ADAS (高级驾驶辅助系统)

The Growth and Increasing Sophistication of ADAS in the World

Introduction

前言

随着我们车辆电子产品的不断发展，**ADAS(高级驾驶辅助系统)**扮演着越来越重要角色，这些系统使驾驶的许多方面变得更容易，而且最重要的是更安全。预防事故的系统显然具有挽救生命和防止伤害的能力。其中一个例子是倒车影像，它提供了一个视频图像供驾驶员在倒车时观看。甚至一些国家的法律规定，倒车影像成为乘用车标配。

As electronics in our vehicles continue to become more sophisticated, ADAS (Advanced Driver Assistance Systems) are taking center stage. These systems make many aspects of driving easier, and—most importantly—*safer*. Systems that prevent accidents clearly have the capability to save lives, and prevent injuries. One example for this is the rearview camera, which provides a video image for the driver to see while backing up. Laws in several countries require that passenger vehicles must have back-up cameras.

Examples of ADAS include:

ADAS例子包括：

- **Lane Departure Warning System**
- **车道偏离预警系统**
- **Surround View Park Assist**
- **全景影像泊车辅助系统**
- Adaptive Cruise Control
- 自适应巡航控制系统
- Blindspot Detection/Monitoring
- 盲点监测
- Night Vision
- 夜视系统
- Driver Monitoring
- 疲劳驾驶监测系统

The two types of systems featured in this article are *Lane Departure Warning System* and *Surround View Park Assist.*

此篇文章着重探讨车道偏离预警系统与全景影像泊车辅助系统

Lane Departure Warning System (LDWS)

车道偏离预警系统（**LDWS**）

The lane departure warning system (LDWS) refers to a specific function by the ADAS system that enables the vehicle to sense and make calculations to determine if the vehicle is moving in the lane properly. The calculation is on-going and sound or vibration warnings may be issued to driver, if it determines that the vehicle is departing from the intended lane. In some situations, it may provide corrections to the steering wheel.

车道偏离预警系统（LDWS）是ADAS系统的特定功能之一，它能够使车辆感知并进行计算，以确定车辆是否正确地在车道中行驶。
计算是持续的，如果确定车辆离开预定的车道，可能会向驾驶员发出声音或振动警告。
在某些情况下，还可能会对方向盘进行修正。

图像获取	检测车道标记，并进行计算以确定车道保持	通过振动，视觉或音频提醒驾驶员

The following figure demonstrates a typical system architecture that enables the lane departure warning function with audio and video feedback.

下图是典型的车道偏离预警系统框图，可以实现具有音频和视频反馈的车道偏离预警功能。
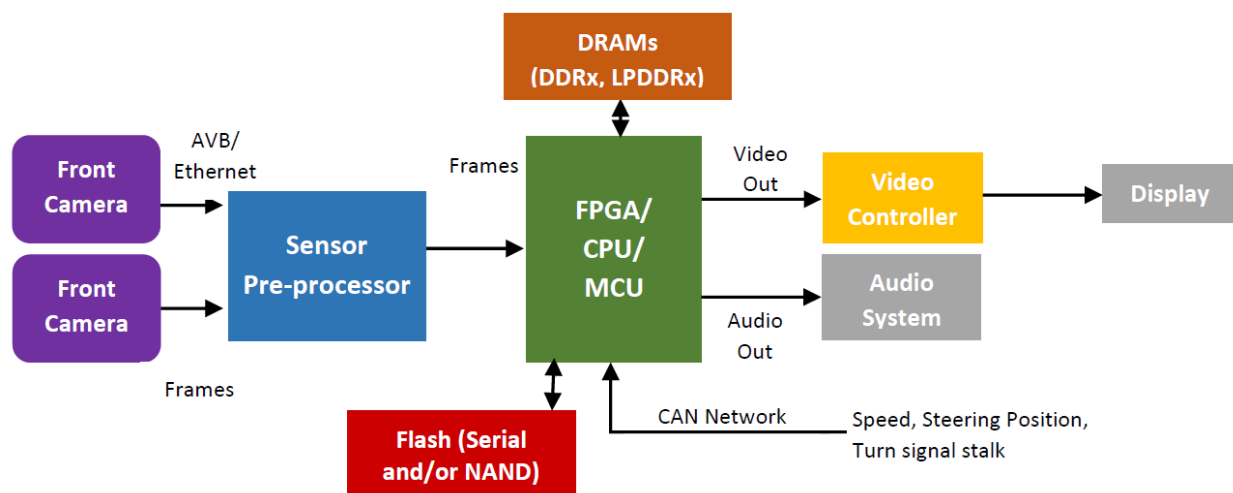
The front cameras capture real-time video frames, which is fed to the Pre-processor unit first to convert the frame to more readily useable data. The key visual objects, such as lane markers are what the processing is designed to accentuate. This information then is available to the main processor, along with additional input data such as speed, steering position, and turn signal stalk, fed via CAN network. The main processor fuses all the data, and determines the vehicle position, and possible lane departure, and whether to take an action. The video frames are buffered in the external DDR2/3, LPDDR2/3 memories. The video may consist of lighting or graphical indications, while audio may provide beeps, chimes, or other attention getters. In some LDWS, vibrations or corrections may be transmitted to the steering wheel.

