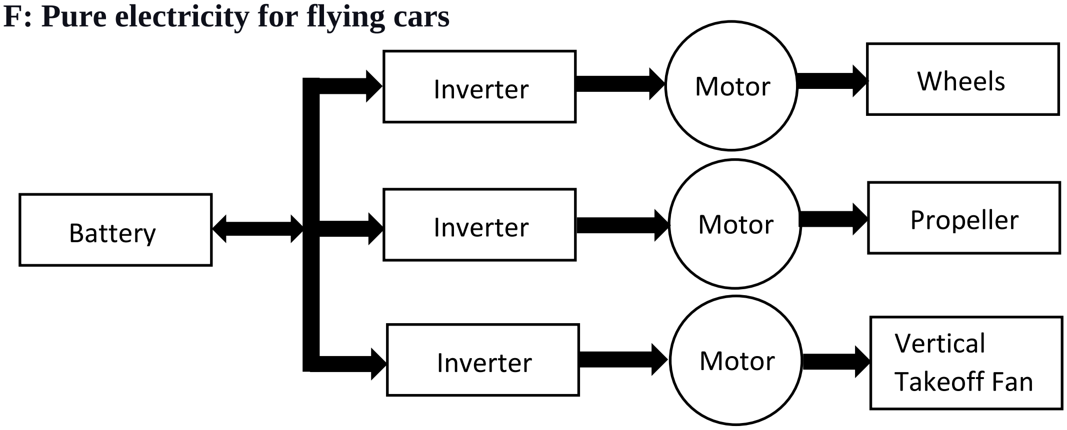
D: Driving a Tilt-rotor flying car.



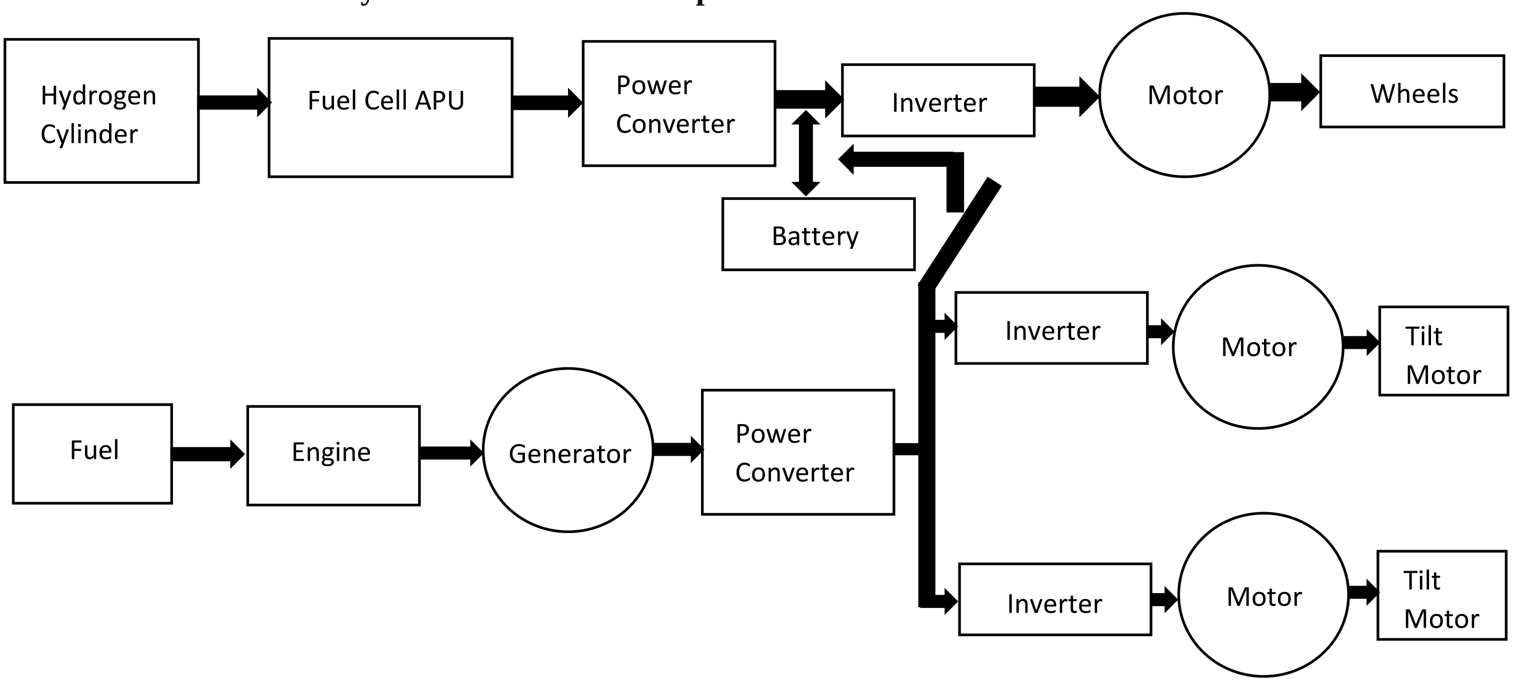
E: An all-electric flying car driving system.



