Cal Poly Pomona 3rd Annual Creative Activities & Research Symposium
August 16, 2017
University Library

Oral and Poster Presentations from 9 to 11:15 am
Symposium Reception and Keynote from 11:15 am to 1 pm
Demo Day: Summer Bootcamp Pitches from 1:15 to 3 pm
Poetry Session from 1:15 to 3 pm

Author: Erwin Perez

Major: Aerospace Engineering

Project Author(s): Erwin Perez , Alexander Winger

Faculty Mentor(s): Subodh Bhandari

Presentation Type: Poster and Creative Works Showcase (i.e. Poster, Design Project, and/or Prototypes)

Project Title: Autonomous Collision Avoidance System for Unmanned Aerial Vehicles using Stereoscopic Vision

Abstract: This presentation discusses the use of stereoscopic vision as a means of sensing and detecting obstacles and other aircraft for collision avoidance systems for small unmanned aerial vehicles (UAVs). The importance of this research has become increasingly significant as the presence of UAVs in commercial and private sectors has led to stricter FAA regulations. Implementing collision avoidance systems can help integrate UAVs more seamlessly into the National Airspace System with fewer safety concerns and fewer financial burdens. Stereoscopic vision provides a cheaper and more lightweight solution for collision detection. The project uses a Zed stereo camera that is mounted on a DJI S900 Hexacopter UAV to generate depth maps. A NVIDIA Jetson TX1 board is used for onboard processing of the depth maps and obstacle avoidance. The board communicates with the PixHawk 3DR autopilot module, which transmits data to the ground control station via XBee radios. By using the Zed SDK, it is possible to obtain depth maps directly from the camera and use them in the implementation of obstacle avoidance. The algorithm that is used will partition the depth map into multiple sections, allowing it to find the section of the image that has pixels which represent objects furthest away. In other words this section should be obstacle free. From here, the UAV can maneuver in the direction of the selected section of the depth map, allowing it to avoid any obstacles in its path.