國立中山大學 工學院 聯合專題競賽與展示
COLLEGE OF ENGINEERING, NSYSU

資訊工程學系
Department of Computer Science and Engineering

肆、Module details

Camera Calibration :to fix the perspective difference of two camera , which will cause Laser Positioning and Animal Detection coordinates mismatch

Original Image
Up: IR camera
Down: RGB camera

Result : after Calibration of RGB camera combined image

Animal Detection

Detection: Marking the difference of normal farm image with current image

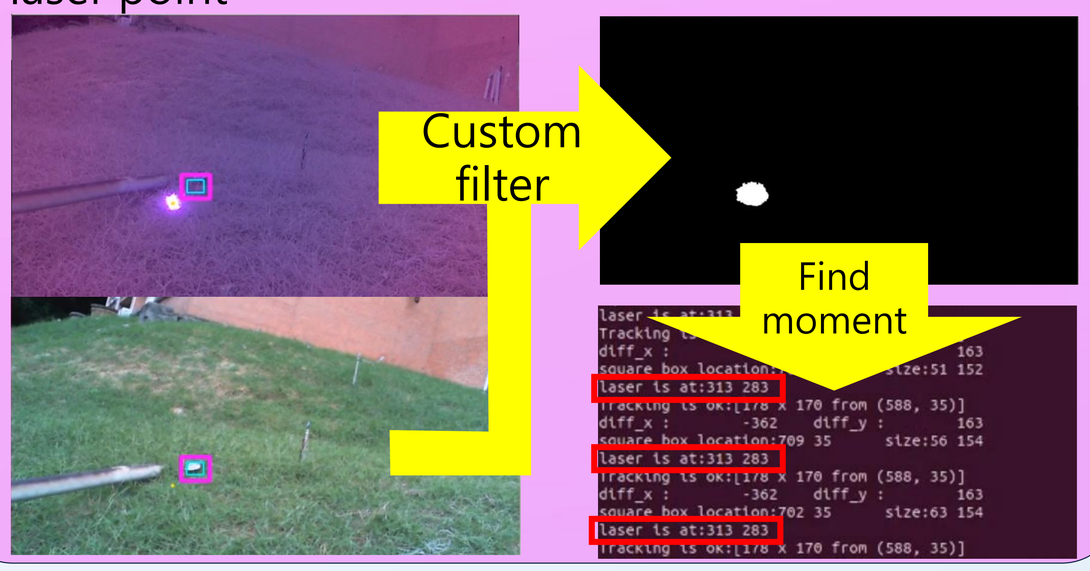
A brick being detected

A people being detected

Tracking: using custom algorithm to judge the marking target is noise or animal movement, if it is animal break into farm , activate KCF tracker for tracking the animal

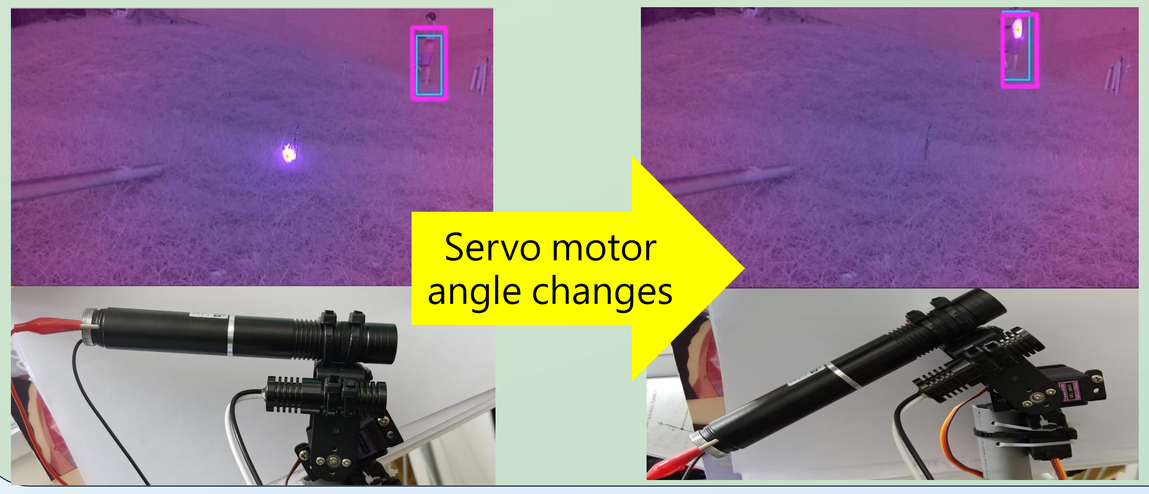
Laser Positioning:

Using luminance and customized intensity filter to produce binary image ,after that find the moment as laser point



Motor Control:

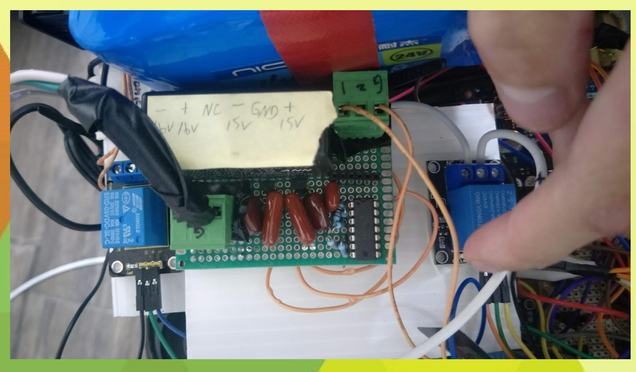
The Embedded computing device (Jetson nano) calculate the difference between laser and tracking target coordinates and assign the angle of servo motor to Arduino which translate angle into PWM signal to drive servo motor



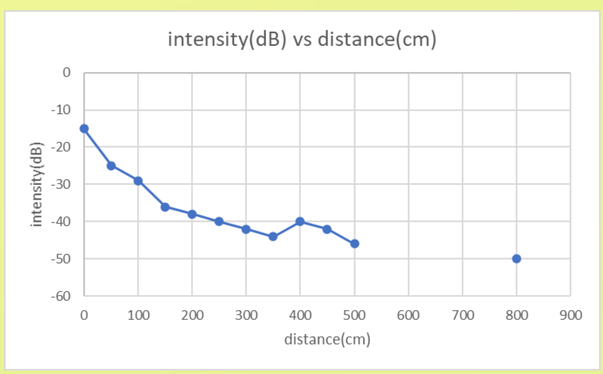
Drive animal method:

Monkey's hearing can up to 45kHz[1] , An Ultrasonic Sonic with high amplitude might drive them away

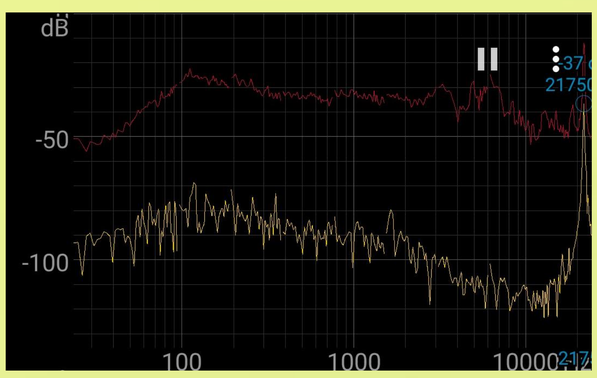
Ultrasonic Generator Circuit



Intensity vs distance plot



Cellphone's microphone spectrum



Monkey moves away

[1] William C. Stebbins, Richard D. Pearson ,et al. "Hearing in the Monkey (Macaca) : Absolute and Differential Sensitivity"