F: Pure electricity for flying cars



G: The Fuel-cell system is used for land explosions



Control and Architecture:

For large vehicles such as the U.S. Advanced Defense Vehicle Transformer Agency (DARPA) Transformer (http://mashable.com/2014/02/11/darpa-transformerdrones/), a different power transmission system can be used lift, plane crash, and ground movement. However, for smaller cars, using a different electric / hybrid system will add extra weight, volume, and cost. In addition, installing individual systems in the car can be great challenge. Also, if the thrust needs to be vertical the elevator is provided by the same engine (or vehicle) used by boat, this engine will be much bigger and harder to do have good performance during sailing. Inconsistencies will create high energy demand and, therefore, more fuel consumption, which leads to more restrictions flight list. So, it depends on the performance once distance requirements, different engines may be required Boating and VTOL performance. The engine is used to provide explosions and piloting. It will not be enabled VTOL. Through land tenure, the propeller is disconnected using a clutch, where it is not it works the same way as a car. During takeoff and landing, the engine drives only the propeller. With this VTOL and the force of flight, motor hybrid propulsion may be extended to flying automobiles. To charge the battery that powers the car's wheels, the APU must be connected to the vehicle's ground. A hybrid vehicle series is being built. For VTOL and aircraft operation, the turbine engine / internal fire engine is employed. When the engine and gearbox are in VTOL mode, the engine and gearbox are moving vertically. Engine drives horizontal propeller when sailboat is attained. Controlling the vertical inclination of the fan allows for a seamless transition from vertical to horizontal plane. When coupled with starter / generator for engine performance, the APU may operate the propeller electrically. Batteries are used to start the engine and the active repair unit converts dc electricity into variable voltage and variable frequency in order to give the engine with the necessary starting power. Motor works as generator when engine is revved up, providing electricity to charge batteries. the battery voltage is converted to ac by the inverter unit, which then powers the power transmission motor explosion. Using an electric automobile and an inverter, the propeller may be driven using the same dc power from the active output as is utilized in plane operation. Engine-driven vertical follower (or fans) for VTOL. With tilt-rotor fans, you may combine the functions of vertical fans with refugee functions. Powered rotors (also termed proprotors) are installed atop a tilt-rotor in order to produce lift and gravity. On a rotating engine pods or nacelles, usually at the edges of a limited wing or engine installed in the fuselage, with Rotor transmissions meetings are held on the sides of the wings ”[http: //en.wikipedia.org / wiki / Tiltrotor]. Unlike helicopters, tilt-rotor cars can move and sit down. Rotors are equipped with wings to function as conductors, giving them the appearance of helicopters. The rotor-rotated rotors may be tilted 90 ° forward to act as propellers, allowing it to take off and land like a helicopter and fly like an airplane with fixed wings. An engine and battery power a generator that drives tilt-rotor electric motors. Using the APU, you may simulate Earth's explosive force. The APU and the tilt-rotor generator can be integrated into a single system. When the engine is started, an active repair unit generates electrical power. Generating power generator is used to power ground power motor and motors drive tilt-rotors. The clean electrical design of the aircraft. The battery is a power source for ground, airplane, and VTOL. Divide electric motors are used to achieve the performance of VTOL, aircraft, and ground operations. Replace the battery enables the propeller and vertical fan, the system can also be configured to power the battery motors drive two tilt-rotors for VTOL and aircraft and a ground motion engine. In the formulation of the 15th diagram, for ground operation, instead of a generator powered engine such as an APU, a polymer electrolyte membrane fuel cell can be used to power motors on the ground. The hydrogen input to the fuel cell can be stored in a small cylinder. If there is not enough hydrogen by continuing to drive until the hydrogen filling station achieved, dc power in earth-transforming power can be found in the power output to change the tiltrotor path by closing the button. Another possibility that two electric motors running tilt may be connected to the drive shafts in a standard central gearbox so that one car can use both tilt-rotors in the event failure of any of these vehicles.

