Abstract: The lack of obstacle avoidance capability has limited the use of unmanned aerial vehicles (UAVs). In order to utilize the full potential of UAVs, they must be integrated into the National Airspace System. This requires that the UAVs have sense and avoid or obstacle avoidance capability. This project focuses on the design of obstacle avoidance capability for a UAV airplane. The airplane is equipped with an autopilot for autonomous flight. The airplane is also equipped with cameras and a laser range finder for obstacle detection. A path planning algorithm is being developed that will choose alternate feasible paths for the airplane when an obstacle is detected. A flight computer based on X86 architecture is used to perform optical flow and avoidance algorithm.

Optical Flow is the pattern of apparent motion of objects, surfaces, and edges in a visual scene caused by the relative motion between an observer and the scene.

Using a pair of high powered 802.11n radios, we created a Wifi network that lets the aircraft communicate with a ground station at a 1000 feet range.

The AVL program was used to make a flight dynamics model of the aircraft. By measuring each side of the wings and the tail, and using the airplane mass characteristics, we were able to make the model.

Athena Vortex Lattice (AVL) program is used for the analysis of flight dynamics and control.