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Development of Inshore Fishing UAV at Sea Based on Preliminary Assessment Result

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Abstract: This paper initiates and describes the development of an inshore fishing UAV at the seashore, where the UAV can communicate with its controller by sending all the information during its flight in real time to the base station. The operation distance of the UAV from the seashore ~~is~~ to the fishing point will be between 500 m to 1km. The navigation method is under investigation, which is to guide the UAV from the seashore to fishing points along a predefined path planning by avoiding sudden obstacles it may face.

Keywords: UAV; Drone; Assessment; Navigation

I. INTRODUCTION

An Unmanned Aerial Vehicles (UAV) commonly known in many academic communities as a Drone, is an aircraft without a human pilot on board, as its flight is controlled either autonomously by computers in the vehicle, or under the remote control of a pilot on the ground or in other vehicles [1]. Warring robots have brought home a new wave of High Tech flying sensors and geospatial paradigms are about to change [2]. As Google Earth brought web mapping to the masses, Unmanned Aerial System (UAS) will also bring mapping into every facet of our lives. Our lives and business will be dramatically affected. Our 21st century skies are about to become animated like a group of bees moving ~~on~~ in the sky searching for a new home. The Unmanned Aerial Vehicles have been around us a long time. One of the earliest usage of the Unmanned Aircraft taking aerial photographs was in World War II when Germans experimented with pigeons specially trained for the aerial missions using 40-gram cameras strapped to their chests. These early UAVs share the same important attributes that will make modern aircraft indispensable in new applications in the coming years. Whether autonomously or remotely piloted, both UAV types will have broad implication for our society, economy and existing remote businesses. Over the last several years, we have seen tremendous applications of UAVs around the world that promise to benefit society. They are being used responsibly in precision agriculture; search and rescues; and for surveilling wildlife; hazardous environment like fires, nuclear reactors, armed men and so forth. All these are the only low hanging fruit for this technology, the tip of the iceberg of future commercial applications. Unmanned aircrafts must not be confused with model aircrafts or with drones as is often done by media or in many published articles written by many authors doing their research on UAVs. A radio-controlled aircraft, ~~is~~ used only for sport, must remain within sight of the operator, and is usually limited to instructing the aircraft to climb or descend and to turn to the left or right. A drone aircraft will be required to fly out of sight of the operator, but has zero intelligence, merely being launched into a pre-programmed mission on a pre-programmed course and will return to base. It does not communicate and results of the mission (e.g. photographs) are usually not obtained from it until it is recovered at base. UAV, on the other hand will have some greater or lesser degree of automatic intelligence. UAV are able to communicate with its controller and return to payload data such as electro-optic or eternal TV images, together with its primary state of information, position, airspeed, heading and altitude. UAV also transmit information as to its condition, which is often referred to as housekeeping data, covering aspects such as the amount of fuel or battery level it has, and temperatures of components (e.g. engines or electronics) [3]. If a fault occurs in any of its sub-system or components, the UAV may be designed automatically to take corrective action and/or alert its

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operator to the event. In the event for example, that the radio communication between the operator and the UAV is broken, then the UAV may be programmed to search for radio beams and re-established contact or to shift to a different radio frequency band if the radio-link is duplexed. A more intelligent UAV may have further programming which enable it to respond in an "if that happens, do this" manner. For some systems, attempts are being made to implement on-board decision-making capability using artificial intelligence in order to provide it with an autonomy of operation, as distinct from automatic decision making. UAVs are being used in research and development work in the aeronautical field for test purposes. The use of the UAVs as small-scale replicas of projected civil or military designs of manned aircraft enable airborne testing to be carried and under realistic conditions, more cheaply and with less hazard. Wong [4] described and presented an update to the range of programs undertaken by a group of research at the University of Sydney as part of the Department of Aeronautical Engineering research contribution to the university. The group which originated in 1988, has made good progress in incorporating UAV flight platform, design, development, control and operation to the department's core teaching and research activities. Waharte and Trigoni [5] proposed ~~a~~ supporting search and rescue operations with UAVs, where they focused on the parameters that can affect the search task and present at the same time some of the research avenues they have been exploring. This includes the study of performance of different search of algorithms when the time to find the victim is the optimization criterion.

