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FLYING PAV USING NOVEL STEERING CONCEPT

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ABSTRACT: It has become appallingly obvious that our technology has exceeded our humanity. -Albert Einstein. The Above Word describe about the technology development. The transportation is mostly depend upon the use of roads. Traffic Jams is very serious factor which waste our time, fuel and also giving trouble to emergency services like fire services, Ambulance , Police vehicles etc. When vehicles are fully stopped for periods of times, this is colloquially known as a traffic snarl-up. Traffic congestion can lead to drivers becoming frustrated and engaging in road rage. Our project has the pros of using the Vehicle in emergency and urgency times. For this we design a small extra Changes in the car to fly. It use three electric rotor motor with the hydraulic actuator. This Motor Fly upward first and then to front, right, left and turnings. Use of Battery it can fly up to more than three hour.

Keywords: *Actuators, Electric motor, Traffic control, flyable car*

I. INTRODUCTION

Today's cars has the following cons which affect our expectation. These are the some of cons the first and foremost factor is Traffic Jams is very serious factor which waste our time, fuel and also giving trouble to emergency services like fire services, Ambulance , Police vehicles etc. Accidents occur due to unskilled drives, over speed, drunk and drive etc. It also cannot used in Floods area, Natural disaster area, for crossing a river in non bridge constructed area. To over come this cons and give all cons into pros, our project will help. It doesn't have any traffic jam in air navigation and it can used in emergency situation, floods area and natural disaster area too. A company has announced of releasing flying car in 2015.But that car can accomplice maximum three members. Use a propeller for pull it and use lot of energy. Our project can capable of flying the entire car with whatever the maximum capability of the car and also provides the security to the passengers. We use a composite material to the weight of vehicle with same or more than the factor of safety of the actual vehicle.

We are using current transportation systems such as Long-distance transportation &Short-Distance Transportation

Long-distance transportation:
High-Speed (Planes / Trains)
Specific Locations (Airport / Stations)
Expensive Infrastructure (ATC, Rails)

Short-Distance Transportation:
Door-To-Door Travel (Cars)
Relatively Slow (Traffic Jams)
Expensive Infrastructure (Roads, Bridges, …)

1.1 Existing road traffic has big problems:
maintenance costs, peak loads, traffic jams, land usage

II. EXISTING SYSTEM

Lot of system has put forward by government to control traffic jam and avoid road accidents. Such as LASER guns, RADAR etc which are expensive. A company has going to launch which are similar to car. But it is accomplice on two to three members only. They are also having the following disadvantages, They are expensive.

They suggest major changes in automobile architecture
Novel Human-Machine Interfaces

2.1 Make flying as easy as driving:

- Multisensory approach: provide additional information with
- fast and easily understandable cues
- vision
- vestibular
- haptics
- auditory
- Test Interfaces in simulators
- MPI CyberMotion Simulator
- DLR Flying Helicopter

III.PROPOSED SYSTEM

Flying car encompasses the following modules:

3.1 Actuator:
Actuator is a device which is operated by either hydraulic or pneumatic fluids. It can do heavy work with a small applied force. Here the actuator is used to pullout the wing like shaft first and another actuator turn the motor set to 90degree upward.

3.2 Composite Material:
It is the combination of two or more material which give the similar property of the material to be replaced. It is used in car to reduce the weight with more strength.

3.3 Electric Motor:
It is small in size but capable of do a heavy work with very good accuracy. It is used to lift the car vertically and move it horizontally with lifted height.

3.4 Microprocessor:
It is programmed to control the speed of motor by input from the motion sensor to turn the car.

3.5 Sensors:

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A motion sensor is used in the steering. On the basics of small steering the sensor give the input to the microprocessor.

3.6 Mode Changing Switches:

It is used to change the mode either flying or road transportation modes.

3.7 Blades:

It is made up of carbon fiber. Because it has a higher strength than steel with low weight.

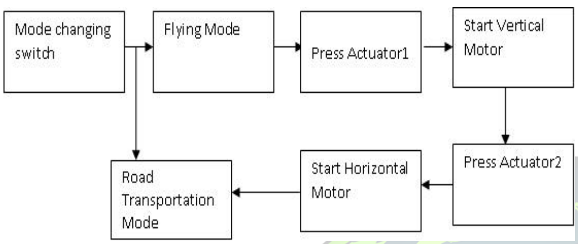

Fig 3.1ARCHITECTURAL DIAGRAM OF FLYING CAR

3.8 Establishing Connection:

We use three motors. Two for lift the car vertically and another one motor for horizontal movement of car. First of all when the flying mode is on and the actuator switch 1 is pressed. Then the actuator pull the wing like shaft and then another actuator inside that turn the motor set to 90 degree upward. After that Motor start switch is pressed. It achieve the enough RPM to lift the vehicle it lift it to 1-2km from ground surface. And then Actuator2 switch is pressed, it pull the horizontal motor set from the front side of car. Then press the Motor2 switch ON to move the vehicle for front and turning .

