iPhone Tracking

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Outline

- Mid-quarter Recap
- Unexpected Surprises
- High-level View
- Application Features
- Website Interface
- Demonstration
Background

✓ **State of the art**
- iPhone core location: triangulation with available hardware

✓ **Motivation**
- parental control
- emergency situations (SOS)

✓ **Approach**
- Send location data to a remote PC or website
- Balance tradeoff between power and accuracy
Components

- SDK suite - Xcode and Simulator
- iPhone Development Center
- iPhone (original/EDGE)
- PC program and Web Site Interface
Mid-point Progress

- Jailbreak / Unlock iPhone (pwnage)
- Developer Program certification
- LocateMe Example Application
- BSD Socket Communication

- Time
- Location
- Altitude
- Last update
- Accuracy
Initial Results

Location information:
Location: 37.3317° North, 122.0307° West
(accuracy 100 meters)
Altitude unavailable
-----
Nov 12, 2006 4:18:07 PM
Location: 37.3317° North, 122.0307° West
(accuracy 100 meters)
Altitude unavailable
Location changed 0.00 meters in 66.5 seconds

File Edit View Terminal Tabs Help
giacomo@giacomo-desktop:~/Desktop/cse237b$
giacomo@giacomo-desktop:~/Desktop/cse237b$
giacomo@giacomo-desktop:~/Desktop/cse237b$
giacomo@giacomo-desktop:~/Desktop/cse237b$ ./track.out
ipo address is 132.239.95.96
My address is 132.239.95.96
I am listening...
I accepted a connection...
Nov 12, 2008 4:16:07 PM
Location: 37.3317° North, 122.0307° West
(accuracy 100 meters)
Altitude
unavailable
Location changed 0.90 meters in 66.5 seconds
7° West
(accuracy 100 meters)
Altitude
I am listening...
Unexpected Surprises...

Battery Information

- No API
- Hidden details

Frequency Updating

- Distance Filter provided
- Unclear if effective

GPS

- Serial port interface
- File permissions and IAPD daemon
GPS SparkFunIII Issues

[Images showing a smartphone screen with messages: "GPS Handshake result: No such file or directory!" and "GPS Handshake result: Permission denied"]
High-level View

track.cpp

track.html

Server

iPhone

Browser

```html
<!DOCTYPE html PUBLIC "-//W3C//DTD HTML 2.0//EN">
<html>
<head>
<title>
Hello World Demonstration Document
</title>
</head>
<body>
<h1>
Hello, World!
</h1>
</body>
</html>
```
iPhone Application Features

- BSD socket communication
- Update Improvement
- Battery Emulator
- Accuracy Control
- Distance Filter Control
BSD socket

- Successful communication between Desktop program and (both) iPhones

Update improvement

- CoreLocation framework flaws
- Eliminate old or repeated data
Battery Emulation

- Hidden information - proprietary software
- Battery emulation using timer
Location Accuracy

Six levels of Accuracy

- Best
- 10 meters
- 100 meters
- 1Km
- 3Km
Location Distance Filter

Distance Filter: 1 to 1000 meters

- **1m**
  - `distanceFilter`
  - The minimum distance (measured in meters) a device must move laterally before an update event is generated.
  - @property(assign, nonatomic) CLLocationDistance distanceFilter

- **10m**
  - Discussion
  - This distance is measured from the previously delivered location. Use the value kCLLocationDistanceNone to be notified of all movements.

- **100m**
  - The default value of this property is kCLLocationDistanceNone.

- **500m**
  - Availability
  - Available in iPhone OS 2.0 and later.

- **1Km**
  - Related Sample Code
  - LocateMe

- Declared In
  - CLLocationManager.h
The Web Interface: track.cpp

- Receive information updates from iPhone
- Store location data
- Update track.html
The Web Interface: track.html

- html and javascript
- Google API
- Coordinates
- Speed
- Distance
- Total distance
Results

✓ Actual Tracking of the iPhone
✓ Web Interface
✓ Power and Accuracy Tradeoff
Demonstration

Demo 1: Show power and accuracy tradeoff

Demo 2: Tracking Giacomo
Comments or Questions?