

Senior Design Project Lane Departure Warning System II

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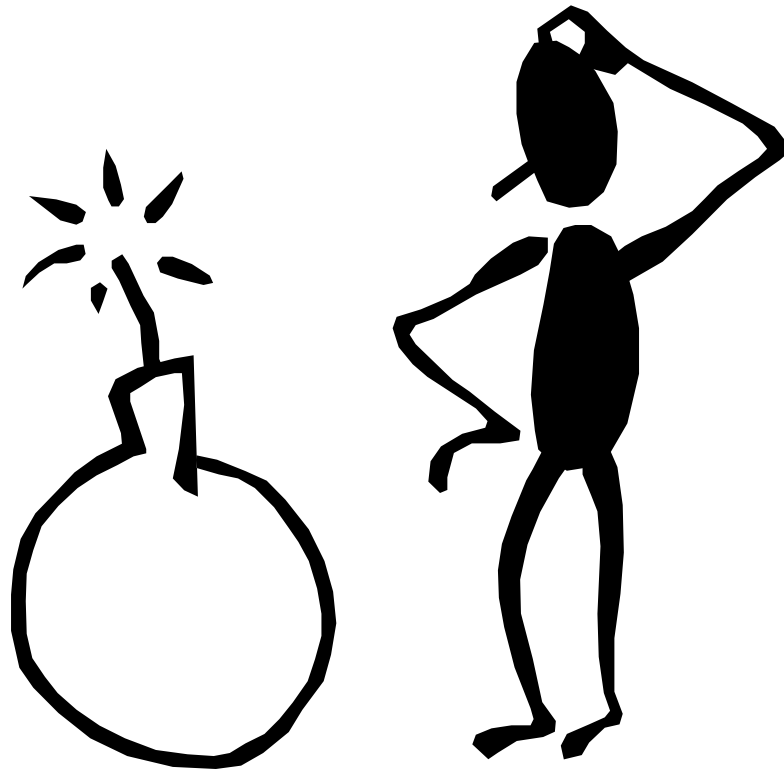
Background

- ▶ 1996-2000: **59%** [approx. 3,000] of all large single-unit truck fatalities occurred on non-divided 2-lane roadway
 - ▶ 2003: LDWS was first developed by Iteris for trucks
 - ▶ 2004: **1.2 million** automobile accidents due to unintended lane departure
 - ▶ 2004: Iteris Technology was chosen by Nissan to design the first passenger car LDWS
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Problem Statement

- ▶ Unintended lane departure caused by drowsy or distracted drivers



Design Requirements

- ▶ Must notify of lane departure within 0.05 seconds
- ▶ Comply with SAE and NHTSA safety standards
- ▶ Design must be **GREEN**
- ▶ Cost less than \$500
- ▶ Power consumption must be negligible when compared to the automobile

