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## Bomb Detecting Ultra Drone using RADAR with Surveillance Camera

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**Abstract:** Unmanned aerial vehicles are most commonly used for various purposes. Quad copter unmanned aerial vehicles are used for surveillance and reconnaissance by defense and law enforcement agencies, as well as in search and rescue missions. It is a small UAV that can quietly hover in place and use a camera to observe people and objects on ground. It is a difficult task to identify the bomb by using bomb detectors that may lead to death of the person. So these drones are used to detect bombs by travelling through air which is controlled from far away. It can also detect the obstacles and sense the temperature & humidity as well as detect the various types of bombs in most dense areas. It also has an ability to travel on road where it is unable to fly. It also identifies the enemies and releases the arrows towards them.

**Keywords:** Roll Yaw, Pitch, Drone, Transceiver, UAV.

### I. INTRODUCTION

An Unmanned Aerial Vehicle(UAV), commonly known as a drone, Unmanned Aircraft System(UAS), or by several other names, is an aircraft without a human pilot aboard. The flight of UAVs may operate with various degrees of autonomy: either under remote control by a human operator, or fully or intermittently autonomously, by onboard computers. Compared to manned aircraft, UAVs are often preferred for missions that are too "dull, dirty or dangerous" for humans. They originated mostly in military applications, although their use is expanding in commercial, scientific, recreational, agricultural, and other applications, such as policing and surveillance, product deliveries, aerial photography, agriculture and drone racing. Civilian drones now vastly outnumber military drones, with estimates of over a million sold by 2015. The term drone, more widely used by the public, was coined in reference to the resemblance of navigation and loud-and-regular motor sounds of old military unmanned aircraft to the male bee. The term has encountered strong opposition from aviation professionals and government regulators. The term Unmanned Aircraft System (UAS) was adopted by the United States Department of Defense (DoD) and the United States Federal Aviation Administration in 2005 according to their Unmanned Aircraft System Roadmap 2005–2030.

The International Civil Aviation Organization(ICAO) and the British Civil Aviation Authority adopted this term, also used in the European Union's Single-European-Sky(SES) Air-Traffic-Management(ATM) Research (SESAR Joint Undertaking) roadmap for 2020. This term emphasizes the importance of elements other than the aircraft. It includes elements such as ground control stations, data links and other support equipment. A similar term is an Unmanned-Aircraft Vehicle System(UAVS) Remotely Piloted Aerial

Vehicle(RPAV), Remotely Piloted Aircraft System(RPAS). Many similar terms are in use. A UAV is defined as a "powered, aerial vehicle that does not carry a human operator, uses aerodynamic forces to provide vehicle lift, can fly autonomously or be piloted remotely, can be expendable or recoverable, and can carry a lethal or nonlethal payload". Therefore, missiles are not considered UAVs because the vehicle itself is a weapon that is not reused, though it is also unmanned and in some cases remotely guided. The relation of UAVs to remote controlled model aircraft is unclear. UAVs may or may not include model aircraft some jurisdictions their definition on size or weight, however, the US Federal Aviation Administration defines any unmanned flying craft as a UAV regardless of size. A radio-controlled aircraft becomes a drone with the addition of an autopilot Artificial Intelligence(AI), and ceases to be a drone when the AI is removed.

### II. RELATED WORKS

Researchers have discovered a new radar technique that could be used to find an Improvised Explosive Device(IEDs) in a pile of trash on the road, and the finding was inspired from an unlikely source: dolphins. The technology could also be used to find buried earthquake victims, animals marked with tags, or tiny surveillance devices hidden in walls. The researchers call the Technique Twin Inverted Pulse Radar(TWIPR), and as with the sonar method it sends two identical electromagnetic waves at inverted phases — meaning when one wave crests the other troughs. It's able to determine semiconductors from other objects by the way each scatters the waves when they make contact. In a paper describing their findings, the researchers say it can even distinguish between rusty metal and semiconductors. They also tested cell phones with or without an active SIM card, as well as one with the battery removed, and they concluded that their finding "suggest that there is a possibility that the

differing operating states of a mobile phone can be distinguished using TWIPR.". This all makes the method appealing for finding explosive devices, and the cell phone tracking may allow first responders to find victims buried after a building collapse. But the researchers point out that a simple tag that can be made for less than one euro could be tuned for easy detection with TWIPR, making it a good fit for animal-tracking devices or as part of a kit worn by explorers.

