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Design and Fabrication of Camouflage UAV

A.Balthilak,P. Saranya, K. Karthika, T. Banu, S. Paul Arokiam
Assistant Professor, Department of Aeronautical Engineering
Nehru Institute of Technology, Coimbatore, Tamilnadu
nitbalthilak@nehrucolleges.com

Abstract:This paper discuss the Unmanned Aerial Vehicle (UAV) used for surveillance purposes and for dropping bombs in enemy headquarters. CAMOUFLAGE is defined as the blending of material with its surroundings in terms of colour in the surroundings. In Defence sectors their uniforms, vehicles, tools and tool boxes are camouflaged with the paint coatings. In nature the reptile chameleon changes its colour with help of different pigments stored under its skin. Primary mission threats do not stem from infrared or radar signatures, but from the amount that an UAV visually stands out against the sky. This concept such that visual mismatch can often jeopardize mission success and induce the destruction of entire UAV. To bring out the colour changes in UAV according to the region it travels. With the naked eye it can be caught down, but with this technique there is no possibility of finding the UAV with RADAR System and by naked eye. With the help of (OLEDs) organic light-emitting diode display, we are going to cover on the Visual Cross Section of our UAV. Colour sensors are used to sense colour in the surroundings. Altering the RGB values necessary CAMOUFLAGE can be achieved**.**

Keywords: UAV, CAMOUFLAGE, OLED, RGB.

Introduction:

For countless millennia humans have used camouflaging techniques to hide things from dwellings to traps to hunters and prey. Still today, the fundamental desire not to be seen is highly desirable for many civil and military applications. Of course, the classic techniques of camouflage, concealment and deception (CCD) are often based on the same types of techniques used by our ancestors – hide objects or individuals of interest behind, within or underneath objects that blend in with the background. While this general principal is still in practice as seen in a different type of approach is called for when dealing with camouflaging structures like uninhabited aerial vehicles (UAVs) against a background sky.The concept of visual stealth has its roots in a 1943 U.S. Navy project code name Yehudi. The intent of the program, which was highly secret at the time and came to light only in the 1980s, was to give Navy patrol aircraft a better chance of sinking enemy submarines. During 1942, German U-boats took a heavy toll on merchant marine shipping off the East Coast of the United States. Aircraft scrambled to attack the U-boats, but submarine captains called for crash dives whenever they spotted approaching attack planes. By the time an aircraft got close enough to sink a sub, it had disappeared. Yehudi's inventors needed a way to make the aircraft harder to see, and they realized that camouflage paint wouldn't do the job: Regardless of its color, the airplane would be a black dot against the sky. The only way to make the plane less visible was to light it up like a Christmas tree.

The engineers fitted a TBM-3D Avenger torpedo-bomber with 10 sealed-beam lights, installed along the wing's leading edges and the rim of the engine cowling. When the intensity of the lights was adjusted to match the sky, the Avenger blended into the background. Tests proved that the Yehudi system lowered the visual acquisition range from 12miles to two miles, allowing the Avenger to get within striking distance of its targets before they submerged. AB-24 Liberator bomber was also modified, with similar results. Yehudi was not put into production, because better radar had already enabled Navy airplanes to regain the tactical advantage, but the idea was reviewed after air battles over Vietnam.

The First Aircraft to Employ Active Visual Stealth Treatments -- the Grumman TBM Avenger, 1943Concerned that the big F-4 Phantom could be seen at a greater range than its much smaller Russian adversary, the MiG-21, the Pentagon started a program called Compass Ghost. An F-4 was modified with a blue-and-white color scheme and nine high-intensity lamps on the wings and body, reducing the detection range by as much as 30 percent. It is most interesting to read that such offset lighting concepts are still being actively pursued today.

In addition to matching the background via differential illumination in the visible spectrum, several inventions have been conceived which work to make the aircraft wings and fuselage match the background in the infrared spectrum.

Although a worthy goal, typically the thermal signatures of the propulsions generate the largest infrared signature, rather than the skin of the aircraft. Accordingly, much more effort has been and is currently being placed on suppressing the signature of UAVs in the visible spectrum. One very interesting method of visual camouflage is through the use of fiber optic transfer mechanisms. By gathering light from one side of the aircraft, contiguous fiber optic lines can transfer that image to the other side of the aircraft. Although it consumes no power, the weight penalty is prohibitive and losses in the fibers and packing arrangement induce a prohibitive luminescence under match with respect to the background.

To skirt these under match problems, modern methods of visual stealth have used active techniques. The overall scheme is to measure the color and luminosity of the background, then project it on the opposite side of the aircraft. A number of programs have been centered on variants of this concept. Although various forms of illumination mechanisms and feedback loops are described, all require relatively complicated and costly treatments which require major overhauls of the aircraft for installation. Accordingly, it is the purpose of this investigation to lay out a much less expensive method of achieving a reduced visual signature through the use of optically adaptive materials.

