ROVER: A FRAMEWORK FOR CONTEXT-AWARE APPLICATIONS

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Overview of Rover

- Context-Aware Application Integration Platform
- Independent of
  - Client devices
    - Smart phones, PDA, Laptop,…
  - Communication Technology
    - WiFi, WiMAX, 2G, 3G, 4G
Overall Goals of Rover

Managing Context   Data Sources and Services

Uniform Access   Messaging   Logging
What Rover Does Not Address

- Usability / Human-Computer Interaction
- Authorization
- Privacy Issues
- Dissonant Information
- Misinformation
- Methods of Reasoning
- Schema and Ontology Development
MyeVyu
Improving the Quality of Life on Campus
Team

Faculty
- Ashok Agrawala
- Amitabh Varshney
- Neil Spring
- Bobby Bhattacharjee
- Atif Memon
- Evan Golub

Students
- Christian Almazan
- Thomas Krug
- Ankur Oberoi
- Rachana Gandhi
- Saurabh Kulkarni
- Vinay Gangadhar
- Paulo Shakarian
- Geoff Stoker
- Larry Michele
- ...

Campus Organizations
- UMIACS
- OIT
- Facilities
- Department of Public Safety
- ...

[MIND Logo]
MyeVyu Goals – High Level

- Quality of Life
  - Education
  - Social/community
  - Safety
  - Transportation
  - …

- Quality of Life Support for
  - Students
  - Faculty
  - Staff
  - Visitors

- Integrate university services and enhance them with context (time, location, security, …)
Enabling Technologies

Communications
- WiFi
- WiMAX
- Cellular
- ...

Location
- Horus
- PinPoint
- GPS
- Cell-based location
- ...

Time
- Clock Synchronization

Information Integration
- Rover
Location Technologies

- Indoors and Outdoors
- Accuracy
  - Depends on Application
    - Few feet
- Rapid Deployability
- Robust
- Horus
  - Based on Signal Strength
- PinPoint
  - Based on Time of Flight measurement
MyeVyu on Campus

- **Mobility Initiative**
  - 200 undergrads are part of the initial test
  - Devices used
    - iPhone
    - iPod Touch
    - Palm Pre
    - Android
    - Windows Mobile - Samsung
MyeVyu Applications on IPhone
Logging to UM Portal

UM Portal
Student Schedule
Student Grades
Dining Menus
Hoff Theater

Note: Password would be used for future logins to all UMSe...
Directory ID or UID
Directory Password
Login
Testudo Access
UM Portal Access
Dining Hall Menus

Entrees

Selections vary daily

Monday-Friday, 11:00 a.m.-2:15 p.m. and 4:15 p.m.-7:15 p.m.

* Shrimp Scampi
* Cajun Chicken
* Pizza Rolls and Stromboli
* Spaghetti with Marinara
* Spaghetti and Meatballs

Entrees

* Spaghetti and Meatballs
* Meat Lasagna
* Fettuccini with Alfredo Sauce
* Pasta Primavera
* Spiral Pasta with Marinara
* Spiral Pasta with Meatballs
* Ravioli
* Stuffed Shells
Hoff Theater Schedule

Applications

- UM Portal
- Student Schedule
- Student Grades
- Dining Menus
- Hoff Theater
## Hoff Theater Schedule

