

GEOG 780 Seminar: Wireless Mobile GIS (Spring 2010)

Blackboard URL: <https://blackboard.sdsu.edu/>

Facebook: [\[Geospatial Technology at SDSU\]](#)

Lectures: Tuesday 2:00pm – 4:40pm (with a ten minute break around 3:20)

Location: Storm Hall 321 (Seminar Room)

Instructor: Dr. Ming-Hsiang Tsou
Storm Hall 326
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Office Hours: Tuesday 12:00pm- 2:00pm
or by appt. (619) 594-0205

Overview:

This seminar will focus on the discussion of wireless mobile GIS technology and its applications. The class will provide a comprehensive literature review covering recent advancement of mobile GIS and location-based services (LBS). You will gain a deeper understanding about software and hardware frameworks of mobile GIS and related topics, including cartographic design, user analysis, locational privacy, and social impacts. Through reading journal articles, book chapters, and in-class discussions, you will be able to identify the key technologies that enable wireless communication, mobile computing, and web mapping services inside the mobile devices. You will write a white paper to demonstrate your knowledge in the domain of mobile GIS and a research paper to explore the potential of mobile GIS research and applications.

Prerequisites: Six units of upper division or graduate level courses in spatial analytic techniques. Basic understanding of GIS technology.

Textbooks:

There is no required textbook. Journal articles and book chapters and will be the major reading materials.

Grading: Your grade will be based on the following components:

- **Class participation and leading discussions 30%**
- **One technical white paper 20%**
- **Final presentation 10%**
- **Final research paper 40%**

This course is a seminar and all students are expected to (1) read the assigned material carefully before each class meeting and (2) participate in class. All students in this class are required to submit **one question for each topic (1A, 1B....) on the Blackboard** pertaining to the assigned readings prior to **5pm on the day (Monday) before class**. Usually, each week will cover two topics. We will discuss these questions in class on Tuesday.

You will lead class discussions **TWICE** during this semester. A sign-up sheet will be provided on the first day of this course. You will be evaluated based on your leadership during the discussion, your ability to engage other students, your organization and presentation skills, and any supporting material you use (i.e., your PowerPoint slides or handouts).

During this semester, you need to write one **technical white paper** (7-10 pages in Word) on related wireless mobile GIS topics. The white paper could focus on one specific application (software) domain of mobile GIS (such as navigation/traffic, LBS, social networking, public health, weather, etc.) or the development of specific mobile device hardware and operating systems (such as Android, iPhone, Bada). The due date of technical white paper is **March 16 (Tuesday) 2pm** on Blackboard.

A final research paper (no page limit, in Word) should be based on your own areas of interest and the knowledge gained in the class. The topic of your research paper could be a prototype development (iPhone or Android), original ideas, techniques, designs and experiences in the field of wireless mobile GIS and location based services. The research paper will follow the format of *the Journal of Location-based Services* (<http://www.tandf.co.uk/journals/titles/17489725.asp>) and use the Word template in the Instructions for Authors (<http://www.tandf.co.uk/journals/journal.asp?issn=1748-9725&linktype=44>). You will submit a two-page proposal articulating your ideas and approach to this research paper by **March 23, 2pm** via Blackboard. The whole class will discuss and review your proposal on the same day and provide suggestions. You will make a final research paper presentation on **May 11**. Each presentation will be 10 minutes with 5 minutes Q&A. The final research paper due date is **May 18, 5pm**.

| WEEK | LECTURE | Leader |
|-----------|---|--------|
| 1 | 26 Jan Introduction of Wireless Mobile GIS Transborder Immigrant Tool Discussion | Tsou. |
| 2 | 2 Feb UCSD iPhone software and web development seminar. (2:30pm - car pool) | |
| 3 | 9 Feb 1A. Development History of Mobile GIS 1B. iPhone Apps and SDK.(REGAL user accounts) | |
| 4 | 16 Feb 2A. Mobile Hardware and Wireless Technology 2B. Android Apps and the SDK (REGAL) | |
| 5 | 23 Feb 3A. ESRI mobile GIS development 3B. Other Operating Systems (Windows mobile, Bada, etc). | |
| 6 | 2 Mar (NO class) | |
| 7 | 9 Mar 4A. GPS and Navigation Systems 4B. Sensor Webs | |
| 8 | 16 Mar 5A. Mapping Services and Map Design 5B. User-Centered Design for mobile GIS (Technical white paper DUE: March 16, 2pm on Blackboard) | |
| 9 | 23 Mar 6A. Location-based Services I Submit Research proposal on Blackboard (two page) by March 23, 2pm. (Three minutes proposal presentation in class) | |
| 10 | 30 Mar Spring Break (No class) | |
| 11 | 6 Apr 7A. OGC LS Standards 7B. Related mobile mapping principles | |
| 12 | 13 Apr 8A. Field-based GIS Applications: Green Technology 8B. Field-based GIS Applications: Environmental Monitoring | |
| 13 | 20 Apr 9A. Disaster management 9B. Homeland security | |
| 14 | 27 Apr 10A. Location-based Services II (new applications) 10B. Mobile GIS with Cloud Computing | |
| 15 | 4 May 11A. Mobile users and usage analysis. 11B. Social Impacts and Locational Privacy | |
| 16 | 11 May Final Research Paper presentation (10 minutes each with 5 minutes Q&A) | |
| | 18 May Submit the Final Research Report by 5pm, Office hour 12pm-2pm. | |

Readings: (electronic copies in the Course Documents in Blackboard).

