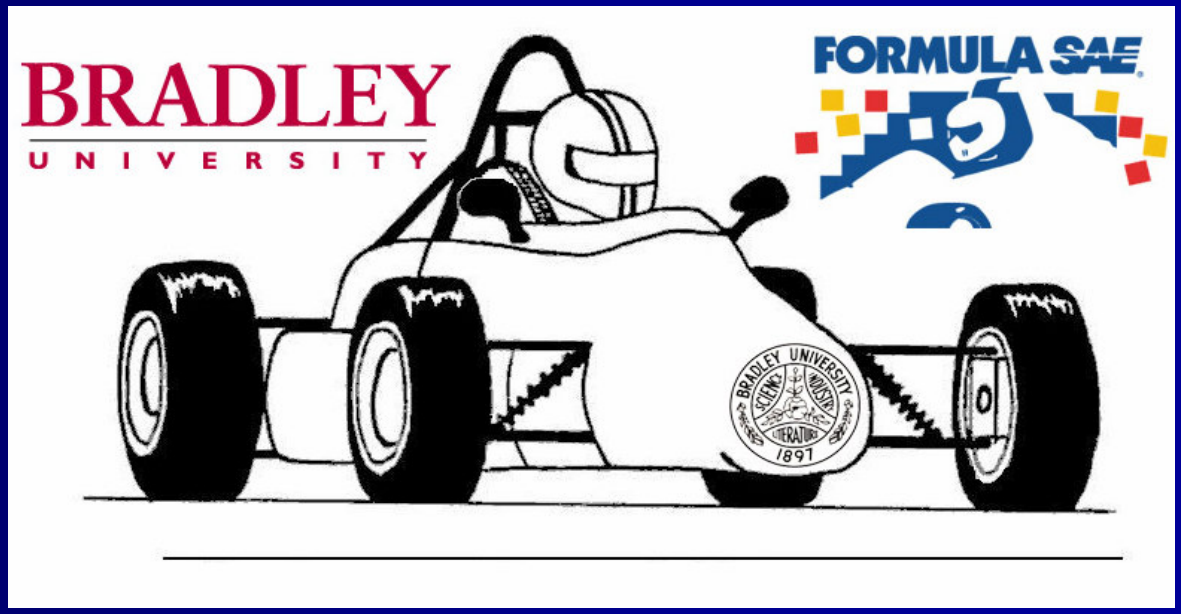
Wireless Data Acquisition for SAE Car



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Presentation Outline

- Project Overview
  - Schedule
- Hardware Description
  - Wireless Transceivers
- Software Description
- Current Progress

SAE Formula Car

- Ongoing Senior Design Project at Bradley University
- Needs a system that can track the car's behavior.