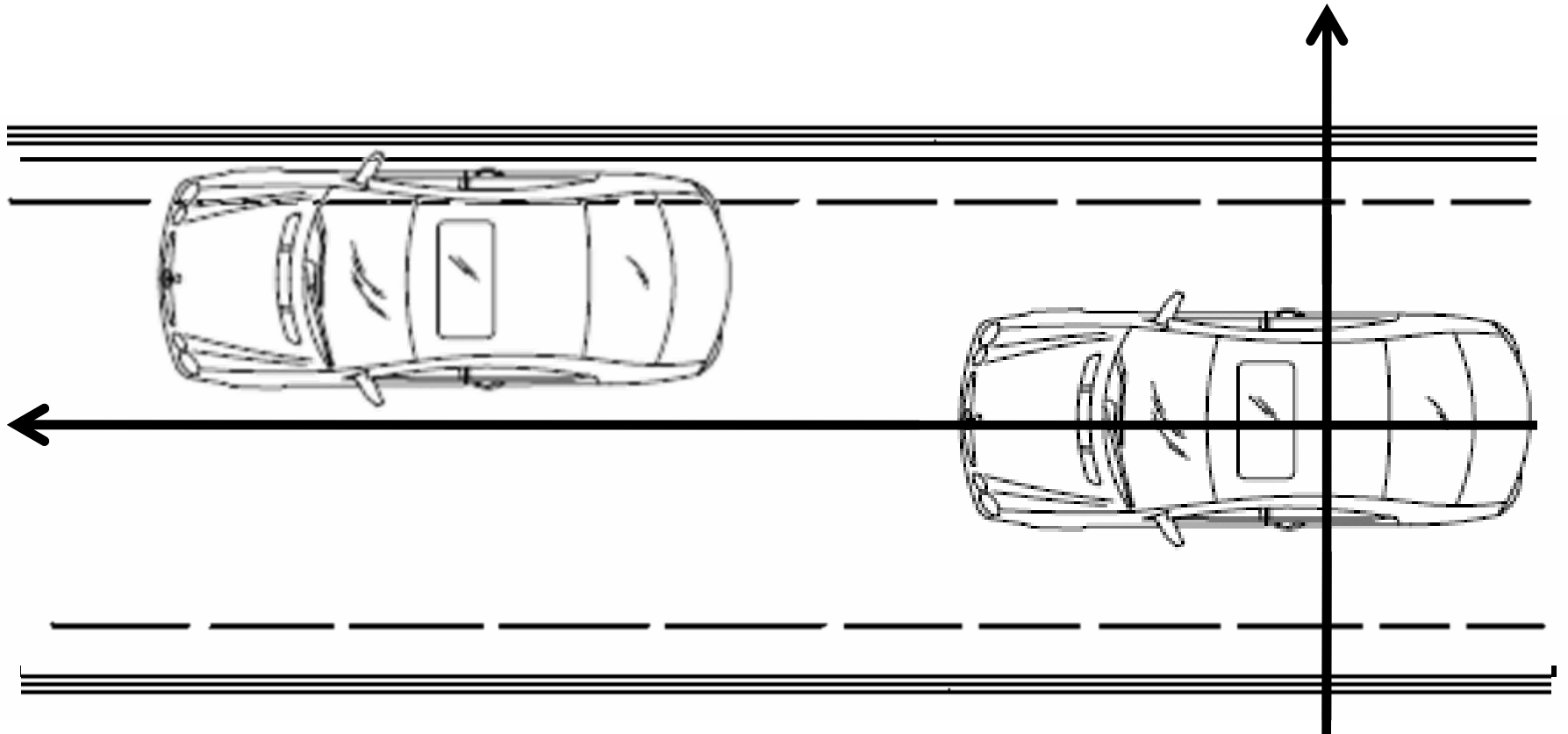


Solution Approach

- ▶ Independent of Lane Markings: **Virtual Lanes**
- ▶ Forward Looking
- ▶ To be used as a Verification for Existing Systems



Solution Approach contd.