II. UAV SPECIFICATIONS

The authors' previous article explored a preliminary assessment from different perspectives on how this project should be processed including the key features of the UAV to be used. The outcome of the assessment concluded the UAV Phantom 2 Standard as the aircraft to be used. Unfortunately, the manufacturer has discontinued the production of the Phantom 2, forcing ~~us~~ the authors to make a new choice of the project engine for the simple reason that in case the project is completed and that the ISFUAV is made commercially available, it will be difficult to provide the aircraft ~~for~~ to the public. After reconsidering the assessment, the new choice for the aircraft is the **Phantom 3 Standard** shown in Fig.1 for the following reasons:

Fig.1 Phantom 3 Standard for Inshore fishing development

The Phantom 3 Standard is an easy-to-fly quadcopter for aerial photography and filmmaking. It includes a high-quality camera, a custom-built remote controller, the Intelligent Flight Battery (IFB), and is compatible with the DJI GO app for mobile devices. The remote controller features a 2.4 GHz Wi-Fi Video Downlink, 5.8 GHz aircraft transmission system, and a built-in battery. It is capable of transmitting a signal to the aircraft up to 0.62 miles (1 km) away that matches the exact distance the UAV will fly. There is also a foldable mobile device holder attached to the remote controller used to mount to the smartphone if needed. The flight controller provides stability and safety for controlling the UAV. The supported flight modes are designed to optimize aircraft control for different conditions and purposes. The flight controller allows the aircraft to automatically Return-to-Home (RTH) if the remote controller signal is lost or when instructed by the pilot, ensuring the safe return of the aircraft. Flight data is stored to the device every time the UAV flies and can be accessed anytime. The DJI Intelligent Flight Battery has a capacity of 4480 mAh, a voltage of 15.2 V and a smart change or discharge functionality. The on-board camera features a 1/2.3 inch Complementary Metal-Oxide Semiconductor (CMOS) sensor that captures up to 2.7 K ultra HD video at 30 fps and 12 Mpx still photos. Video can be recorded in Mp4 or MOV format. MOV is an MPEG-4 video container and common multimedia format using a proprietary compression algorithm developed by Apple Computer. Those formats still can be saved in both Joint Photographic Experts Group (JPEG) and Digital Negative (DNG) formats. Shooting modes include burst, Auto Exposure Bracketing (AEB) and time-lapse. A live HD video feed from the camera can be viewed on the mobile device through the DJI GO application. The 3-axis gimbal is also on stage. It provides a stability platform for the camera attached, allowing the operator to capture crisp, clear images. The gimbal can tilt the camera across a 120 ° range. The Aircraft, gimbal and the camera specifications are detailed in Table I-III.

Table I. Aircraft Specifications

Weight (incl. Battery and Propellers)	1216 g
Max Ascent Speed	5 m/s
Max Descent Speed	3 m/s
Max Speed	16 m/s (A-Mode)
Max Service Ceiling Above Sea Level	6000 m
Max Flight Time	Approx. 25 m
Operating Temperature	0 ° to 40 °
GPS System	Built-in GPS

Table II. 3-axial Stabilized Gimbal Specifications

Gimbal Range	120°
Axis	3-axis
Controllable Range	Pitch: - 90° to +3 0°
Angular Vibration Range	+/-0.02°

Table III. Camera Specifications

Sensor	1/2.3°
Photo resolution	12 Megapixels
ISO Range	100-3200(video); 100-1600(photo)
Electronic Shutter Speed	8 s-1/8000 s
Max Image Size	4000 x 3000 pixels
Still Photography Modes	Single shot, Photo burst mode: 3/5/7
Video Recording Modes	2.7 K: 2704 x 1520p
	FHD: 1920 x 1080p 24/25/30
	HD: 1280 x 720p 24/25/30/48/60
Max Video Bitrate	40 Mbps
Supported File Formats	FAT32/exFAT
	Photo: JPEG, DNG
	Video: MP4/MOV
Supported SD Card Types	Micro SD, Max Capacity: 64GB
Operating Temperature	0 ° to 40 ° C

III. UAV CONTRIBUTION TO THE SOCIETY

In the author's previous article on the Preliminary Assessment for Inshore Fishing UAV [6] some examples were given of the UAVs civilian applications.Most of the examples given were in the fields of technology, but to broaden the range of the UAVs civilian applications that contribute to the society in other domains, other examples will be provided. The UAVs were previously associated with the military but they are now increasingly performing civilian tasks as the technology becomes more common. Humanitarian activities have started to use UAVs for data collection and information tasks that include real time information and situation monitoring, public information and advocacy, search and rescue such as: Rapid assessment of damage, collapsed buildings or inaccessible roads, monitoring distribution of goods (e.g. tarpaulins or tents), identifying and analyzing temporary settlements or tracking displacement or movement of people. The following examples show how helpful the use of UAVs are.