### III. HISTORY

- In 1849 Austria sent unmanned, bomb-filled balloons to attack Venice. UAV innovations started in the early 1900s and originally focused on providing practice targets for training military personnel. UAV development continued during World War I, when the Dayton-Wright Airplane Company invented a pilotless aerial torpedo that would explode at a preset time. The earliest attempt at a powered UAV was A. M. Low's "Aerial Target" in 1916. Nikola Tesla described a fleet of unmanned aerial combat vehicles in 1915. Advances followed during and after World War I, including the Hewitt-Sperry Automatic Airplane. The first scaled remote piloted vehicle was developed by film star and model-airplane enthusiast Reginald Denny in 1935. More emerged during World War II – used both to train anti-aircraft gunners and to fly attack missions. Nazi Germany produced and used various UAV aircraft during the war. Jet engines entered service after World War II in vehicles such as the Australian GAF Jindivik, and Teledyne Ryan Firebee I of 1951, while companies like Beechcraft offered their Model 1001 for the U.S. Navy in 1955. Nevertheless, they were little more than remote-controlled airplanes until the Vietnam War.
- In 1959, the U.S. Air Force, concerned about losing pilots over hostile territory, began planning for the use of unmanned aircraft. Planning intensified after the Soviet Union shot down a U-2 in 1960. Within days, a highly classified UAV program started under the code name of "Red Wagon". The August 1964 clash in the Tonkin Gulf between naval units of the U.S. and North Vietnamese Navy initiated America's highly classified UAVs (Ryan Model 147, Ryan AQM-91 Firefly, Lockheed D-21) into their first combat missions of the Vietnam War. When the Chinese government showed photographs of downed U.S. UAVs via Wide World Photos, the official U.S. response was "no comment". The War of Attrition (1967–1970) featured the introduction of UAVs with reconnaissance cameras into combat in the Middle East. In the 1973 Yom Kippur War Israel used drones as decoys to spur opposing forces into wasting expensive anti-aircraft missiles.
- In 1973 the U.S. military officially confirmed that they had been using UAVs in Southeast Asia (Vietnam). Over 5,000 U.S. airmen had been killed and over 1,000 more were missing or captured. The USAF 100th Strategic Reconnaissance Wing flew about 3,435 UAV missions during the war at a cost of about 554 UAVs lost to all causes. In the words of USAF General George S. Brown, Commander, Air Force Systems Command, in 1972, "The only reason we need (UAVs) is that we don't want to

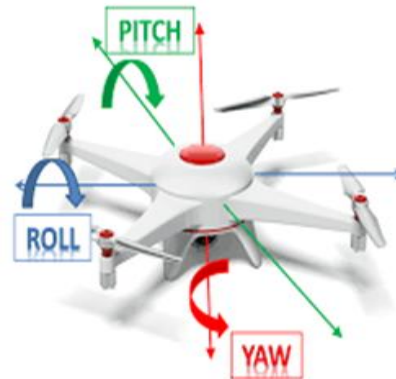
needlessly expend the man in the cockpit." Later that year, General John C. Meyer, Commander in Chief, Strategic Air Command, stated, "We let the drone do the high-risk flying. The loss rate is high, but we are willing to risk more of them.

- During the 1973 Yom Kippur War, Soviet-supplied surface-to-air missile batteries in Egypt and Syria caused heavy damage to Israeli fighter jets. As a result, Israel developed the first UAV with real-time surveillance. The images and radar decoys provided by these UAVs helped Israel to completely neutralize the Syrian air defenses at the start of the 1982 Lebanon War, resulting in no pilots downed. The first time UAVs were used as proof-of-concept of super-agility post-stall controlled flight in combat-flight simulations involved tailless, stealth technology-based, three-dimensional thrust vectoring flight control, jet-steering UAVs in Israel in 1987.