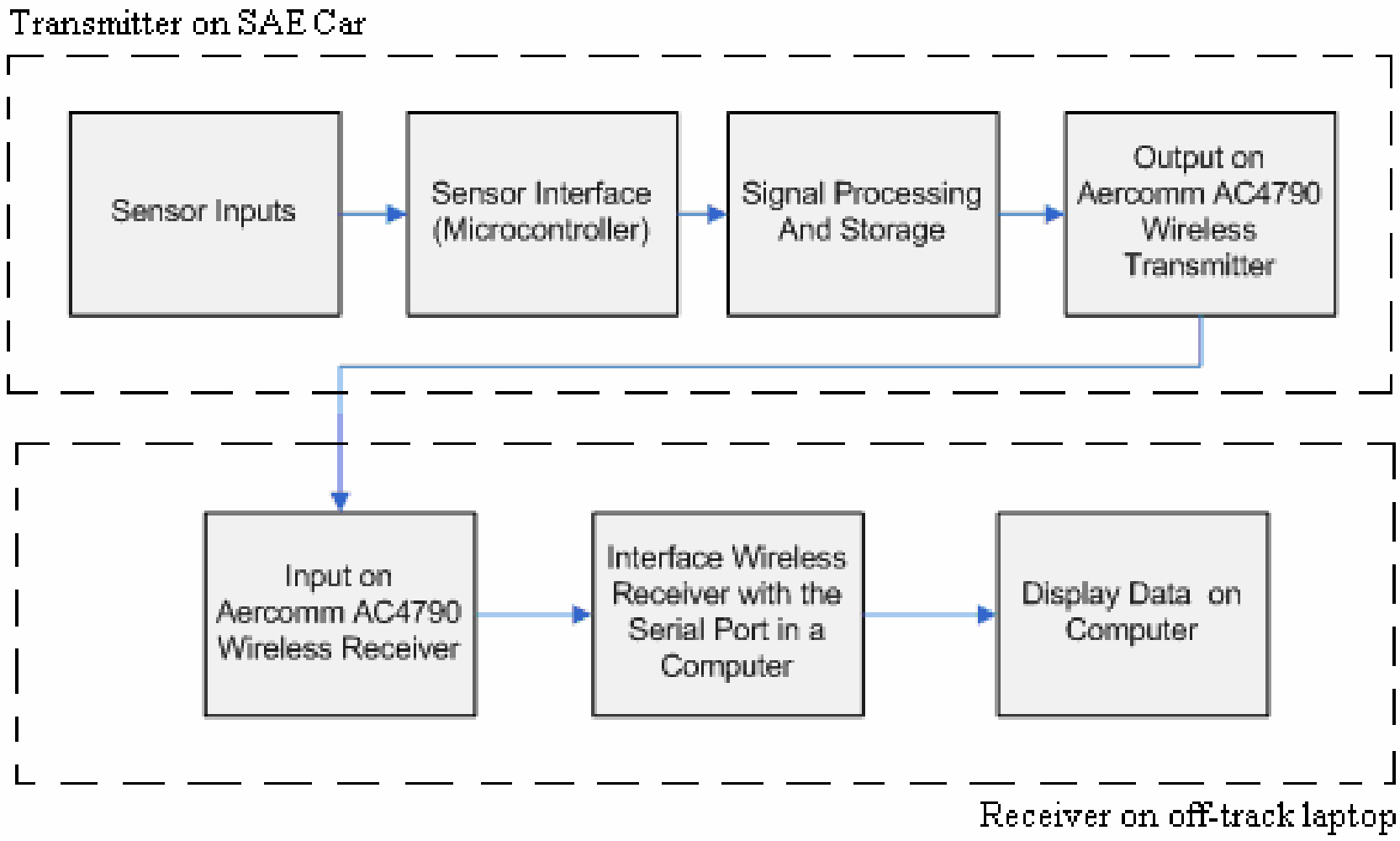
Wireless Data System

- Use the EMAC 80515 to interface with the sensors on the car.
- Transmit the data wirelessly to a laptop computer and store it for further analyzing.
- We will use the Aerocomm AC4790-20 Wireless Transceivers.
- Update the laptop frequently to track car behavior.

Data to Acquire

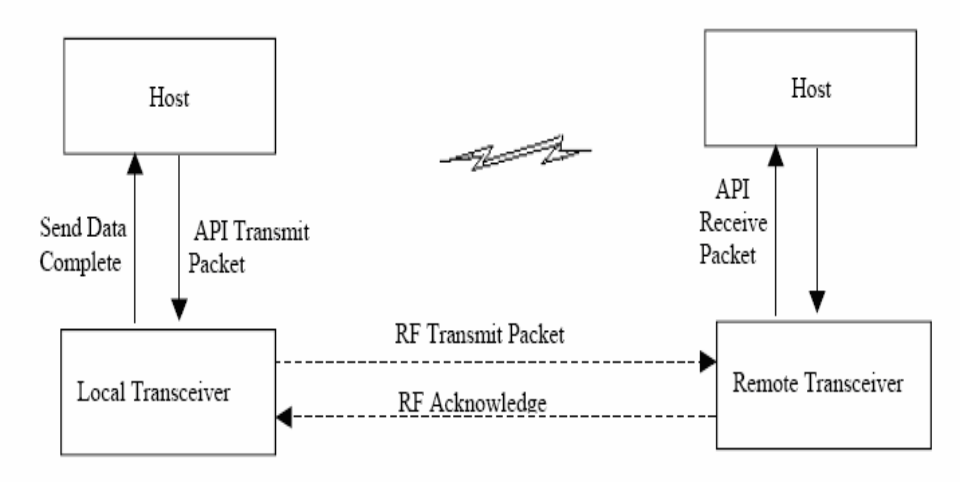
- Car Velocity
  - Acceleration Computation
- Engine Speed
- Engine Water Temperature
- Oil Pressure
- Lap Timer
- Suspension travel
  - Four Sensors

High Level Flow Chart



Aerocomm AC4790-20

- Uses RS232 Serial Port to Wirelessly Transmit Data
- Range of about 1 mile. (4 miles with external antenna)



Additional Hardware

- One on-board EMAC 80515 Microcontroller Development Board to take in sensor signals and transmit them through the RS232 Com Port 2.
- One additional EMAC 80515 Microcontroller Development Board to test the receiving end of the system before interfacing the transceiver directly with a laptop.