A. Unmanned Aerial Vehicles in Humanitarian

In November 2013, super Typhoon Haiyan devastated the city of Taclobain in the Phipplines [7]. Soon after, a case the size of a backpack arrived accompanied by a small team of experts. This pilot project to bring in a UAV with a range of up to five kilometers and a high-resolution video camera to assist humanitarian responders was the work of a partnership between several private sector firms and a consortium of NGOs. At that time, the Philippines Government did not have the regulation to permit the use of the UAVs. But given the urgency of the situation the use of the UAVs was cleared by a special agreement with the Mayor of the Tacloban city. The UAV was used first to identify where to set a base for the operation [8] and to check if the roads were accessible so that some equipment could be delivered. A task that could take days when done on foot or by helicopter. The UAV was not limited to that one task. The UAV was also flown up the coast to evaluate damage from the storm surge and flooding and to see which villages had been affected. The use of the UAV helped to speed up humanitarian efforts by cutting down on wasted time and work and more accurately target-assistance. Not to forget that, the UAV was reported to have located survivors in the rubble with its infrared camera [9].

B. Homeland Security

In the Congress Research Service (CRS) report of July 8, 2010, the congress has expressed a great deal of interest in using Unmanned Aerial Vehicles (UAVs) to surveil the United States' international land borders [10]. One potential benefit of using UAVs is that they could fill the gap in border surveillance by improving coverage along remote sections of the US borders. With their equipped Electro-Optical Sensors (EOS) UAVs can identify an object the size of a milk carton from an altitude of 60,000 feet (18,288 km). UAVs can also provide precise and real-time imagery to a ground control operator [11] who would then disseminate that informed decisions regarding the deployment of border patrol agents could be made very quickly. Another potential benefit of the UAVs is their abilities to loiter for a prolonged period, which has important advantages over manned aircrafts as UAVs can fly for more than 30 hours. The longer flight time of the UAVs means that sustained coverage over previously exposed area may significantly improve border security. The praise of the Home Land Security officials of the UAVs as a safe and important tool, has proved its capabilities. UAVs have contributed to the seizing of more than 200,000 pounds (9,979kg) of Marijuana and the apprehension of 5,000 illegal immigrants. In addition, the UAVs were used successfully to assist the apprehensions of aliens who had already been detected by other means [12]. The range of UAVs is a significant asset when compared to border agents on patrol or stationary surveillance equipment. Despite the potential of using UAVs for diverse tasks for the civilian applications, one of the obstacles that is now perceived among many research community as well as among general users is the cost factors such as: the development acquisition, operation, and especially in the civilian market [13]. In other word, the general perception of the user community at present is that UAVs are too expensive to use. This perception can be justified for larger UAVs capable of performing very complicated tasks. Limited production of larger, specialized UAVs means high costs to procure and require significant personnel to set up as well as to operate. The mitigation of this obstacle can most easily be accomplished by removing the technical regulatory barriers to UAVs flight. To make UAVs available to a larger number of users, Civil Aviation Bureaus or Militaries of each country interested in making UAVs to be used in many domains, should grant a subsidy to companies willing to develop UAVs in the commercial sense. Then the cost would become affordable for everyone. This approach will also involve the revision of the current policy or making new policies that facilitates flight in National Air Spaces. Two technology models that can be used as examples are the commercialization of the Global Positioning System (GPS) and the Earth Observing System (EOS). Safety and reliability will also play a major role in reducing the cost of UAV missions. Safety in the context applies to both the safety of the public and the safety of the platform itself. The safety concerns and the operating costs along with the acquisition costs will determine the success of UAVs in civil applications.