1A. Development History of Mobile GIS

- National Research Council (NRC): Committee on Intersections Between Geospatial Information and Information Technology. (2003). **Chapter 2.** Location-Aware Computing, in *IT Roadmap to a Geospatial Future*. the National Academies Press, Washington, D.C. (pp. 25 - 46).
- Clarke, K. C. (2004). Mobile mapping and geographic information systems. *Cartography and Geographic Information Science* 31:131-136.

1B. iPhone Apps and the SDK

- Zandbergen, P. A. (2009). Accuracy of iPhone Locations: A Comparison of Assisted GPS, WiFi and Cellular Positioning. *Transactions in GIS*, 2009, 13(s1): 5–26.
- iPhone Apps Website: <http://www.apple.com/iphone/apps-for-iphone/>
- iPhone Dev Center (SDK): <http://developer.apple.com/iphone/>

2A. Mobile Hardware and Wireless Technology

- Tsou, M.H. (2004). Integrated Mobile GIS and Wireless Internet Map Servers for Environmental Monitoring and Management, (the Special Issue on Mobile Mapping and Geographic Information Systems) in *Cartography and Geographic Information Science*. 31(3), pp. 153-165.
- Tsou, M.H. (2006). Bridging the Gap: Connecting Internet-based Spatial Decision Support Systems to the Field-based Personnel with Real time Wireless Mobile GIS applications. Book chapter in *Collaborative Geographic Information Systems* (Edited by Shivanand Balram and Suzana Dragicevic). Hershey, Pennsylvania: Idea Group, Inc., pp. 316-339.

2B. Android Apps and the SDK

- di Flora, C. and M. Hcrmersdorf (2008). A practical implementation of indoor location-based services using simple WiFi positioning, . *Journal of Location Based Services*, 2(2): 87-111.
- Android Website: <http://www.android.com/>
- Android Developers: <http://developer.android.com/index.html>

3A. ESRI Mobile GIS Development

- ESRI. (2007). *Mobile GIS for Homeland Security*, An ESRI ® White Paper. ESRI, Redland, California.
- ArcPad: <http://www.esri.com/software/arcgis/arcpad/index.html>
- ArcGIS mobile: <http://www.esri.com/software/arcgis/arcgismobile/index.html>

3B. Other Operating Systems (Windows Mobile, Bada, etc).

- Tsou, M.H., Guo, L., and T. Howser (2005). A Web-based Java Framework for Cross-Platform Mobile GIS and Remote Sensing Applications. *GIScience & Remote Sensing*. 42(4),pp. 333-357.
- Arikawa M., Tsuruoka K., Fujita H., and A. Ome, (2007). Place-tagged Podcasts with Synchronized Maps on Mobile Media Players, *Cartography and Geographic Information Science*, 34: 293-303.

4A. GPS and Navigation Systems

- Devlin G. J., McDonell, K, and S. Ward. (2007). Dynamic non-DGPS positional accuracy performance between recreational and professional GPS receivers. *Journal of Location Based Services*, 1(1): 77–85.
- Ishikawa, T., Murasawa, K., and A. Okabe. (2009). Wayfinding and art viewing by users of a mobile system and a guidebook. *Journal of Location Based Services* 3:277-293.

4B. Sensor Webs

- Winter, S. and S. Dupke. (2008). Queries for historic events in geosensor networks. *Journal of Location Based Services*, 2(3):177 - 193.
- **The leader needs to find one related journal article and email it to everyone one week before the session.**

5A. Mapping Services and Map Design

- Meng, L. and T. Reichenbacher. (2005). Chapter 1: Map-based mobile services. In Meng, L., Zipf A., and T. Reichenbacher (Eds.). (2005). *Map-based Mobile Services: Theories, Methods, and Implementations*. Springer-Verlag, Berlin. pp. 1-10.

- Meng, L. (2005). Chapter 7. Ego centres of mobile users and egocentric map design. In Meng, L., Zipf A., and T. Reichenbacher (Eds.). (2005). *Map-based Mobile Services: Theories, Methods, and Implementations*. Springer-Verlag, Berlin. pp. 89-108.