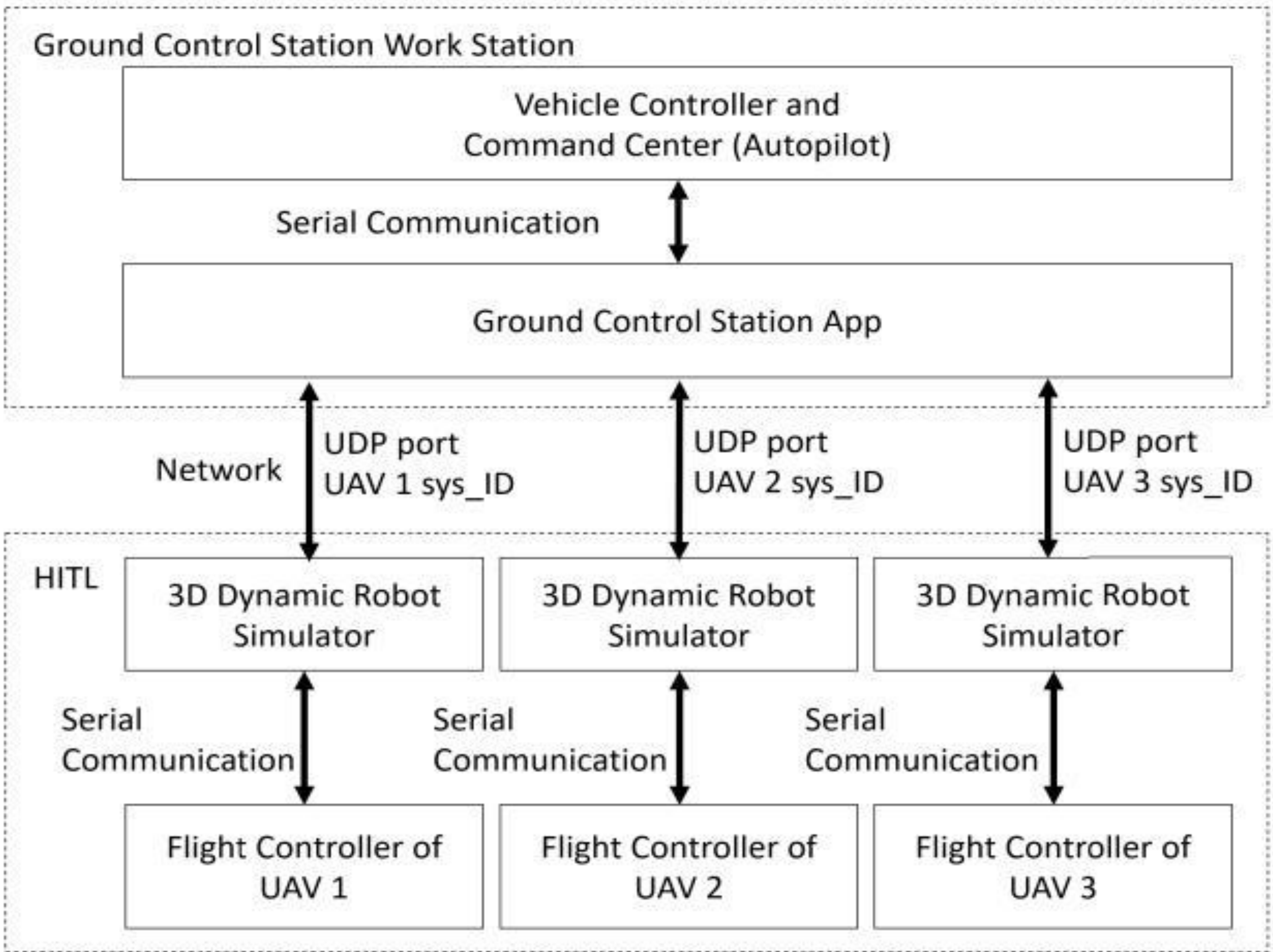
Hardware Requirements:

A system's needs must be defined before a system model can be created. According to the prior experience with AVs in disaster planning, this part explains the program's objectives from the standpoint of its development.