前置摄像头用来捕获实时图像，该图像首先被传送到预处理器单元，以将帧转换为更易于读取的数据。 关键影像部分，如车道标识线需要着重处理。
然后，该信息传送到主处理器进行处理，同时主处理器还会处理通过CAN总线传输的附加输入数据，例如速度，转向位置和转向灯信号等。
最后主处理器会融合所有数据，并确定车辆位置，可能的车道偏离以及是否采取行动。
图像缓存在外部DDR2 / 3或者LPDDR2 / 3存储器中。
图像可以由警示灯或图形指示组成，而音频则可以提供蜂鸣声，铃声或其他醒目标识。
在一些车道偏离预警系统中，振动或校正可能传递到方向盘。

Surround View Park Assist

全景泊车辅助系统

Surround View Park Assist is a system that provides a clear and complete exterior view of the vehicle to the driver so he or she is aware of the surroundings while parking. With several cameras positioned around the vehicle, the images can be captured. The images are buffered in the DRAM until sent to the

display. A more sophisticated feature of some surround view systems is to combine the different views together in a comprehensive image (ie. Top view). In this manner, the driver can see everything in one screen. In order to accomplish this, the microprocessor must combine each image and apply mathematical mapping and alignment of images to create a realistic picture for the driver. The level of data manipulation and accesses tends to require a higher end MPU and high bandwidth DRAM than might otherwise be needed for single images. Data taken from the gear box, steering wheel, or speedometer is transmitted via CAN to the MPU which may select the appropriate image for the display, or be needed for calculations or the system algorithm. Sonar inputs on the bumpers are sometimes included in the system, adding to array of information provided to the driver.

全景泊车辅助系统是一种向司机提供清晰完整的车辆周围图像的系统，因此他或她在停车时能够清楚知道周围环境，以此来辅助停车。通过车辆上安装的一些摄像头来拍摄图像，图像被缓存在DRAM中，经过处理后发送到中控显示屏上。全景泊车辅助系统复杂之处在于需要将不同的图像拼接在一起，形成一个全景的图像（即鸟瞰图），通过这种方式，驾驶员可以在一个屏幕上清楚看到车辆周边所有内容。为了实现这一功能，微处理器必须拼接每个图像并应用映射和图像对齐，以便为驾驶员创建真实的图像。因此该系统对数据存取访问的级别往往需要比单个图像需要的更高端的MPU和更高带宽DRAM。从变速箱，方向盘或码表取得的数据通过CAN总线传输到MPU，MPU通过算法来选取合适图像显示在中控屏幕上，此外位于保险杠上的声纳系统有时也包含该系统中，以便给驾驶员提供更多信息。

The following figure demonstrates a typical system architecture that enables the surround view park assist with audio and video feedback.

下图是典型的全景泊车辅助系统框图，可以实现具有音频和视频反馈的辅助泊车功能。