For turn the vehicle , just steer it to side to turn. The sensor give the input to Microprocessor it control speed of the motor on that side for turning or change the polarization of the motor for turn the vehicle in that side. For landing the vehicle first Off the Motor2 switch and then press the actuator2 switch for retraction of the actuator with the motor set.

Then press the Landing switch in the Switch panel. It slowdown the speed of the two Motor constantly. So, it come to landing slow as helicopter. After landing press the Motor1 switch OFF and then Press the actuator1 for retraction.

Now, it can change the mode to the Transportation by road for Roadways.

3.9 BATTERY:

It is the power source for the Motor. It can supply the power to the motor for minimum three hour. There is a alarm which alert you when the battery backup is half an hour only. You can charge the battery by the use of solar panel in the top side of car.

IV. DECENTRALISED AIR TRAFFIC CONTROL

4.1 Formation flying along flight corridors:

- Global traffic control strategies require swarming behaviour
- Develop flocking algorithms with UAVs
- Evaluations of a Highway-in-the-Sky human-machine interface

Fig.4.1 Flocking behaviour

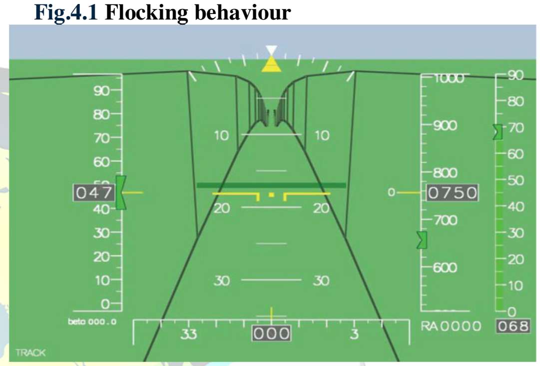

Fig 4.2 Highway-in-the-Sky, DLR

4.2 Collision Avoidance In Three Dimensions:

4.2.1 Novel sensor technologies for onboard sensing:

- Determine range and bearing of surrounding vehicles
- Active (laser, sonar, radar) vs. passive sensors (vision, acoustic)
- Evaluation with many small flying vehicles
- Light-weight sensor technology for PAVs

4.3Ascending Technologies in PAV

4.2.2 A Novel Approach To Control

Develop robust novel algorithms for vision-based control and navigation

4.2.2.1 Vision-aided localisation and navigation

_ Estimate position in dynamic environments

_ Build a 3D map for autonomous operation

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Fig 4.4 Vision-aided automatic take-off and landing

4.2.2.2 No ground based landing guidance, everything on board:

- Proper landing place assessment and selection are paramount for safe PAV operations
- Onboard surface reconstruction to recover 3D surface information using a single camera
- Autonomous landing with visual cues

4.2.3 Flying PAV Simulator:

- Fly-by-wire / fly-by-light experimental PAV
- Equipped with many sensors, reconfigurable pilot controls and displays
- Validate HMI concepts and automation technologies

4.3 NOVEL STEERING CONCEPT

PAVs would lift personal transport to the third dimension. In order to keep this transportation system open to the general public it must be easily understood even by flight-naïve users. Let us assume that transferring the steering wheel control concept to a PAV will indeed make the change from car to PAV easier for the user. When concentrating on car drivers, the novel PAV steering concept should be as similar to the already known control schemes as possible. Therefore, a control concept has been developed that takes over as many known features as possible but is at the same time compatible to the developed PAV response type configuration.

To begin with, the acceleration command can easily be transferred from the automobile concept to a PAV. Gazda and Flemisch used the longitudinal movement of a stick for pitching and resulting forward movement. This is typical for conventional helicopter control. Drees went one step further in bringing rotorcraft and automobile controls together by introducing a brake pedal. To make the two steering concepts even more alike, a second pedal should be included in the PAV. This accelerator pedal will be used for speed commands. This matches the TRC and AcC response types of the PAV dynamics model well. From hover to forward flight a constant pedal deflection would result in a constant airspeed. After blending to the forward flight mode, the pedal deflection causes longitudinal acceleration. This means the pedal can be released to hold the current velocity. This behaviour is analogue to a cruise control in the automobile sector. Cruise control is especially effective on long tours e.g. on a highway where the same speed can be maintained for several kilometres. This will be equally helpful in cruise flight in a PAV.

The function of the automobile's brake pedal can be transferred in the same manner like Drees had imagined it for his easy-to-fly helicopter. Pressing the pedal decelerates an automobile to stand whereas it would decelerate a PAV to hover.

