



Case Study: Safe Drive Detection system

Introduction

The safety of passengers is solely on the drivers' alertness and driving capability. The long hours of driving causes the drivers to lose alertness or dose off especially at night time. The Safe Drive Detecting System is designed to address this problem. The Proposed system is a vehicle drive detection system designed using embedded Processor- Cortex-A7 ARM Processor / ODROID Platform and 3GPP technology. The Inputs are acquired by the Camera attached to the dashboard, processed by Cortex-A7-ARM Processor or ODROID Platform and output transmitted to mobile or receiver installed in the vehicle.

Requirement

The System must be able to monitor the face and eye movement of the driver and send out alarm message in case of any distraction of attention or loss of alertness.

Possible test cases:

- Closed /half closed Eyes, drooping eyelids
- Nodding or Drooping or Bobbing head
- Usage of Mobile phone- calls and messaging
- Sudden brake, acceleration, sudden turns
- Distractions like looking left, right, up or down
- GPS Tracking of the vehicle location and route

Proposed Solution

Using the Exynos Octa 5, ODROID XU platform, the world's first big. LITTLE architecture based bare-board computer. The Exynos Octa 5 architecture houses 8 cores; Cortex – A15 1.6GHz quad core targets intense task processing and Cortex-A7 quad core processes lighter workloads.

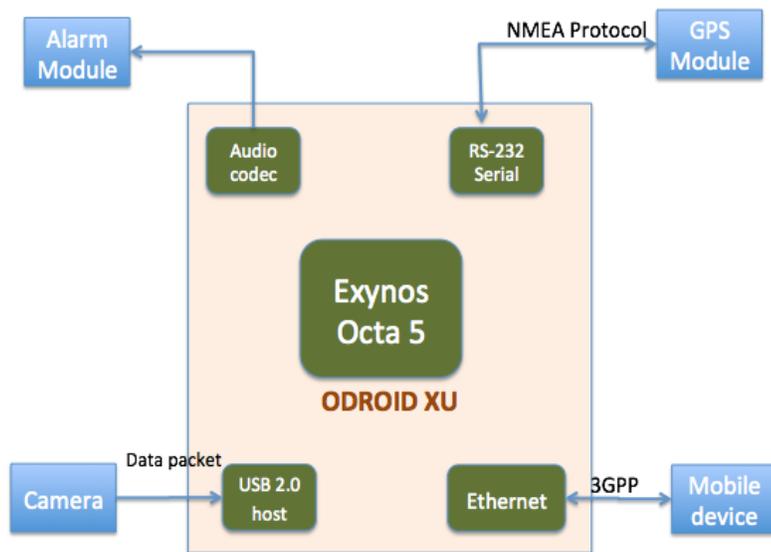
ODROID XU platform features fast data transfer with 70% better CPU performance and 20% more energy efficiency. The platform supports many flavors of LINUX and the Android 4.2 software, giving flexibility in using compatible application.

The embedded systems functionality includes the following:

- Real –time Video Codec input from Dashboard Camera.
- Video Stabilizer device to be connected to Dashboard camera.
- Mobile signal detector senses the incoming/ outgoing calls or messages in drivers' mobile phone, and sends out alarm indication to the driver.

- ODROID Platform captures the input video codec signals as well as signals from mobile detector system in real-time, and generates voice message output, that continues to run until the driver acknowledges it.
- The External GPS module connected to the Platform, captures location coordinates in real-time and transmits through satellite communication to monitor vehicle route on Google Maps.
- The driving statistics captured by the system, analyzed and transmitted to Cloud Computing.
- 3GPP being high speed network and being compatible to GSM, EDGE, UMTS, CDMA, GPRS; is used to connect the proposed system to the driver mobile as well as communicate with the remote control stations.

Board Level Design



Recent study shows that more than 50% of embedded systems development projects are months behind schedule and only 44% of designs are within 20 percent of feature and performance expectations.

Challenges

The system components have their respective limitations in terms of communication over internet, low power and data storage. Thus, it becomes pretty challenging to control or monitor such components under standard internet networks.

The data transmitted through internet networks for remote monitoring is prone to manipulation, making data security a serious concern in Embedded system.

Conclusion

Driver alertness preemption and monitoring can be the single most important improvement in driver aided technologies. The Proposed System not only adds safety to the drivers and passengers but also enables quicker rescue operations in case of any accidents of the vehicles. It also helps drivers to correct their driving behavior saving them from wrongful blame. The International standard followed in the System design, facilitates it to be used in any part of the world.

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