IV. PROJECT CONCETP OVERVIEW

A. Project Concept

The main goal of this project is to develop a cost-effective Inshore Fishing Unmanned Aerial Vehicle (ISFUAV) at sea for the public in general, but especially for disabled people to enjoy fishing during their leisure time as shown in the project concept in Fig.2. The investigation done prior to the project includes: Investigation of the capability application of the UAV for fishing by examining the safety concern of the aircraft and the development of a communication system that will transmit live video images from the ISFUAV to the base station at the seashore monitored by the ISFUAV fisherman agent. What we have considered and done are as follows:

- Assessment of materials that best fit the project objective and their estimate cost.
- Methodology and control concept.
- Flight control should be shifted easily from automatic flight control to manual flight control.
- Preparation for initial field experiments and evaluation of the aircraft performance.
- Do the flight regulations apply to ISFUAV or not? If yes which Department should the application

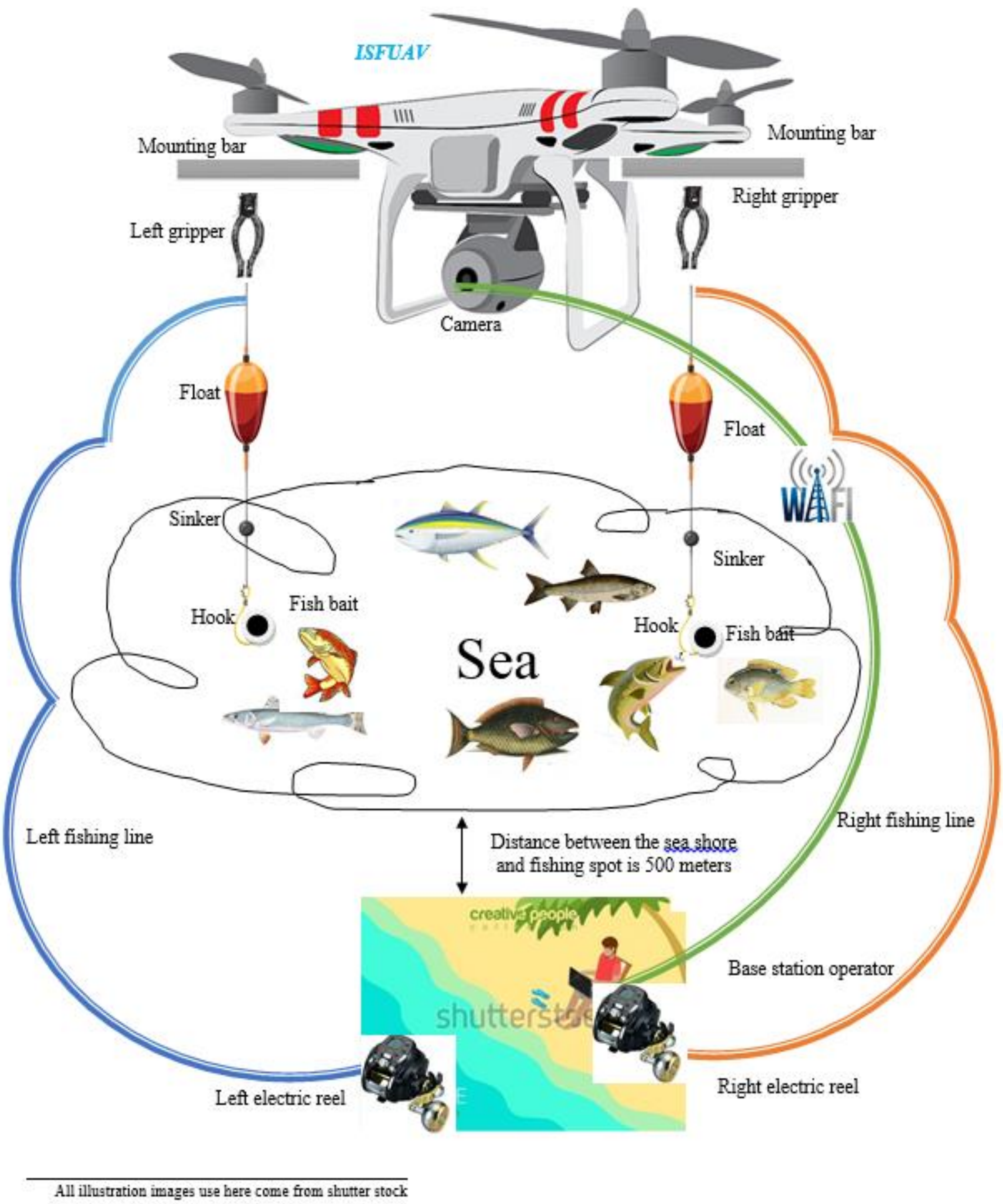

Fig.2 ISFUAV project concept

for the flight clearance be sent

- Evaluation of the fishing materials and their sizes and weights based on the aircraft performance and capability.
- Methodology and control concept.
- Flight control should be shifted easily from automatic flight control to manual flight control.
- Preparation for initial field experiments and evaluation of the aircraft performance.
- Do the flight regulations apply to ISFUAV or not? If yes which Department should the application for the flight clearance be sent
- Evaluation of the fishing materials and their sizes and weights based on the aircraft performance and capability.

