

Design and Manufacturing of Air Pod Vehicle

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ABSTRACT

In this project, present the design and manufacturing of a compact one-seated air-pod vehicle. In particular, the drag force and propulsion mechanism are investigated. Experimental studies must be conduct to evaluate the mechanism of propulsion. This development has to draws inspiration from meeting user requirement and aims to improve upon the currently available conventional design of hovercraft. Large attention has be give to the development of compact light weight air pod vehicle which this paper will provide some valuable insights.

Keywords: 35cc 2-strook IC engine, Catia Software.

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I. INTRODUCTION

The concept of the air pod vehicle is simple, starts with a particular kind of wood that has the property in carrying loads and has some gaps to help wood floats above any land. Underneath the wood, the skirt of cushion takes place , and it function to create a change in pressure by catch the air in one area to create the required difference in pressure between inside and outside of the skirt. The mechanical part of our project is the engine and control system which help in maneuver.

Air pod vehicle is a vehicle that floats such as ice, sand, grass, and water. Air pod vehicle sometimes called Air Cushion Vehicle due to its ability to move by cushion or skirting filled with air and cause the board to hover above the ground, and by the thrust engine it run and monitoring the direction of the hovercraft. The project is helpful and necessary many cases such as military and security in which air pod vehicle are excellent for off beach protection and rescue.

For commercial operation also air pod vehicle can play a distinct role in guiding the ships to the shore safely and efficiently rather than using small boats which can cost a low maintenance. The best application of the air pod vehicle comes in situations like flooded areas like what happened in al-Khobar city a few weeks ago.

Advantage is two-fold:

- Less friction = less fuel burnt to move

- Less friction or interruption to the surface = less disturbance of the environment.

Problem Statement:

1. As compared to hovercraft we design the compact light weight air pod vehicle
2. Hovercraft are used only on water we have to use the air pod on plane surface
3. Propeller based engine are difficult to control the direction and motion of vehicle.
4. Uncontrolled Non linear motion is one of the major parts of concern.

II. OBJECTIVES

- In traditional Hovercraft's a propeller fan driven by an engine is used to create thrust.
- The capacity of engine is very high as 200 to 300 cc.
- The hovercraft which we have made is having an air blower which is driven by an 35cc 2-stroke petrol engine.
- When the engine starts running, it also runs the air blower. This air blower sucks the air from atmosphere and compresses it.
- This compressed air is used to inflate the skirt. The skirt is provided with six holes so that air will escape at an high velocity from those holes .

- When this air starts coming out from the holes it creates thrust and the hovercraft start moving forward .

III. LITERATURE SURVEY

[1] Soe Myat Hein and Hwee Choo Liaw, "Design and Development of a compact hovercraft vehicle", *ASME international conference on AIM. @2013THIS*.

This paper present the design and development of a compact one seat air pod vehicle . In particular the hovering and propulsion mechanism are investigated. A mathematical model is derived to described the dynamics of proposed prototype. Air pod vehicle is also known as air cushion cycle . From wider perspective, over the course of history of study air pod vehicle attention coverage mostly on large-scale vehicle in commercial and military sector apart from the hobbyists, little attention has been given to the development of compact light weight air pod vehicle into which this paper will provide some valuable insights.

[2] David Cabecinhas, Pedro Batista, Paulo Oliveira, Carlos Silvestre, "Hovercraft control with dynamic parameter identification", *IEEE transaction on control system technology page 1063-6536@2017*.

This paper present an integrated parameter estimator and trajectory tracking controller for a air pod vehicle. A generic parameter estimated for time varying system linear in the parameter is derived and then particularized for the dynamic model of vehicle at hand non linear motion control of under actuated vehicle and more specifically thrust propelled surface vehicle understood. A trajectory tracking controller is proposed for the nonholonomic air pod vehicle which renders the tracking error system exponentially stable and it is zero dynamic stale. The inter connection of the estimator and the controller proven to the locally stable. experimental attesting the performance robustness of the controller and it is a inter connection with the estimator are presented.

[3] Fuguang Ding, Yanqing cui, Chenglong wang, Xuelian zhang, "Course control of air cushion vessel based on terminal sliding mode control", *proceedings of the 35th chinese control conference@2016*.

