# Embedded Systems Workshop -GPS Based Tracking System

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## Agenda

- Goals and Challenges
- Hardware Blocks
- Software Blocks
- Measurements
- Demonstration
- Future Enhancements

# **Goals and Challenges**

- Building portable GPS Tracking device
  - Outputs KML (Keyhole Markup Language) files
  - Flash based storage including standard FS
  - Power efficient [and battery powered]

#### Challenges

- Custom board, SD Interface electrical design
- Driving GPS controller
- Integrating SPI-MMC and UART-GPS
- Development and Debugging Environment (IAR, O'scope, JTAG)

### **Use Case - Application Flow**





### Software Blocks



### Measurements

#### • GPS Fix timing

- 1-2 minutes on initial boot
- Less than 30 seconds for re-fix after return from idle mode

#### • Power Consumption:

- Idle/Lowpower 4mA
  - GPS is off
  - MSP is in LPMo
- Recording 110mA
  - GPS is on
  - MSP is on

### Demonstration

#### • Sample NMEA invalid line (no GPS fix)

- \$GPRMC,,V,,,,,,N\*53
- Sample NMEA valid line (GPS fix)
  - \$GPRMC,083559.00,A,4717.11437,N,00833.91522,E,0.004,77.52,091202,,A\*57
- Parsed Sample
  - Status: GPS\_VALID
  - Lat: 4.72852401E+1
  - Long: 8.56525325
  - Time: 8:35:59
  - Date: 9.12.2002
- KML <coordinates> entry
  - 34.827308000000,32.003270000000,0
- Sample KML File: 03310947.KML

## Sample Track - 03310947.KML



### Sample Track - 04020757.KML



## Future Enhancements

- Remove power consuming voltage regulator
- Attach an accelerometer and provide even more power saving
- Connect board to network assisted GPS
- Attach Wi-Fi device and transmit GPS samples directly to nearby server