The project concept in Fig.2 shows the chopped Unmanned Aerial Vehicle from the original with two mounting bars fixed with a small screw between the main aircraft and the 3-axis gimbal holding the camera for stability and steadiness. These two mounting bars are used to hold the two grippers that will carry out the hooks and the fish bait. The main function of the camera equipped to the ISFUAV is to transmit in real time ~~a~~ video images of the flight during its fishing mission to the ground station at the seashore. The video image transmission of the recorded image is done via Wireless Fidelity (Wi-Fi). For multi-purpose use of the video by the ISFUAV owner. The video is also recorded in MOV, MP4 format or can also be saved in both Joint Photographic Expert Group (JPEG) and Digital Negative (DNG) formats. The details of the fishing materials that compose the ISFUAV are described as follows:

B. Fishing Materials

- **Gripper:** The gripper here is used to hold and carry the fishing line with hooks and bait to the sea for 300 meters to 500 meters from the sea shore and release them in the sea. The 300 to 500-meter distance is the best distance allocated for the ISFUAV to catch a big fish. This gripper (Fig.3) is a handmade gripper with a DC motor produced at the laboratory of Electrical and Electronic Engineering at the National Institute of Technology, Oita College.

Fig.3 Hooks holder gripper

- **Float:** The float here is used to keep the bait attached to the hooks suspended allowing fish to easy access the bait and shallow the hook. Another merit of the float is that, when the bottom of the body of water (if the fishing is going to be done in a river or lake and so on) tends to be the snaggiest (abound with snags) place, the float will keep the hook above the worst of it. Or when it happens to be suddenly caught by strong wind during ~~the~~ fishing, the float can drift with the water current and present the bait to more fish. The lighted float or bobber is also recommended when the fishing is to be done at night under the moonlight, too.

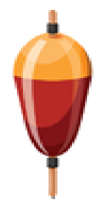

Fig.4 Float

- **Sinker:** The sinker to be used here is the egg sinker with a weight of about 100 grams (3oz). The egg-shape makes the sinker snag resistant and able to roll along the bottom and can slip on the line.

Fig.5 3oz Egg sinker

- **Line or thread:**
  The fishing line or tread that we have selected is a super strength power nylon with a length of 500 meters with a code of 16 to 18 grams.

Fig.6 Fishing line super power bobbin

- **Electric Reel:**
  There are many different types of fishing reels that range from fixed spool, spinning reel, and spin cast reel, and bait casting reel and more [14]. However the most commonly used are the electric reels. We chose the electric reel instead a manual reel (Fig.7) because the ISFUAV is developed to release the fishing hooks at about a 500-meter distance from the seashore into the sea of 30 meters to 50 meters deep. This deep range is the best environment to catch big fish. Specifications of the chosen electric reel is shown in table IV.

Fig.7 Electric reel Daiwa LEOBRITZ 500J

Table IV Electric reel specification

Model	Daiwa LEOBRITZ 500J
Gear ratio	3.7
Weight	815 g
Line capacity	5 (50lb)/400 m, 6 (60lb)/300 m
Bearings	10/1
Max drag	23 kg
Norma winding speed	145 m/min
Jigging function	Programmable Jigging function
Manufacture country	Japan
DC	12 V

This reel has a unique structure with a double JOG dial which we can use with both the right and left hand. The power handle is settled in the middle of the JOG Dial to use ~~it~~ while set the rod in a rod holder.

- **Electric reel rod holder:**
  The electric reel rod holder is the Ex AGS Zero which weighs 59 grams ~~and~~ with a length of 1.75 meter.

Fig.8 Fishing electric reel rod holder

- **Hooks:**
  Fishing is a very pleasant activity when you are onshore with your friends or family with the anticipation of catching a small fish or big fish. At that moment, all your stress will be gone and what you will need for this job is the hook (Fig.9).