OLED display

The new OLED (Organic Light Emitting Diode) is a brighter, higher contrast display that has faster response times, wider viewing angles and consumes less power than conventional VFD, LED or LCD Displays. OLED displays are self-illuminating and require no backlight for maximum visibility in all environments. This also allows OLEDs to be significantly thinner than standard VFD, LED or LCD displays. Newhaven Display offers Character and Graphic type OLED displays as complete, easy-to-use modules.

Features

1. Fast response time: 10μs
2. Wide viewing angle: Up to 160°
3. Thin designs
4. Self-illuminated; no Backlight necessary
5. Low power consumption
6. High Brightness
7. High Contrast ratio: 2000:1
8. Wide Operation Temperature: -40°C to +80°C
9. Serial or Parallel MPU interface
10. Character Module OLEDs include 4 built-in Font Tables
11. Graphic Module OLEDs include required external logic and voltages

OLED Technology

Newhaven Display's Character OLED modules come in standard sizes and can be used as compatible replacements for LCD or VFD modules. They use serial or parallel MPU interface, have LCD compatible instructions and 4 built-in font tables. Newhaven Display's Graphic OLED modules are easy to use, all-in-one designs. Most Graphic OLED displays require multiple high-voltage power supplies and external logic components. New haven Display's custom designed module boards for each Graphic OLED allow the user to have just one interface supply. The Graphic OLED module board has all the required external logic components, making it fast and easy to start using the displays.

OLED Display Structure

OLED Displays (Organic Light Emitting Diode) provide brighter, higher contrast displays, have faster response times, wider viewing angles and use less power than the conventional LEDs or LCD displays. OLED Displays are made up of a layer of organic material placed between two conductors. These two conductors (an anode and a cathode) are then between a glasses top plate (seal) and a glass bottom plate (substrate). When an electric current is applied to the two conductors, the organic material produces a bright, electro-luminescent light. When energy passes from the negatively charged layer (cathode) to the other (anode) layer, it stimulates the organic material between the

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two, which in turn emits light that's visible throughout the outermost layer of glass.

OLED Color Production

In order for OLED displays to produce color, an electric current is needed to stimulate the relevant pixels on the OLED display. The pixels are created by the arrangement of the cathodes and anodes; which are arranged perpendicular to eachother. Where these two intersect, is where the light is emitted. The electric current applied to the selected strips of anodes and cathodes determine which pixels get turned on and which pixels remain off. The brightness of each pixel is proportional to the amount of applied current.

OLED Light Emission

Electrical current flows from the Cathode to the Anode through the organic layers, giving electrons to the emissive layer and removing electrons from the conductive layer.

Removing electrons from the conductive layer leaves holes that need to be filled with the electrons in the emissive layer.

The holes jump to the emissive layer and recombine with the electrons. As the electrons drop into the holes, they release their extra energy as light.

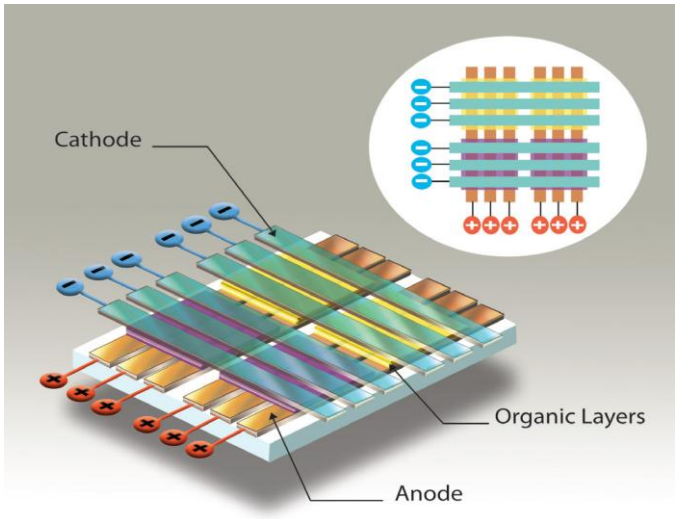

Figure:1:OLED Display Inner Structure

Proposed approach

In this project we attempt to fabricate the CAMOUFLAGED UAV. Invisible UAV will be possible by our concept. Since the payload will be less the endurance of the flight will be more when compared to other UAV designs. It will help in hiding from enemy country cameras and also less expensive when compared to other types of UAV models.

Concept of OLED camouflage of UAV

The prototype model of UAV has been designed and it was covered with the OLED display, with the help of colour sensor attached to the UAV we can sense the colour in the surroundings and with the interface between the colour sensors and the OLED display we can achieve the colour camouflage of the UAV. Since the OLED is flexible we can bend it to different shapes and we can cover the UAV surfaces.

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Figure:: 2OLED Camouflaged UAV Comparisons

Conclusion

This project helps in fabrication of the invisible UAV,Which will be help in defence and military purposes for finding out the enemy borders and planning towards the work of attacking our countries and also to identify the nuclear weapons and the prohibited researches done on enemy regions.

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