Equipment List

- (2) EMAC 80515 Microcontroller Development Boards
- (2) Aerocomm AC4790-20 Transceiver Chips
- Various Analog Components for Protection Circuitry
- Function Generator
- Digital Multi Meter
- Oscilloscope
- Laptop
- High Current Power Supply (to run wheel sensor motor)

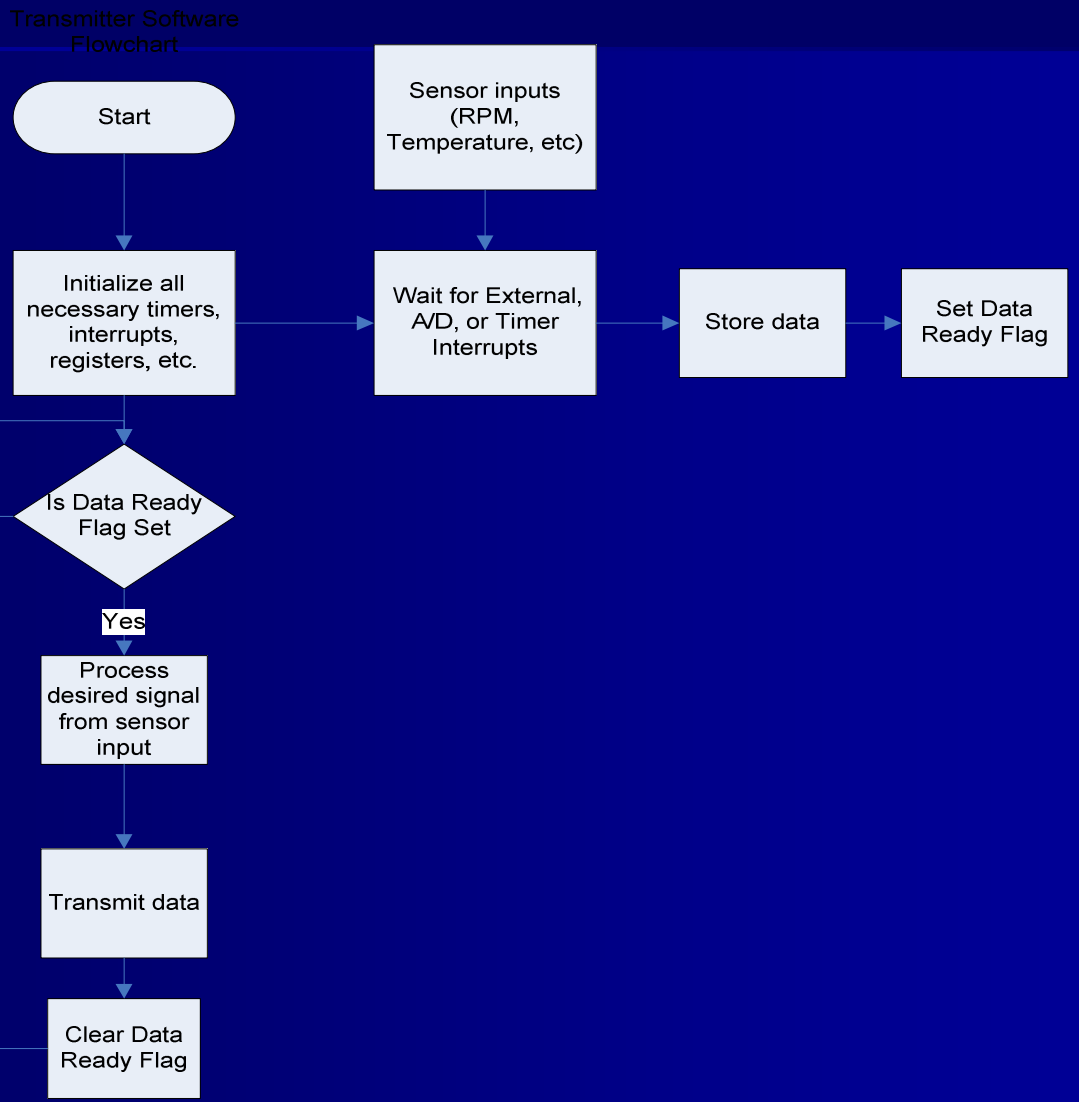
Software Requirements

- Utilize A/D Converter and interrupts to interpret the signals from the SAE car.
- Use Com Port 2 to interface the transceiver with the EMAC board.
- Update information as required by the Mechanical Engineers.
  - Different Priorities

Updating Priority

- Priority ONE
  - Car Velocity
  - Engine Speed
  - Suspension Travel
  - Lap Timer
- Priority TWO
  - Engine Water Temperature
  - Oil Pressure

