Automotive Sensor for Object Recognition using RedPitaya and Raspberry Pi

Autonomous Intelligent System

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User Manual Guide for Real Time Classification between Wall, Human and Car

This is a complete guideline for how to use the *Red Pitaya* and *Raspberry* Pi for real time classification. All the python scripts and required libraries were installed in *Raspberry Pi* to execute scripts for *Red Pitaya* to show output on the basis real time data receiving from Ultra-Sonic sensor. The device operates on *Plug and Play* feature. Take the following step to execute classification:

Step 1 : Turn on *Red Pitaya* by connecting it with a power supply of *5V*.

Step 2 : Similarly, turn on *Raspberry Pi* by connecting it with a power source of *5V*.

Step 3 : As soon as *Raspberry Pi* boots up first execute service daemon description file controlled by *"systemd"* configuration which first checks for network initialization and then execute *"Shell Script".*

Step 4 : After network initialization (connected to *Red Pitaya Wi-Fi*) the system executes *Shell Script* containing script for establishing a Secure Shell *(SSH)* connection with *Red Pitaya* as well as enabling *Red Pitaya* to start data acquisition for real time classification based on extracted features. [Note: *Shell Script* enabled to be executed at boot using *"systemd"* configuration].

Step 5 : Now real time classification will be started. The classification will be done based on three features (*energy*, *sum* and *standard deviation*).

Step 6 : Move the *Red Pitaya* in front of object any specified object for which model is trained (wall,human,car). Then place *Red Pitaya* still on some table or surface to get proper data from acquisition.

Step 7 : Following response could be noticed for each object on *Red Pitaya*:

- For Wall Led "0" glows on
- For Human Led "1" glows on
- For Car Led "2" glows on

Note : The classification can be done using two Classifiers *SVM* or *Naive Bayes Classifier*, but one classifier can be activated at a time and that could be done in *"Classification.py"* file present in the *Raspberry Pi (home/pi/Desktop/PythonFiles/Classification.py)*