In order to reduce the error caused by the unchangeable surface of a sliding mode control, a RBF neural network is introduced to approximate external disturbances to of set the disadvantage and guarantee robust performance of the sliding mode control moving the sliding surface effectively. The stability of the proposed movement control law was proved utilizing the Lyapunov theory under condition of different external disturbance, the stimulation result of the TSM control conform that TSM control can achieve fast response speed, good stability and high precision with a simple controller.

[4]A.V.Kale,A.J.ghogare,R.n.yerrawar,P.B.Biradar, "Design and air flow stimulation of small scale of working model'' (*IOSR.JMCE*)@2017

In this paper we mainly focus on applying the basic principle, laws and equations like continuity, energy, momentum for stimulating the model. The simulation of model is done to optimize the model optimize flow pattern

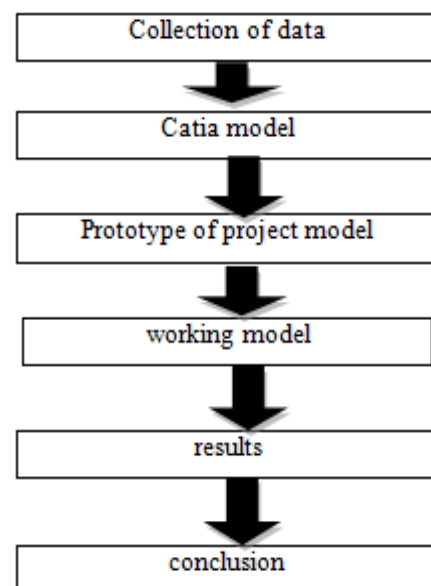
and by finding dimension and other parameter like pressure, velocity, discharge for particular weight. This paper prepared regarding to work of simulation and design of small scale working model of air pod vehicle before the actual simulation basic theory is a study various form simulation is studied and optimum flow pattern for particular weight is selected in order to design the actual model. The result obtain by simulation are compared with result obtain from the experimental model of air pod vehicle.ths paper is regarding to work of simulation and comparison of theoretical calculated value.

[5] S H Mohamed Noor, Development of working model'' *IOP Conference series(2016)*.

This paper present the development process to fabricate a working air pod vehicle model. The purpose of study is to design and investigate of fully functional air pod vehicle based on the studied that had been done the different design of air pod vehicle model had been made and tested but only one model is presented in this paper. In this thesis, the weight, the thrust, the lift and drag force of the model had been measure and the electrical and mechanical part of also present. Since our prototype should be functioning the processing unit of the model is arduino Uno by using the PSP2 (playstation2,) as the controller on all kind of earth surface, or model also had been tested in different flower condition. They included water, grass, cement and title. The speed of the model is measure in every cases as the respond variable, current (I) as the manipulated variable and voltage (V) as the constant variable.

IV. METHODOLOGY

A number of literatures related to the topic of Air Pod Vehicle (APV) and monitoring is reviewed and analysed.