With the maturing and miniaturization of applicable technologies in the 1980s and 1990s, interest in UAVs grew within the higher echelons of the U.S. military. In the 1990s, the U.S. DoD gave a contract to AAI Corporation along with Israeli company Malat. The U.S. Navy bought the AAI Pioneer UAV that AAI and Malat developed jointly. Many of these UAVs saw service in the 1991 Gulf War. UAVs demonstrated the possibility of cheaper, more capable fighting machines, deployable without risk to aircrews. Initial generations primarily involved surveillance aircraft, but some carried armaments, such as the General Atomics MQ-1 Predator, that launched AGM-114 Hellfire air-to-ground missiles.

### IV. PROPOSED METHOD

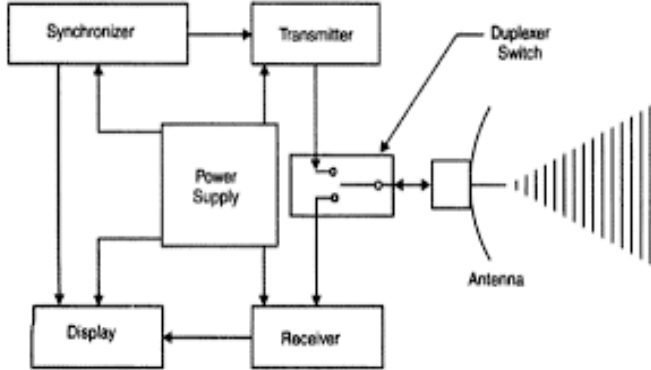
In this method we are proposing a drone which has RADAR for the detection of various types of bombs. By using this we can also operate the drone upto 15 kms. Drone can able to detect the bombs present upto the range of 15kms.



It is the method mainly based on the dolphins which can able to detect the sounds in the deep of the sea. By using this technique new type of radar is invented. So that all types of bombs are detected by using this technique. This RADAR can track the enemies coming and gives signals to the operator of drone. So that operator can click the button by which the can release the poisonous arrows on enemies. It also has wireless camera which can be able to observe the situations around 15 kms. It gives the live by using raspberry pi upto the range. It

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consists of wheels the places where drone unable to fly can travel by wheels at very narrow places. So that it can be able to protect the public from the bomb. These days bomb attacks are increasing to protect people without disturbing them is major problem. By observing the density of people the bomb detectors can detect the bomb. When drone is activated it can be controlled by using flight controller. It has mainly three directions roll, yaw and pitch.

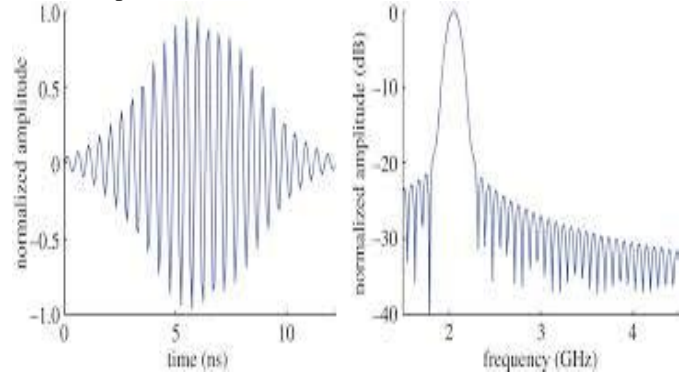


These all are activated, based on this the drone can move as per operator instructions. After the activation of the drone all the radar is activated for the tracking and detection of the bomb. Radar is operated based on Doppler effect, as the signal is transmitted based on the echoes received to the antenna it can be able to identify the object present at that particular area. This radar are of many types varied based on their operation but here radar can be used to detect he bomb and also for tracking. For very long distances we can able to operate the drone by using radar technology. The recived echo signal is received by the antenna and these signals are processed to display the shape of an object. Mostly in radars microwave signals are used which has high frequency so it can be able to penetrate through the ground to identify the bomb easily. So that a drone can detect the bomb. Then camera starts give live telecast around 180 degrees of angle to the receiver. A wireless camera which consists of both transmitter and receiver. It is connected to the servo motor that can easily rotate the camera up to 180 degrees to cover the wide range of area. If the drone is landed then the wheels are activated to move. Radar can detect the bombs present in the underground and give the information to the operator that is the bomb is present in place as per the GPS location. Global positioning system which can easily detect the exact location of bomb presented. If it tracks the enemies in the surroundings it can able to change its mode to release the arrows which is poisonous towards the enemies.

