The drone carries the bug-zapping screen, which is suspended by cables at each corner. The location of this screen determines the efficacy of the mosquito drone, measured in mosquitoes eliminated per second of flight time.

For manufacturing ease, the electrified screen is a square measuring on each side. The mosquito species we are initially targeting fly at low altitude, so the screen is suspended a distance beneath the drone flying at height .

Suspending this screen beneath the drone improves efficiency because a hanging screen requires less weight than a rigid frame to hold the screen above the drone. This screen can be suspended at any desired angle in comparison to horizontal, as shown in Fig.~\ref{fig:DroneConfigs}.

A key question is what distance the screen should be suspended from the drone, and the optimal angle . The goal is to clear the greatest volume of mosquitoes per second, a volume defined by the drone forward velocity and the cross sectional area cleared by the screen, as shown in Fig.~\ref{fig:AngleVsSpeed}.

To hover, the drone must push sufficient air down with velocity to apply a force that cancels the pull of gravity. The drone has mass and has a square-shaped cross section of size . The mass flow of air through the drone's props is equal to the product of the change in velocity of the air, the density of the air and the cross sectional area.

Then the required propwash, the velocity of air beneath the drone, for hovering is

The drone testing site in Houston, Texas is 15 m above sea level. At sea level the density of air is 1.225 kg/m3

The 3DR Solo drone weighs 2 kg with a diameter of 0.71 m \cite{Sollenberger2015}. The acceleration due to gravity is 9.871 m/s2. Substituting these values into \eqref{eq:dronePropwash} gives = 5.6 m/s.

Due to propwash, a mosquito in level flight will fall relative to the drone at a rate of . As shown in Fig.~\ref{fig:DroneConfigs}, we can extend lines with slope from the screen's trailing edge to and from the leading edge to

The optimal angle is therefore a function of forward and propwash velocity:

To ensure the maximum number of mosquitoes are collected, the screen must be sufficiently far below the drone and the bottom of the screen must not touch the ground, .

Changing the flying height of the drone will target different mosquito populations because mosquitoes are not distributed uniformly vertically. Gillies and Wilkes have demonstrated that different species of mosquitoes prefer to fly at different heights \cite{gillies1976vertical}.