To accurately identify areas of change in coral colony, Axol first positions itself within a target boundary by using a standardised boundary in the GUI for the driver to follow. Once the coral colony is within the image boundaries, Axol runs its autonomous background subtraction to extract only the coral structure based on a target pixel’s attributes for further processing. Axol will now further isolate the coral structure through feature matching with the past reference coral image. With similar features found, Axol runs a homography mapping to generate a transformation matrix that maps the points in the current coral image to the reference coral image and runs the corresponding perspective transformation to align the pictures. Finally, Axol can compare the two aligned coral images using bitwise comparison for death and growth changes, and by analysing the mean colors of a region of change for bleaching and recovery changes.

Axolo first identifies the black base of the coral. By aligning the coral according to the midpoint of base, this allows Axolo to obtain a region of interest of the current coral to prepare for comparison. Next, Axolo produces pink and white masks of the coral structure by using predetermined ranges in the HSV color space. Next, Axolo iterates over each pixel in the pink mask of the current coral and calculate whether it is closer to a pink or white pixel of the past coral structure. The same is done to the white mask of the current coral. For example, if a pink pixel in the current coral mask is closer to a white pixel in the past coral, it will be classified as recovery. Though, if the pixel in current coral mask is too far away from either past masks, it will be classified as growth.

Axolo first identifies the black base of the coral. By aligning the coral according to the midpoint of base, this allows Axolo to obtain a region of interest of the current coral to prepare for comparison. Next, Axolo produces pink and white masks of the coral structure using predetermined ranges in the HSV color space. Axolo can now determine areas of change between past reference and current coral by using pixel distance measurements implemented with the numpy library for fast array computations. Axolo is careful in finalizing such areas of change based on its contour area to filter out insignificant changes, which is inevitable due to noise. With all the significant areas of change now identified, Axolo draws the corresponding rectangles on the frames.