5B. User-Centered Design for mobile GIS

- Tsou, M.H. and J.M. Curran (2008). Chapter 20. User-Centered Design Approaches for Web Mapping Applications: A Case Study with USGS Hydrological Data in the United States. In *International Perspectives on Maps and the Internet*. (edited by M. P Peterson). Berlin: Springer., pp. 301-321.
- Nivala A. M., and L.T. Sarjakoski. (2007). User aspects of adaptive visualization for mobile maps. *Cartography and Geographic Information Science* 34:275-284.

6A. Location-based Services I

- Gartner G., Bennett D.A., and Morita T. (2007). Towards ubiquitous cartography. *Cartography and Geographic Information Science* 34:247-257.
- Khurri, A., and S. Luukkainen. (2009). Identification of preconditions for an emerging mobile LBS market. *Journal of Location Based Services* 3:188-209.

7A. OGC Location Services (LS) Standards

- OGC (2008a). *OGC Location Services: Tracking Service Interface Standard*, (OGC 06-024r4), Open Geospatial Consortium.
- OGC (2008b). *OpenGIS Location Services (OpenLS): Core Services*. (OGC 07-074), Open Geospatial Consortium.

7B. Related mobile mapping principles

- Dillemath, J., K. Goldsberry, and K. C. Clarke. (2007). Choosing the scale and extent of maps for navigation with mobile computing systems. *Journal of Location Based Services* 1:46.
- Ellas, B., Hampe, M., and M. Sester. (2005). Chapter 6: Adaptive Visualisation of Landmarks using an MRDB. . In Meng, L., Zipf A., and T. Reichenbacher (Eds.). (2005). *Map-based Mobile Services: Theories, Methods, and Implementations*. Springer-Verlag, Berlin. pp. 75-88.

8A. Field-based GIS Applications: Tourism and Green Technology

- Schilling, A., Coors, V., and K. Laakso. (2005). Chapter 15: Dynamic 3D Maps for Mobile Tourism Applications. In Meng, L., Zipf A., and T. Reichenbacher (Eds.). (2005). *Map-based Mobile Services: Theories, Methods, and Implementations*. Springer-Verlag, Berlin. pp. 233-246.
- **The leader needs to find one related journal article and email it to everyone one week before the session.**

8B. Field-based GIS Applications: Environmental Monitoring

- Rahemtullau H.A., Haklay, M., and P.A. Longley, (2008). A mobile spatial messaging service for a grassroots environmental network, *Journal of Location Based Services*. Vol. 2, No.2, June 2008, 122-152.
- **The leader needs to find one related journal article and email it to everyone one week before the session.**

9A. Disaster Management

- Tsou, M.H. and C.H. Sun (2007). Mobile GIServices Applications in Disaster Management, Book chapter in *Dynamic and Mobile GIS: Investigating Change in Space and Time*. (edited by Drummond, J, Billen, R., Forrest, D. and Joao, Ed. 2007. London: CRC Press (Taylor & Francis). (Innovations in GIS book series), pp. 213-236.
- **The leader needs to find one related journal article and email it to everyone one week before the session.**

9B. Homeland Security

- Tsou, M.H., Stow, D., and J. Kaiser. (2006). Spatial Decision Support Services Enhance Homeland Security. *GeosIntelligence*, Mar/Apr 2006. pp. 18-23.
- **The leader needs to find one related journal article and email it to everyone one week before the session.**

10A. Location-based Services II (new applications)

- Papadopoulou K. and N. Karanikolas, (2009). Tactile maps provide location-based services for individuals with visual impairments. *Journal of Location Based Services*, Vol. 3, No.3, September 2009,150-164.
- McCarthy, S., and K. Curran. (2007). An RFID-enabled middleware architecture for urban gaming. *Journal of Location Based Services* 1:62.

10B. Mobile GIS, Internet GIS, and Cloud Computing

- Tsou, M.H. (2009). Chapter 48: The Integration of Internet GIS and Wireless Mobile GIS. In *Manual of Geographic Information Systems*, edited by Marguerite Madden, published by the American Society for Photogrammetry and Remote Sensing (ASPRS), pp. 923-933.
- **The leader needs to find one related journal article and email it to everyone one week before the session.**

11A. Mobile users and usage analysis.

- Torrens, P.M. (2008). Wi-Fi Geographies. *Annals of the Association of American Geographers*, 98(1) 2008, pp. 59–84.
- Ahas R., Aasa A., Silm S., Aunap R., Kalle H., and U. Mark. (2007). Mobile positioning in space-time behaviour studies: Social positioning method experiments in Estonia. *Cartography and Geographic Information Science* 34:259-273.

11B. Social Impacts and Locational Privacy.

- Raper, J., Gartner, G., Karimi, H. and C. Rizos. (2007). A critical evaluation of location based services and their potential. *Journal of Location Based Services*, Vol. 1, No. 1, March 2007, 5–45
- Sui, D. (2005). Will ubicomp make GIS invisible?. *Computers, Environment and Urban Systems*. 29:361–367.