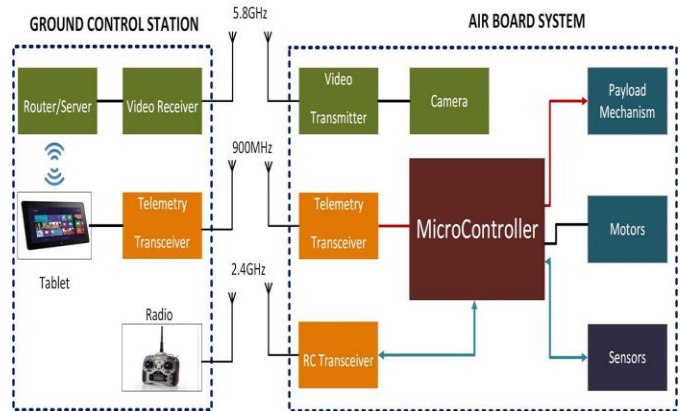
## V. EXPECTING RESULTS

By using this method we are aimed to reduce the death of people and protect them from bombs. As the drone gets some position it sends the exact location and temperature & humidity of that particular place. So that radar starts its operations and it is twin pair inverted radar sends the signals if object is identified echoes are produced. So that based on the particular shape of the object the bomb is detected. So radar also switch to another mode at which it can detect the

enemies from far distance. By using tracking technique it can release the arrows towards the people. It can be able to give chance to protect ourselves from the enemies.

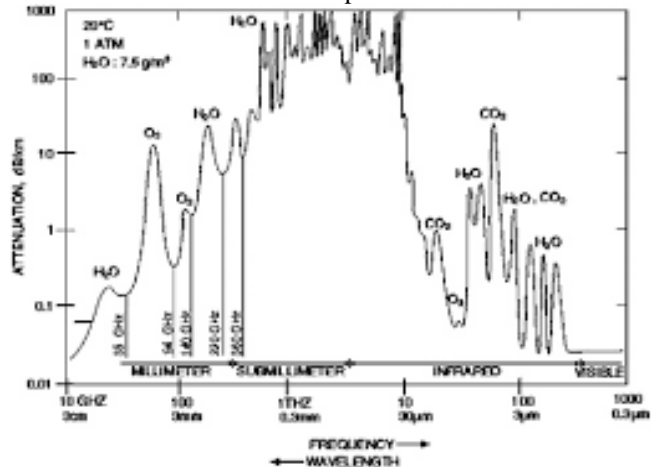


In this microcontroller plays the crucial role by formatting the signals and presenting them to the user without causing any interruption. It can be able to control all the operations present in the board.



## VI. COMPARING PROPOSED METHOD WITH OTHER METHODS

In previous methods human beings are holding the bomb detection equipment to detect the bombs this technique also for only few types of bombs. But in this method man can just sit and detect where the bomb is placed.



For the detection of chemical bomb dog squad is used, as the dog detects the bomb by smelling the bomb. For the checking of vehicles X-rays are used which can scan the

vehicles by penetrating through it. But by using this we can easily detect the bomb by controlling the drone up to range of 15 kms. It can also detect the enemies from the long distance and can release the arrows to give protection from enemies. It has an ability to give live telecast with high definition whereas other drone can't. When compared to other methods it is best method to detect the bombs. There are various methods for the detection of bomb. By comparing this method with the other methods the graph shows the best method in the previous techniques involved. In previous drone can detect only 1.8 miles but in this drone it is able to detect up to 15 kms which is improvised than previous method.

#### **VII. CONCLUSION**

Hence in this we are concluded that technology can be used in many ways to save the life of human beings. This drone can detect the bombs as well as enemies which are very dangerous to the human beings. It is the method where an operator can't run with the equipment to detect the drone. Because it has an ability to detect the bomb from long distance 15 kms. It is easy to handle and also operation is so easy. Sensing of temperature and humidity makes the work easy how to operate the drone and also drone operates automatically out of its range.

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