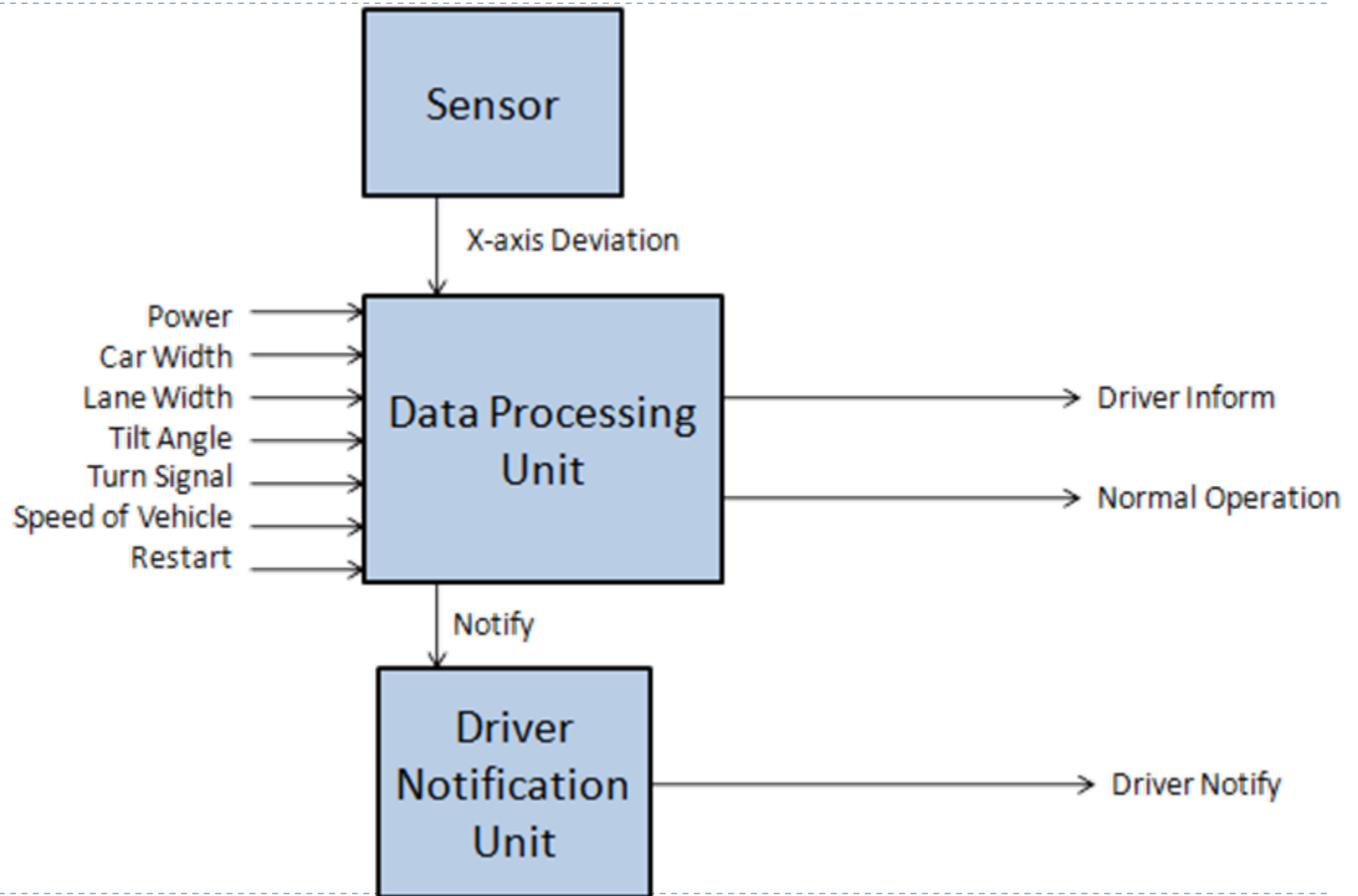
Driver is notified of unintended lane departure



Top Design Selection



Top Design Selection contd.



Top Design Selection contd.

- ▶ Sensor: **Accelerometer**
- ▶ Data Processing Unit: **PIC 32 microcontroller**
- ▶ Driver Notification Unit: **Buzzer and LED**

- ▶ PIC – Accelerometer Communication: **Serial Peripheral Interface (SPI)**
- ▶ Programming Language: **C**
- ▶ Software: **MPLAB, Microsoft Visual Studio**



Implementation Plan

▶ **PIC Chip Programming: Wednesday, 25th of March**

- ▶ Create module to process the accelerometer input
- ▶ Create module for scenario 1: straight road
- ▶ Create module for scenario 2: curved road
- ▶ Create module for driver notification
- ▶ Create test plan for the various modules
- ▶ Load modules on PIC Chip

▶ **Hardware Assembly: Friday, 27th of March**

- ▶ Connect accelerometer, buzzer and LED to PIC board
- ▶ Mount PIC board on remote control car

▶ **Demonstration: Friday, 3rd of April**

- ▶ Test 1: Recreate a version of a straight road using paper tape, and test the assembled product
 - ▶ Test 2: Recreate a version of a curved road and test the assembled product
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Implementation Plan contd.

Other Completed Tasks

- ▶ Received all our components
- ▶ Completed Demonstration Plan for ECE Day



Evaluation Plan

- ▶ **Effective Detection of Virtual Lanes**
 - ▶ Extensive testing of C code
 - ▶ Extensive testing of SPI (Accelerometer – PIC communication)
 - ▶ Demonstration of entire system

- ▶ **Effective Notification of Driver**
 - ▶ Extensive testing of forward-looking algorithm
 - ▶ Extensive testing of PIC code
 - ▶ Extensive testing of Buzzer – PIC and LED – PIC communication
 - ▶ Demonstration of LDWS system



Risk Management

Risks

- ▶ Unable to complete project by ECE
- ▶ Complexity in programming

Control

- ▶ Project is developed incrementally
- ▶ C will be used instead of assembly language



Questions?