The current study is listed below:

- Building a multi-AV collaborative system for post disaster mapping.
- Selection of various types of AVs.
- Proper adjustment to reduce flight time.

- Testing the performance of AVs in the simulator.



To evaluate the performance of AVs, a variety of hardware simulators on the loop (HITL) are available. Although some simulators offer various AV choices, most test only a single model, making it impossible to evaluate different types of AVs. Objectives include aeroplane straps and altitude as well as stepping and vehicle speed. In the HITL simulator, a controller on the AV board is linked to numerous sensors. Data from sensors and the environment were fully incorporated into HITL, resulting in an AV reaction rather than the sensor data from a real aircraft during the tragedy Following mission design, waypoints are loaded and delivered to the AV controller over the network for display on the AV display. Flight plans are synchronised with flight controllers when mechanical configuration is complete. As part of the workspace and flight control storage, BASE STATION maintains AV aircraft data records. The HITL simulator provides sensor information in the form of this data (or sensors in real flight tests). It is the person or pilot who controls the AV and then develops mechanical systems, which is known as the operator (or global user). Aircraft design, shipping, command administration, and network and monitoring are the four primary components of the land user.

The BASE STATION unit performs many functions as listed below:

- Manage communication between AVs and Base station.
- Linking control tools to AV sensors.

- Setting AV boundaries.
- Build an AV aircraft system and manage missions.
- Sending orders and receiving information from AV.
- Monitor AVs in real time.
- Analysis and storage of videos and photos taken from the AV.
- Analyse data obtained and analysis.
- Simulate equipment and predict the results execution.
- Record recording aircraft logs and save them at work.

Conclusion:

The history of the flying car is still being written. Over the past 100 years, there have been numerous attempts to build a successful flying car. Very few attempts have met with technological success, and those that have worked at any level have been as ineffective as a car or a plane or both. With the right protections, flying cars can be the answer Our congestion is getting worse and helps improve air quality. Flying cars traveling hundreds of miles an hour can reduce congestion and allow us to live hundreds of years miles away from work. They will also develop the environment by reducing the need to build airports and highways. At first, they were not welcomed by the police, the army, or the immigrants. Agency before being distributed on a larger scale. A functional aircraft carrier should be able to be safely secure travel, flight, and arrival in any densely populated city nature. So far, however, no VTOL car has ever existed to demonstrate such skills. To produce such a plane may require a quiet and efficient development plan undisclosed rotor so that they can flow safely in urban areas Acne. In addition, they will need to work very well, lightweight, powerful engines. Many types of aircraft technology and state-of-the-art are suggested to be converted to flying cars. Coupling flights are usually easy to lose my balance and have difficulty walking long distances, while tilt-rotors are usually noisy. VTOL and short departure and immigration factors are very important in producing interest in flying cars. VTOL efficiency is better achieved with lightweight vehicles loaded with low wings. VTOL capability requires a high degree of weight gain, therefore, Power sources with low weight and volume approx. is very important for the development of flying cars. Turn on heavy materials such as aluminum and compounds are a must-tested physical component of flying vehicles. Simple designs will reduce fuel or energy consumption. The technology of flying cars is evolving, with options as well tools are now available to modern designers who were not in the past. With the advancement of engine technology, electrical equipment, electricity, energy storage, community communications, and controls, flying cars can be real. Electric construction is expected to play a significant role in the file the future of the complete construction of the automotive system, operation, and performance. In addition to power transmission systems, technology related to communication, control, sensors, packaging, security, avionics, and related technologies should be very high improved large shipping of flying vehicles. Electronic control, flight control, collision prevention, obstacle detection, avoidance of crashes, roaming technology, etc. are included in the automotive and aerospace industry. The hybrid propulsion techniques are developed for flying vehicles like Terrafugia TF-X and Skycar are the way of the future.