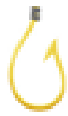

Fig.9 Owner hook type for ISFUAV

Different fishermen have different preferences on fishing hooks based on sharpness, durability, saltwater versus freshwater capability, price, variety and many other factor [15]. For that reason, there is no one best fishing hook, but there are brands that consistently delivery great fishhook products. The choice of this project is the Owner hook due to its sharpness~~,~~

V. METHOD

A. *Autonomous Flying Mission*

One of the objectives of this project, but not the goal, is to make the ISFUAV fly autonomously within its pre-planned path that will involve high level ~~of~~ sensors for the safety of the aircraft. The high level of the autonomy is required to take the advantage of using the UAV platform to support fishing missions. Less direct human interaction with flying the ISFUAV requires less effort by the onshore station and allows the ISFUAV fishermen more freedom to manipulate multiple electric reels simultaneously. This objective must be balanced with the requirement for the onshore fishermen operator and the ISFUAV to respond to onshore control in a timely manner. This should also allow the redirection of the mission from its current state to another fishing location once the first fishing hook has been released into the sea. This will include pre-flight planning, and real-time flight path adjustment during the releasing of the hook into the sea. For the high level of autonomy to be successful the ISFUAV will require a collision avoidance system to be prepared for unknown threats such as birds or other recreational UAVs flying around the ISFUAV. The intention is to have an equivalent level of safety as piloted aircrafts. The system will allow the ISFUAV to detect birds or unknown objects and avoid them. The technology for this system will be divided into two parts: The "Detect" and the "Avoid". The detection part will deal with the detection of anything around the aircraft during its flight mission. The avoid part will be the prediction of any unknown object direction and if the unknown object is likely to cause an incident that could lead to collision, and what appropriate action should be taken through a software algorithm to avoid the unknown object. The priority of the sensors that will be equipped with the ISFUAV will be to detect unknown objects at a sufficient distance so that emergency maneuvering can be avoided. The first step in this development will be to implement a cooperative [13] sensors for collision avoidance. For avoidance, sensor information must be used to predict future position of the unknown object to determine collision potential. If a collision potential exists, a safe escape trajectory must be derived and automatically executed. Once development progresses, more UAVs will be purchased for the detection and avoid system performance tests.

B. Path Planning

This section concerns the method for enabling the ISFUAV to fly autonomously when in mission with respect to its given coordinates or landmarks, d the best path from one point to another in a given space while avoiding obstacles and map the environment. Since the measurements UAVs use to orient themselves are made using imprecise materials, and since the environment in which they operate is generally varying, the resulting data is noisy. Hence many navigation and localization algorithms are probabilistic. Therefore, the autonomous flight of the UAVs is not an easy task when compared to robot navigation, for example. For robots, when moving indoors or outdoors on smooth surfaces over start distances, with unobstructed visibility, navigation problems are not severe. In such situations, a robot may have a clear view of a target location and use vision for navigation. In another case, the robot can navigate to a specific target simply by using wheel encoders' revolutions. This type of navigation is called odometry. In general, these tasks involve obstacles, uneven terrain of varying friction properties, and obstruction of the robot's view to the target. Sometimes the robot will have landmarks of the area to be traveled or information about known landmarks by which to navigate. The navigation task concerns getting from point A to point B along a path ~~that~~ avoiding obstacles, in some cases. Another amazing example concerns animals with highly abilities to navigate and localize, including birds, without learning anything from anyone. Let us consider birds since they are probably the champion navigators of the animal kingdom. Canadian geese (Fig.9) navigate from the northern area of Canada to various location in the United States, always returning to the same ponds and lakes.

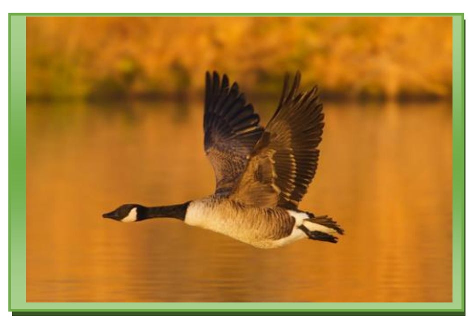

Fig.9 Canadian goose making a long voyage

Small birds called bobolink spend summers in Canada and the United States and winters in South America, particularly in Brazil, Bolivia, and Argentina, for 7,000 kilometers away. How do these small birds accomplish these remarkable navigation tasks in the sky (Fig.10)?

