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LIDAR based Micro-Drone for Birds and Rodents Repellent System

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ABSTRACT: This project deals with the creation of micro drone that is used as a Birds and Rodent's repellent system. Rodents are the major vertebrate pests causing damage to various crops and commodities by feeding and indirect damage by spoilage, contamination and hording during on-farm and post-harvest stages. First and foremost, they are disease carriers and cause physical damage to structures. The analysis of the reviews on pre harvest losses indicates a range of 5-15% damage to cereal crops like rice and wheat. During 2001 it was reported that the overall losses of grain to rodents in India were approximately 25% in pre harvest and 25-30% in post-harvest situations bringing the loss to at least US \$5 billion annually in stored food and seed grain in India. So, there is a huge need to rid the farm of the rat and mice infestation. In this project, we propose a microdrone with LiDAR technology to provide solution to the agricultural sector. The microdrone low weight, small in size and can be easily launched using our hands and does not produce much noise. By using appropriate way of disturbing the Birds and Rodent's movements in the field, the harvest losses shall be minimized to a reasonable level.

KEYWORDS: LIDAR Technology, Micro-Drone, Bird Repellent System

I. INTRODUCTION

Drones are today widely being used in a variety of fields. Applications of drones ranges from filming, thermal inspections and now in agriculture. The major issues of the drones is the cost. Generally speaking drones are costly purchase and there is a huge risk of damage while flying them that is why drones are still not a very common gadget. Mostly large drones make a lot of noise and need a lot of clear space to fly. They cannot be flown in dense forests or areas with many trees. So here we build a micro drone with an obstacle detection feature using LIDAR sensor. Hence this drone helps you understand drone flying as well as how obstacle sensing can be done using drones. And, its small size and lower cost makes it less risky to fly it in dense forest of places. The mini drone consists of 4 drone motors, propellers and Arduino Pro Mini F3 EVO controller and a lidar sensor and buzzer. IR used by the LIDAR sensor is for detecting any obstacles in front of it. If any obstacle is detected the lidar signal are decoded by controller to operate a buzzer and led for indication of obstacle in front of it. The user is constantly alerted with about the proximity by changing the led and buzzer frequency so drone can be controlled accordingly to avoid collision.

II. METHODOLOGY

To develop a moving obstacle detection system: We can use this feature in several autonomous vehicle systems and robots to detect obstacles. • To predict path of obstacle: We can predict the path of the incoming object with speed and angles parameters. • Check for the interference and give a safer path: We can predict the path of the incoming obstacle and adjust out drone accordingly to avoid it.



Figure 1 Block diagram of the system

Fig. Block Diagram

Application-

- Indoor Drones
- Farm Protection from Birds
- Animal Repelling
- Children's fun Toys

III. LITERATURE REVIEW

Classical computer vision problems such as object recognition, identification and semantic segmentation have been applied with great success to deep learning techniques and Deep convolutional Neural Networks. However, deploying them over point clouds implies a high computational burden due to the high dimensionality and sparsity of 3D lidar data. Another method followed is to enforce the well-known 2D convolution tools over the 3D point cloud's corresponding 2D representations. In this project of Object detection using LiDAR, classic approaches for object detection in lidar point clouds use clustering algorithms to segment the data, assigning the created group to different datasets. Other strategies benefit from prior knowledge of the environment structure to ease the object segmentation and clustering. This work presents a concept of intelligent vision-less micro-drones, which are motivated by flying animals such as insects, birds, and bats. The presented micro-drone (named BAT: Blind Autonomous Tiny-drone) can perform bio-inspired complex tasks without the use of cameras. The BAT uses LIDARs and self-emitted optical-flow in order to perform obstacle avoiding and maze-solving. The controlling algorithms were implemented on an onboard micro-controller, allowing the BAT to be fully autonomous. We further present a method for using the information collected by the drone to generate a detailed mapping of the environment.

IV. CONCLUSION

LIDAR works by emitting a laser beam and measuring the time it takes for the laser to bounce back off of an object and return to the LIDAR sensor. By knowing the speed of light, the LIDAR system can calculate the distance to the object based on the time it takes for the laser to travel to and from the object. If the object is approaching the drone, the distance between the LIDAR sensor and the object will decrease over time. This change in distance can be measured by

comparing the distance measurements obtained at different time intervals. To calculate the velocity of the approaching object, the LIDAR system can use the concept of Doppler shift. Doppler shift occurs when there is a relative motion between the LIDAR sensor and the object, causing a shift in the frequency of the laser beam reflected from the object. This shift in frequency can be measured by the LIDAR system and used to calculate the velocity of the object towards the drone.

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