Senior Design Project

TEAM BAJA

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Introduction – Baja Car

- Annual competition with more than 100 colleges in Peoria, Illinois (June 2014)
- Dynamic events: hill climbs and maneuverability test
- Static events: design evaluations and presentations
- Goal: Top-10 Finish

Senior Design – Team Baja

- Our role in the Baja Project: Installing the electrical system for the Baja Car

- Improvement on the Baja Car's design score

- Improvement on the performance of a Baja Car for the race competition

- First successful version of electrical system by March 2014

- System test on a prototype car built last year

Engineering Features

- Engine speed - Have the capability to measure and calculate the engine speed, in RPM

- Wheel speed – Have the capability to measure and calculate the vehicle's wheel speed, in RPM and MPH

- GPS location – Contain a sensor in order to track and store the vehicle's GPS location during the race

- Lap time – Use a timer to track and record the time of each lap of the course, along with the total time elapsed

Engineering Features (cont.)

- Data storage – Utilize an SD Card to store the data
- Data transfer – Ensure that the data can be removed, either by physically removing the SD Card or by plugging in and downloading the data from the card
- Data display – Have a real time display fixed within the driver's view, displaying his current vehicle speed, engine rpm, and his previous lap time
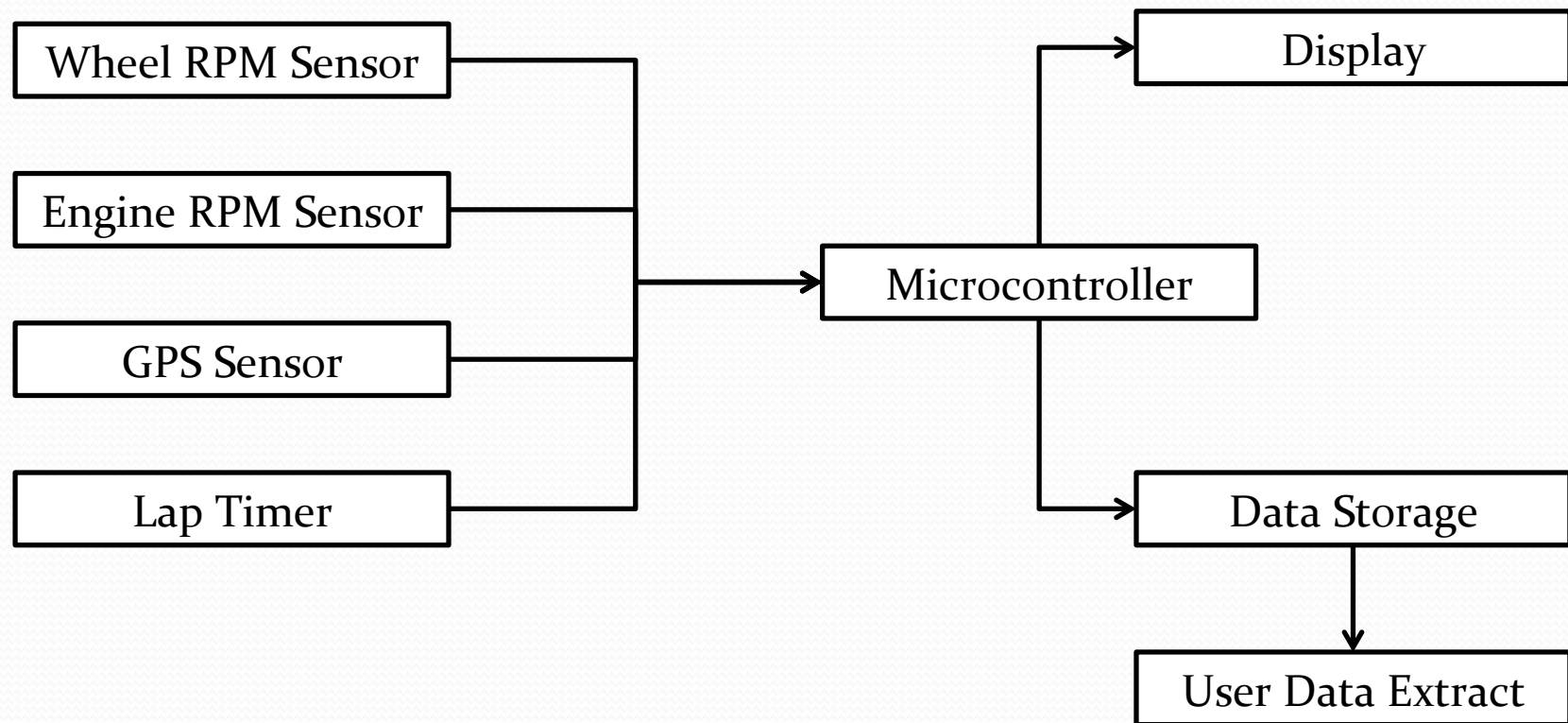
Available Technologies

- Power supply: Baja car's 12V battery
- Display monitor: LCD or seven segment display
- Central unit: a standard microcontroller taking the data from sensors and save it to an SD card
- Data transfer: USB port to transfer the data from the SD card to a computer for analysis
- Sensors (rpm): mechanical magnet-based sensors, hall-effect sensors, IR sensors, and reed switches
- GPS data: ?

Design Criteria

- Sensors must be able to integrate within the Baja design.
- Central unit must be able to be mounted near the driver.
- Design must be lightweight.
- Design must be weatherproof and mud-proof for use in competitions.
- Design must be as small as possible to maximize room for the driver and other features on the Baja vehicle.
- Design must meet the budget requirement.

System Overview


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Wheel RPM Sensor ─┐
                  │
Engine RPM Sensor ─┤──→ Microcontroller ──→ Display
                  │              │
GPS Sensor ───────┤              └──→ Data Storage
                  │                        │
Lap Timer ────────┘                        ↓
                                    User Data Extract
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Conclusion

- Electrical system for the data storage, analysis, and display

- Weatherproof and mud-proof packaging of the system to avoid malfunction during the competition

- Design of the electrical system with the sensors, central microcontroller, and data storage and display function under the budget requirement

Thank You

Questions?