V. FIGURE AND TABLE

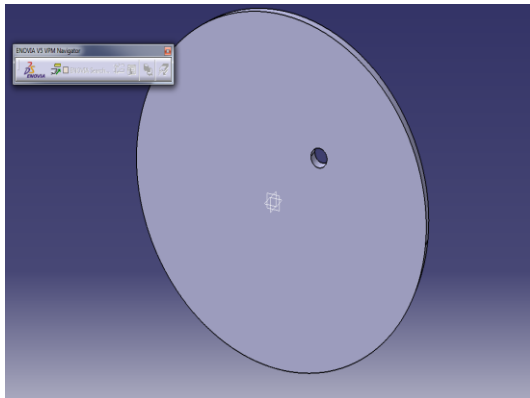


Fig. 1. Plywood Base

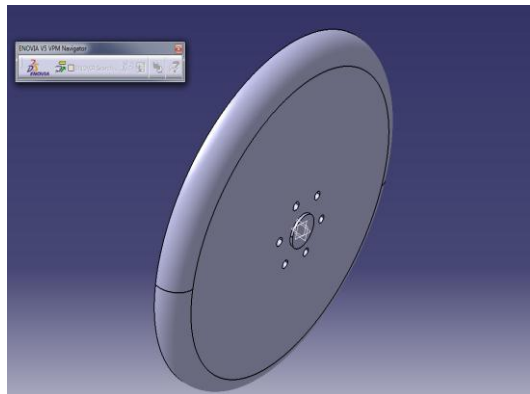


Fig. 2. Plastic Skirt

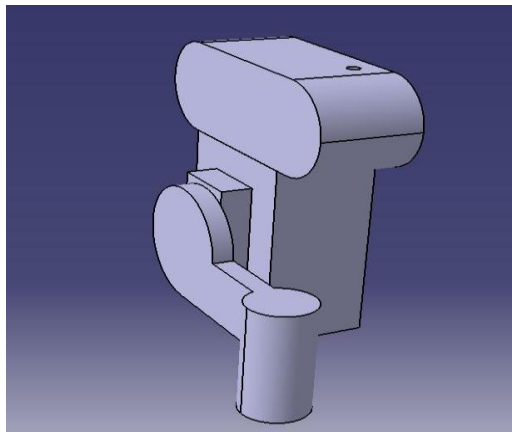


Fig. 3. Engine with blower

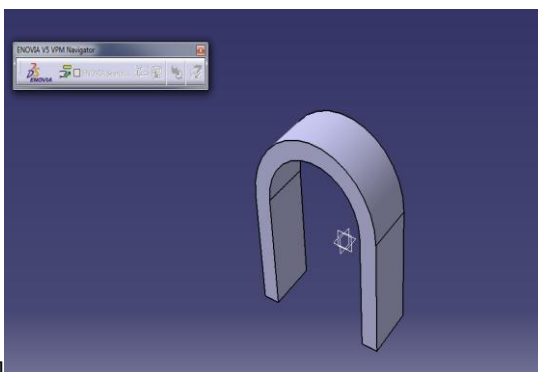


Fig. 4. U joint

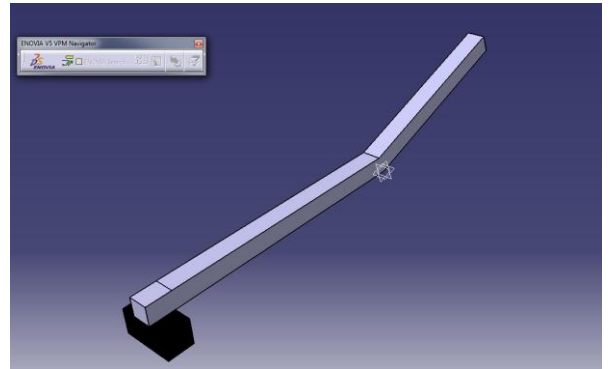


Fig. 5. L type bar for direction and braking

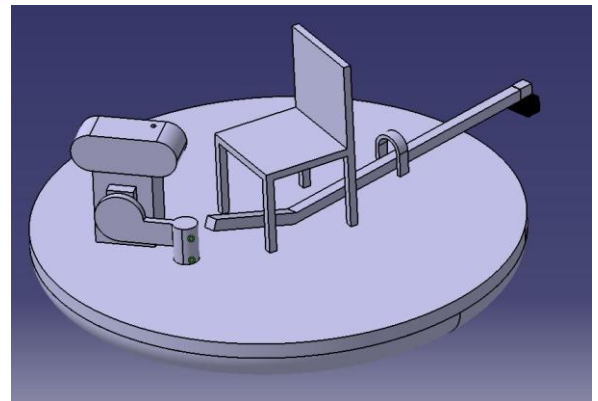


Fig. 6. Assembly

VI. CONCLUSION

Air pod vehicle are generally simple mechanisms in theory. Yet the process from theory to manifestation is not as easy as it may seem.

A plethora of problems exist and must be faced in order to attain a well-functioning hovercraft. The plans and designs must be flawless.

One must take under consideration the weight and the shape of each component in order to avoid problems such as instability and dysfunction.

One thing is certain; when building a air pod vehicle, be well aware of the demands of construction.

REFERENCES

- [1] Soe Myat Hein, hwee choo Liaw, "Design and Development of a compact hovercraft vehicle," ASME international conference on AIM.@2013
- [2] David cabecinhas, pedro Batista,paulo oliveira, carlos Silvestre, "Hovercraft control with dynamic parameter identification" IEEE transaction on control system technology page 1063-6536@2017.
- [3] Fuguan Ding,Yanqing cui,Chengling wang,Xuelian zhang, "Course control of air cushion vessel based on terminal sliding mode control" proceedings of the 35th chinese control conference@2016
- [4] A.V.Kale,A.J.ghogare,R.n.yerrawar,P.B.Biradar, "Design and air flow stimulation of small scale of working model" (IOSR.JMCE)@2017
- [5] S H mohammad noor, Development of working model" IOP Conference series(2016).