Fig.10 bobolink navigation champion

From these few examples of navigation above we can define the path planning of Unmanned Aerial Vehicle (UAVs) is a rather complicated considering the different kinds of constraints under complex dynamic environment [16]. Several significant considerations for an ideal path planner, including optimality, completeness, and computational complexity, the last of which is the most important requirement since path planning should be executed very quickly due to the fast vehicle dynamic. The design of such path should consider some important characteristics in respect to the UAV kinematics parameters that constitute the UAV kinematics equation.

VI. TEST RESEULTS OF THE FISHING MATERIELS

Before integrating all the fishing materials mentioned above in section IV into the ISFUAV a preliminary test was conducted to investigate:

- The exact weight of the fishing material the ISFUAV can lift
- How far/higher or level the ISFUAV can fly with the fishing materials weight?
- What is the flight duration with the present weight?

The was conducted at the National Institute of Technology, Oita College soccer ground, which was suitable for the test due to its surrounding environments. Instead of using a well-known remote-control device such as Nexus 7, a custom remote control device was designed using a TWE-LITE circuit. Currently, there are many things society connects or wants to connect with the wireless devices for different reasons.-Wireless connection is very convenient to check the status of something remotely or for remote operation. However, well-known wireless connections are mainly designed for human connectivity. Therefore, when nonhuman wireless connections are made, there are various restrictions such as battery life span, communication distance, simultaneous communication frequency or the dimension of the communication (Fig.11).

Fig.11 Restrictions of wireless connectivity.

Therefore, it is sometimes a little difficult to operate things remotely. To avoid being stuck in the middle of an operation, the authors have an idea for a new remote-control system design. The device performance will be compared with other wireless devices to see which one best fits the ISFUAV prototype. The device consists of a TWE-LITE transmitter with one input port for switching the voltage from a high to low level. Once the appropriate voltage transmitted by the transmitter is received by the receiver, the receiver uses its one port to output the exact voltage to the ISFUAV motor and cause the lift-off and releasing movement of the ISFUAV. After the completion of the aircraft remote control device, the first flight was tested. Two 500 ml plastic bottles were filled with 200 grams (total weight 400 grams) of water. The two bottles were attached to the aircraft landing gear with fishing lines. The aircraft with the attached bottles flew up to 50 meters high horizontally for a distance of 100 meters (Fig.12). The flight was stable as the two bottles did not tangle.

Fig.12 ISFUAV flight test

The second test was carried out with 300 grams of water in each of the bottles. For this test, the UAV was flown over the soccer ground for about 5 minutes to check the possible flight duration before moving to the real fishing mission. There were no problems. During the flight operation test images 300 meters ahead were recorded via the equipped camera. In each test, the weight was increased by 100 grams. The sixth test was conducted with 450 grams in each of the two bottles (total weight 900 grams). Wind resistance nor by the flight instability were an issue. The flight was as stable as the previous tests.

But when the weight was raised to 1 kilogram, (each bottle with 500 grams), unstable although flight was possible, the flight was unstable. Adjustments were made due to the test results to the total weight of the fishing materials to be integrated into the fishing UAV by changing some of them.

VII. CONCLUSION

The development of UAVs has become an active area of research in recent years, and very interesting devices have been developed. UAVs are important instruments for numerous applications, such as forest surveillance, fire detection, detection of watershed pollution and military missions. Apart from military applications, there are many jobs to be performed in commercial and government applications in surveillance, monitoring and troubleshooting in the fields of utilities, maritime rescue, customs and excise, and agriculture to name only a few. Some police forces are collaborating with industry to develop systems to replace helicopter surveillance [16]. There are many classes of unmanned vehicle in existence, and many types within each class, developed by many manufacturers. The classes range from insect like vehicles, to hand launched sub-scale models, to full size, long-endurance types. They are all capable of carrying some form of sensors and of relaying sensor information to the ground. Most are remotely piloted, and some experimental types are being operated on controlled ranges as part of a gradual progression towards full autonomy, where they will be capable of performing missions with minimum human intervention [17]. This paper initiates and describes the development of the first prototype of the Inshore Fishing Unmanned Aerial Vehicle (ISFUAV), which is cost-effective at sea for the general public and for disabled people to enjoy fishing during in their leisure time. The preliminary experimental tests were conducted 7 times with success by carrying two plastic bottles filled with 900 grams. However, the test for 1000 grams proved to be unstable and adjustments for the next test.

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