Low visibility weather conditions often frustrate the operation of helicopters, by making approach and landing hard to impossible, especially in remote, unknown areas. The realm of drones and sensor technology has seen great leaps in technological development in recent years. With current drone and sensor technology it is feasible to design a drone that can be deployed from a helicopter as a forward landing site observer. Such a drone would be able to perform a reconnaissance of unknown landing sites with significantly smaller and simpler sensors than otherwise needed on the helicopter itself. Sensors, such as radars used in cars and IR cameras, can be used. This scan results in a 3D map providing guidance cues, making a safe approach and landing operation possible even with limited visibility for the ‘mother’ helicopter. As such, the drone is able to mitigate the dangers associated with such an approach, in both a cheap and expendable manner.

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**Mission Objective**

The objective of this project is to design a drone that is capable of safely assisting a helicopter emergency medical service pilot in navigation during approach, landing, and take-off in low visibility conditions. This objective was fulfilled.

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**System Design**

With its powerful 15.5 inch propellers and motors, the drone has a thrust to weight ratio of 3. Through its robust stabilizing flight controller, it can recover from a 6 rad/s spin in 1 second. This allows the drone to start scanning its environment instantly after dropping out of the helicopter’s down-wash. Its cruise speed of 11 m/s and range of 9 km allows it to scan a 200 m radius 100 m high cylinder in less than 10 minutes. The sensors, such as mm-wave radar and IR camera, unobstructed by the moving landing gear, see right through fog and other adverse weather conditions up to 350m. This drone does not emit CO2 during use and at 4 kg can be carried easily by a single person.

The drone pod is mounted front left on the helicopter, its status indicator light in view of the copilot. The drone is spring released for additional downward velocity, with the pod doors guiding the drone safely away from the helicopters skids and bottom.

The data collected by the sensors will be sent to the helicopter and displayed in the cockpit as an interactive 3D environment.

This system makes it possible for the HEMS helicopter to land in poor visibility, while being cost effective and with reduced risk.