Aligning the lateral control of automobile and PAV is more complex as a rotorcraft cannot only rotate along the yaw axis but also along the roll axis. Gazda and Flemisch set their concepts up with the steering wheel giving yaw commands. They had an additional lateral control axis for roll commands (on the same device or on a second stick). In contrast to that, Drees is assuming that a steering wheel alone is enough for initiating turns. This becomes possible by implementing a Turn Coordination. This TC feature is already available in the forward flight mode of the hybrid response type configuration. Thus, the steering wheel can command coordinated turns and the pilot will be relieved from directly controlling a sideslip angle. In cases where flight with sideslip angle would be advantageous, e.g. under strong winds, the flight control computer will have to control the sideslip automatically. This results in the control strategy becoming simpler for the PAV user but at the same time limits the manual manoeuvrability of the vehicle. For the concept of a PAV that is tailored towards the needs of flight-naïve users, this compromise seems to be reasonable.

The problem of yaw and roll interaction with a one-axis steering device remains to be solved in the hover and low speed regime. The question is which of the two movements is more important to be controllable from hover. With conventional controls and AC response type in the roll axis, the PAV would perform a roll, followed by a sideward translational movement when the control stick is moved laterally. This movement cannot be performed with a conventional automobile although it would definitely be helpful for parking into a parking space alongside the street. On the other hand, initiating a turn along the yaw axis of the PAV from hover would turn it on the spot. Yawing on the spot is also not possible with an automobile. Nevertheless, turning on the narrowest possible turn radius with an automobile is closer related to a yawing motion than to a roll motion. In order to make the two control concepts alike, the PAV steering wheel should therefore command a yaw rate in hover. With increasing flight speed the yaw control becomes less important as turns are mainly initiated by a roll motion. The steering wheel's yaw command is therefore blended over to a roll command.

Fig 4.4 PAV (Personal Air Vehicle)

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Finally, an inceptor must be provided for controlling the PAV's vertical movement. Gazda used the vertical axis of his four-axis long pole stick, whereas Flemisch and Drees proposed additional switches on the sidestick or the steering wheel. In order to find the most suitable position for the vertical control device, the experience of automobile users should be taken into account. Owners of a driver's license are used to control steering wheel, pedals, as well as gear shift lever. The gear shift is typically located between the two front seats. This is the same position where many rotorcraft would have their collective lever. It seems to be logical and straight forward to use a lever at this position for height or flight path angle control. This device could either be a conventional collective lever or a sidestick. A disadvantage of this concept is that during climb or descent flight the PAV user must operate the steering wheel with one hand while having his or her second hand at the height control lever. To overcome this disadvantage an alternative would be to follow Drees' suggestions and install switches directly on the steering wheel for vertical control. This would allow initiating climbs or descents without taking the hands from the steering wheel.

The steering wheel selected for this novel PAV concept has only one primary axis. In contrast to that, both Gazda and Drees incorporated multi-axis steering wheels in their concepts. Research on multi-axis sidesticks as conducted by Landis [5] showed that increasing the number of axes on one device can increase the likelihood of unintentional coupling between inputs in different axes. Landis tested a four-axis sidestick with the same functions as Gazda's long pole prototype. It received worse ratings than a three-axis sidestick with additional collective lever. Drees steering wheel resembles more the yoke of a fixed wing aircraft. As the concept developed in this paper is tailored towards the needs of automobile-experienced users and not of fixed wing pilots, a single-axis wheel seems to be the better choice.

4.5 APPLICATION:

It is used in emergency conditions like accident case. It is used in floods area for escape from that area, natural disaster area. It can used for crossing the river where the bridge is unavailable. It can used to reduce traffic jams. It is used to travel to a place with a short period of time. You can define your own path to reach your planned place.

4.6 LIMITATION:

It can be used only upon the battery backup period. When for take OFF and landing it require twice the track width of car. The efficiency and for better speeding the vehicle must be in aerodynamic structure.

V. CONCLUSION

This paper has given an overview of the development of control devices in rotorcraft as well as in automobiles. Derived from the historical development and previous research a novel steering concept for future PAVs has been proposed. The control concept combines a conventional helicopter interface with a car-like steering wheel. In order to prove the assumption on the suitability of the described steering concept, it is currently being integrated into DLR's ground-based helicopter simulator. A PAV flight simulation with the necessary response types and mode changes has already been implemented and will be controllable either by conventional helicopter controls, sidesticks, or the novel steering wheel.

Finally, I conclude that our project will be very efficient for future development of flying car systems. And also it is very helpful for the person who is in the emergence travelling. It is cheap as compared to other flying system. The battery can charge in flying mode. It provide us for traveling for a long distance too. The traffic is controlled and a lot of people life can be saved.

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