

**The problem:** Mosquitos are spreading disease amongst the human population! We need to figure out how to minimise or prevent the negative impacts to people that these mosquitos are causing.

**Our solution:** If we eliminate all of the mosquitoes, then the disease will no longer spread amongst humans as mosquitos are the primary transmission vector for this disease (a transmission vector is something that carries and transmits an infectious disease).

**Our method:** To carry out our plan, we will reprogram a series of humanoid robots to detect, track and destroy any mosquitos that they encounter. The robot will need to detect where the mosquito is, move its arm that the laser is attached to such that the laser beam will hit the mosquito, and then fire. It will need to repeat this process for each mosquito that it detects.

The difficult part of this plan is figuring out how to aim the laser. We will need to write some code that uses the position that the laser is aimed at (point A) and the position of the detected mosquito (point B) to move the robot's arm such that its aim moves from point A to point B. We will perform this movement by setting the speed of the motors in the robot's arm

In the Create step, you will use a series of sensors to detect the position of a mosquito, use this position to calculate the angle that the robot will need to aim at, detect the current angle of the robot's arm, move the arm by setting the speed of its motors until the current angle is the same as the target angle, stop moving the arm, and then fire.

To keep things simple, we will tackle this problem by breaking it down into a series of sub-systems:

- Sub-system 1: *The robot needs to aim and shoot at targets that appear across a horizontal line by changing the yaw angle of the robot.*
- Sub-system 2: *The robot needs to aim and shoot at targets that appear both horizontally and vertically by changing the pitch and yaw of the robot.*
- Sub-system 3: *Avoid large amounts of force on the robot's joints by smoothing the movement between the initial and target angles by using controller algorithms.*
- Final solution: *The robot puts all the previous subsystems together to shoot down targets at all positions without breaking from experiencing too much force.*