FLOOD RESCUE DRONE

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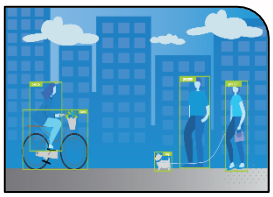
Abstract

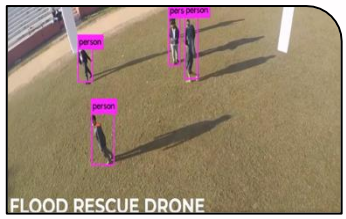
Floods have been a recurrent phenomenon in India and cause huge losses to lives, properties, livelihood systems, infrastructure, and public utilities. India's high-risk vulnerability is highlighted by the fact that 40 million hectares out of the geographical area of 3290 lakh hectares are prone to floods, which is 12%. State-wise study shows that about 27% of the flood damage in the country is in Bihar, 33% in Uttar Pradesh and Uttarakhand, and 15% by Punjab and Haryana. **India has lost 6,811 people in the last three years to hydro-meteorological disasters such as heavy rain, lightning, flood and cyclones till March this year.**

We can't control the floods but can control the human loss in the aftermath of the floods. Thus, keeping these things in mind we propose our project that is the **FLOOD RESCUE DRONE.** In our project, using drone technology and object detection algorithms, we would like to detect and locate people that get trapped in floods and after flood debris. Doing so, we can then send recue teams to that locations and save them in time. In such situations, the roads get blocked, as a result, necessary medication and food can't be delivered to recue camps. So, in addition to person detection our drone also has delivery mechanism in place that can deliver these emergency items through air even without the need to make the drone land.

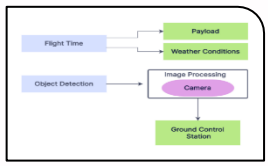


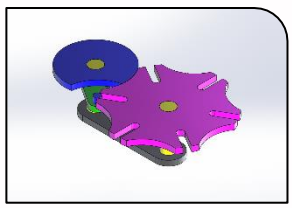
Test Results

We were successfully able to ***autonomously*** fly a prototype drone in **ROS Simulation** and in physical mode. The object detection model is *successful* in detecting people in a ***video stream***. Now using this model, we can detect people present in flood regions and save them in time.



At **67 FPS**, YOLOv2 can give a ***mAP*** of **76.8** while at *40 FPS* the detector gives an accuracy of **78.6 *mAP***, better than the state-of-the-model such as Faster R-CNN and SSD while running significantly faster than those models.





Our **CAD model** of delivery mechanism is completely ready to manufacture for testing purposes. As mentioned, we have used **Geneva Mechanism** for the delivery mechanism because it is the simplest and least expensive of all intermittent motion mechanisms.

Methodology

We have divided our project into *three* parts that is as follows –

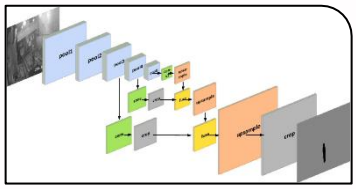
1. **Flight Aspect of the Drone** – In this, we designed the drone keeping in mind the condition that need to be fulfilled for the situation. *The drone can be the guided in the three ways.*

   a. Autonomous flight by Mission Planner - We would be operating the drone autonomously. We can plan missions on Mission Planner by giving it wave points along with other instructions needed during the mission. We have worked on drone technology and made simulations using the ROS package.

   b. Flight planning using code - For complicated paths if we want specific paths for special situation, we can use different programming codes based on the situation to get an optimum path according to the requirement.

   c. Manual Flight - The manual mode would only be used, if necessary, in areas where it cannot be operated autonomously.

2. Object Detection Model – We have used YOLO V2 objection detection model in our program. We have used this because this model is fast and good for real time processing and trained end to end to improve inaccuracy.



3. Delivery Mechanism uses Geneva mechanism to deliver the packages, it works with help of coordination of pulleys and strings.

Conclusion

By integrating drone technology with object detection, ***we are able to solve our problem statement.*** We have conducted test of drone in physical mode also which have revealed positive results.

By using innovation in mechanical engineering, we were also able to create delivery mechanism in a unique manner.

Over 1,500 Indians lost lives to floods every year in last decade. So, by using such technological innovations we can **help out to reduce human loss and create a great impact on mankind.**

References

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