Transmitting Flow Chart



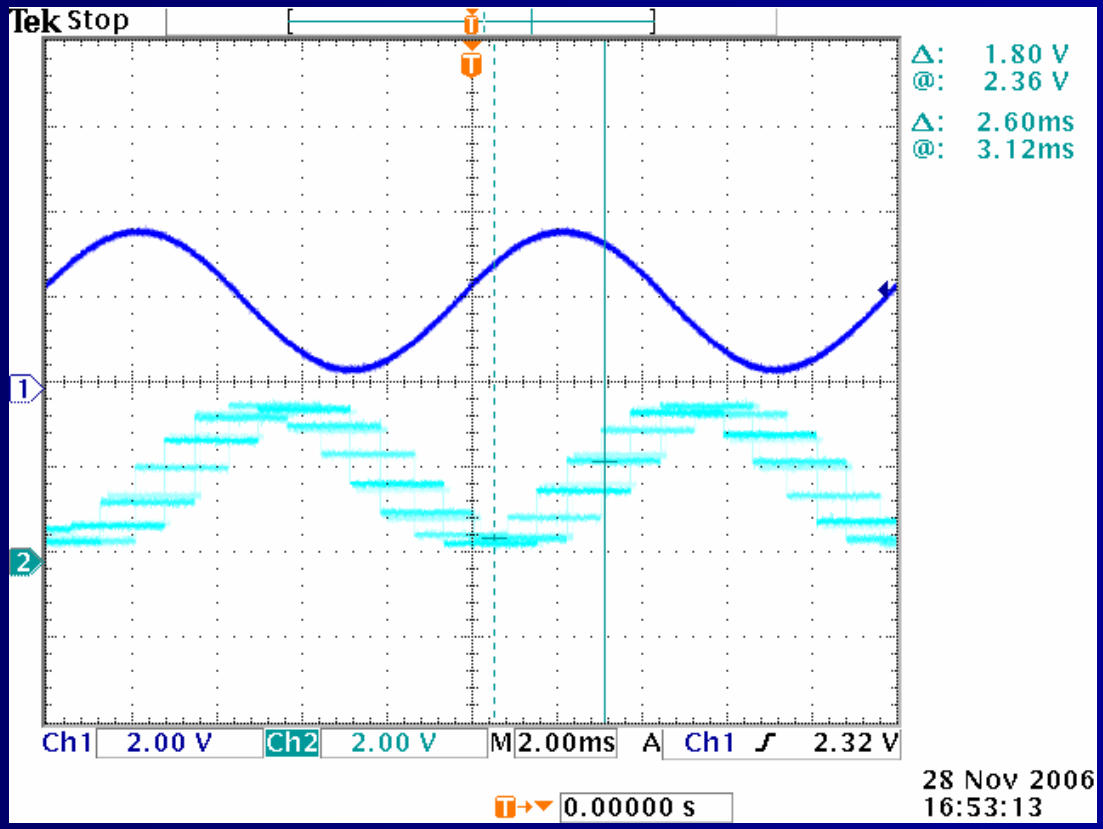
Receiving

- Initially use EMAC board to receive the data coming in on the transceiver.
- In the end, the transceiver will be directly connected to a laptop through the RS232 port.
  - This will require new code to be written (Possibly C Code)
  - Program will store data in some usable file (i.e. Spreadsheet, notepad file)
  - Program will display information on laptop screen and update as new information is received.

Current Progress

- Completed task of getting two EMAC boards to communicate with each other.
  - Sine wave sent in on A/D converter and transmitted out through COM2 Port.
  - Second EMAC Board receives converted signal and sends it back to the first EMAC board.
  - Once the signal is received, the transmission is sent out through the D/A Converter and compared with the input signal.

Input and Output



Project Schedule

Week	Task
1	Designing a Wireless Communication System to Transmit and Receive Data
2	Debugging the Wireless Communication System to Transmit and Receive Data
3	Design System to Process Signals From Sensors on Car
4	Design System to Process Signals From Sensors on Car
5	Debugging the System to Process Signals From Sensors on Car
6	Design Interrupt Routines For Acquiring Data From Sensors
7	Debugging Interrupt Routines For Acquiring Data From Sensors
8	Integrate Subsystems
9	Integrate Subsystems
10	Complete Code For Communicating Between RS232 and User Interface on a Stationary Computer
11	Complete Code For Communicating Between RS232 and User Interface on a Stationary Computer
12	Build Hardware To Be Installed In SAE Car
13	Build Hardware To Be Installed In SAE Car
14	Integrate System in SAE Car
15	Final Report
16	Final Presentation

Questions?