

Gesture Controlled Drone

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Abstract—In this study, we are implementing a QUADCOPTER and controlling its motion using GESTURE CONTROL technology. This gesture-controlled technology is implanted using image processing. The gestures are going to be recognized by a WEBCAM on a laptop or similar device, on which OPENCV and PYTHON programming is going to be done to regulate the drone's motion using BLUETOOTH MODULE HM10.

Keywords— QUADCOPTER, GESTURE CONTROL, WEBCAM, OPENCV, PYTHON, BLUETOOTH MODULE, ARDUINO NANO

I. INTRODUCTION

A drone is largely known as an unmanned aircraft in technical terms. Drones are more officially known as Unmanned Aerial Vehicles (UAVs) or Unmanned Aircraft Systems (UASs). A drone may be considered a robot that can fly and controlled with remote or autonomously flies using software-controlled plans in their embedded systems, which work in unison with sensors present onboard and GPS. According to the recent past, UAVs were most frequently related to the military, where they were used initially for anti-aircraft target practice, intelligence gathering, and so, more controversially, as weapons platforms. Drones can also widely be used for a huge range of roles starting from search and rescue, surveillance, traffic monitoring, weather monitoring, and firefighting, to private drones and business drone-based photography, and videography, agriculture delivery services, etc. They have been a mainstay within the military, playing critical roles, intelligence, surveillance and force protection, artillery spotting, target following and acquisition, combat casualty assessment and reconnaissance, yet as for weaponry.

Gesture control technology allows users to regulate devices with just a straightforward gesture of their hand. This is a fairly new technology, especially within the consumer market. While there are some gesture control devices purchasable, we expect to determine more options to come to the stores over the next couple of years.

II. OVERVIEW

A. Quadcopter

Here, we've used the F450 frame because the base and also the flight controller is constructed using the Arduino NANO board. The brain of the drone is the flight controller, which acquires navigational data from the hand gestures. The hand gestures are processed by the P.C. and transmitted wirelessly to the Arduino Nano via Bluetooth module. The flight controller then sends the information to the electronic speed controller (ESC), which sends signals to the motor about the extent of thrust and speed needed for the drone to fly or hover. The motors employed in drones will have a huge influence on the payload the multi-rotor can lift and the flight period. 1200g is the maximum payload that the four motors can lift. Motors and propellers work in pairs with 2 motors rotating counter-clockwise (CCW Propellers) and 2 motors rotating clockwise (C.W. Propellers). A pusher propeller is employed in the clockwise motor, while a standard propeller is employed in the counter-clockwise propeller.

B. Gesture Technology

Gesture control technology gives people the liberty to regulate what devices do without having to ever touch electronics like smartphones, tablets, or remote control devices. The user activates the gesture recognition software within the computer. The Webcam within the computer senses the gesture given by the user. These gestures are converted into acceptable commands and transmitted through Bluetooth to the Flight controller.

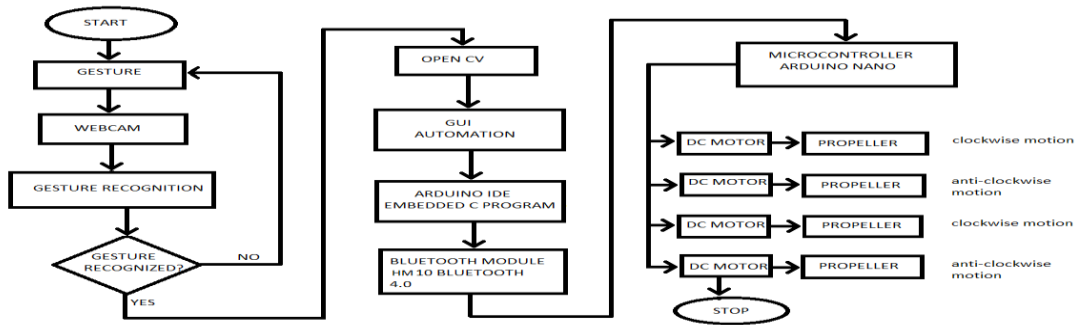
C. Methods employed

Open CV (Open Source Computer Vision Library) is an open-source computer vision and machine learning software library. It's used for programming so that the gestures will be recognized from the user's hand.

Arduino IDE is employed for the microcontroller configuration, Arduino Nano, which can control the drone's motion consistent with the gestures.

The diagram is given as follows, which vaguely summarizes the flow and processes involved during this project.





III. WORKING

A. Gesture Recognition

The gesture is made using the hand, for example, one finger for moving forward, two fingers for stopping. Similarly, hand sliding towards left for turning left and hand sliding towards the right for turning right.

The Webcam on the laptop captures the gesture made by the user’s hand. If it is recognized, it is further processed.

B. Image Processing

The OpenCV algorithm determines whether the gesture matches the required gesture or not; if it does, it is executed using GUI Automation.

The processing of the image is done based on the points at the tips of the fingers and their motion accordingly.

C. Transmission of the signal

The signals from the laptop are transmitted to the drone using the Bluetooth module.

D. Controlling the motion of the drone

The Arduino board is configured to move the motors attached to the propellers in clockwise and anticlockwise motion.

The programming is done in Embedded C on the software, Arduino IDE, and the values given to the D.C. brushless motors are provided in the program itself.

IV.FUTURE WORK

There is a lot of scope in the future for this particular project. Drone technology is very popular today, but its applications can further be extended in a lot of fields.

For instance, Drone technology will revolutionize the agriculture industry by providing precise analysis with the real-time data gathered and processed. Drones can be used throughout the yield cycle for various applications such as soil and field analysis, irrigation, crop spraying, monitoring, and health assessment. This results in higher yield productivity, and in the case of a catastrophe, the farmer will be able to file the losses more proficiently for insurance claims.

The gesture control part can be further utilized for the differently-abled for menial jobs, as it only requires a simple hand gesture without having to operate the appliance with the added complexity of remote control.

So, the person can perform various jobs while sitting at a place, controlling the drone to perform various tasks, equipped with the drone.

V. CONCLUSION

This project can be used for surveillance in civil and military areas. This can be equipped in the border for monitoring ambiguous situations, thereby ensuring the safety of not only citizens but also soldiers. This project has many advantages. Some of them are enumerated below:

- Firstly, drones are faster than a human being and can work without breaks. Drones are cheaper and cost-effective as it reduces the human resources needed for this task.
- Secondly, it is much more convenient for the soldiers to check for the potential threats in hostile terrains
- Thirdly, gesture control allows precise and instinctive ways to maneuver the complicated machine. The person can direct the aerial vehicle with hand movements.

- This method will be much more efficient and less erroneous because human beings are more prone to committing errors than machines

Last but not least, the drone is configured to move by recognizing gestures, so that reduces the complexity of manning the controls of the model with the help of remote control.

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