<table>
<thead>
<tr>
<th>Movie</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>The Dark Knight</td>
<td>November 19</td>
</tr>
<tr>
<td>Noon</td>
<td></td>
</tr>
<tr>
<td>Barefoot Gen/Welcome Home</td>
<td>November 19</td>
</tr>
<tr>
<td>7:00p (Free!)</td>
<td></td>
</tr>
<tr>
<td>The Dark Knight</td>
<td>November 20</td>
</tr>
<tr>
<td>Noon</td>
<td></td>
</tr>
<tr>
<td>Unhappy Meal</td>
<td>November 20</td>
</tr>
<tr>
<td>7:00p (Free!)</td>
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</tr>
<tr>
<td>Indiana Jones and The Lost</td>
<td>November 21</td>
</tr>
<tr>
<td>5:00p (Free!)</td>
<td></td>
</tr>
<tr>
<td>Chronicles of Narnia: Prince</td>
<td>November 22</td>
</tr>
<tr>
<td>Noon</td>
<td></td>
</tr>
<tr>
<td>Baby Mama</td>
<td>November 23</td>
</tr>
<tr>
<td>7:00p (Free!)</td>
<td></td>
</tr>
</tbody>
</table>
MyeTransit
<table>
<thead>
<tr>
<th>Shuttle-UM Nearby</th>
<th>Stations and Stops</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>30500</strong>: Paintbranch Dr &amp; Stadium Dr</td>
<td><strong>30500</strong>: Paintbranch Dr &amp; Stadium Dr</td>
</tr>
<tr>
<td>102 Campus Conn. North</td>
<td>102 Campus Conn. North</td>
</tr>
<tr>
<td>108 Powder Mill Village</td>
<td>108 Powder Mill Village</td>
</tr>
<tr>
<td>106 Greenbelt North</td>
<td>106 Greenbelt North</td>
</tr>
<tr>
<td><strong>27863</strong>: A.V. Williams Building</td>
<td><strong>27863</strong>: A.V. Williams Building</td>
</tr>
<tr>
<td>102 Campus Conn. North</td>
<td>102 Campus Conn. North</td>
</tr>
<tr>
<td><strong>30561</strong>: Paintbranch Pkwy &amp; Greenh...</td>
<td><strong>30561</strong>: Paintbranch Pkwy &amp; Greenh...</td>
</tr>
<tr>
<td>104 College Park Metro</td>
<td>104 College Park Metro</td>
</tr>
<tr>
<td>119 Greenbelt South</td>
<td>119 Greenbelt South</td>
</tr>
<tr>
<td><strong>30996</strong>: Regents Drive Parking Garage</td>
<td><strong>30996</strong>: Regents Drive Parking Garage</td>
</tr>
<tr>
<td><strong>27973</strong>: Technology Dr. &amp; Paintbranc...</td>
<td><strong>27973</strong>: Technology Dr. &amp; Paintbranc...</td>
</tr>
<tr>
<td><strong>30140</strong>: University View</td>
<td><strong>30140</strong>: University View</td>
</tr>
<tr>
<td><strong>30397</strong>: Regents Dr &amp; Stadium Dr (Bi...</td>
<td><strong>30397</strong>: Regents Dr &amp; Stadium Dr (Bi...</td>
</tr>
<tr>
<td><strong>36112</strong>: Campus Dr across from Mat...</td>
<td><strong>36112</strong>: Campus Dr across from Mat...</td>
</tr>
<tr>
<td><strong>36288</strong>: Campus Dr &amp; Regents Dr (at...</td>
<td><strong>36288</strong>: Campus Dr &amp; Regents Dr (at...</td>
</tr>
<tr>
<td><strong>30000</strong>: Paintbranch Dr, Greenbelt</td>
<td><strong>30000</strong>: Paintbranch Dr, Greenbelt</td>
</tr>
<tr>
<td><strong>27863</strong>: A.V. Williams Building</td>
<td><strong>27863</strong>: A.V. Williams Building</td>
</tr>
<tr>
<td><strong>30500</strong>: Paintbranch Dr &amp; Stadium Dr</td>
<td><strong>30500</strong>: Paintbranch Dr &amp; Stadium Dr</td>
</tr>
</tbody>
</table>
MyeTransit

- College Park-U of MD
- Prince George's Plaza
- Greenbelt
- West Hyattsville
- Fort Totten
- Takoma
- New Carrollton
- Landover
- Brookland-CUA

Landover

- New Carrollton 3 10:19:23 AM
- New Carrollton 7 10:23:23 AM
- New Carrollton 16 10:32:23 AM

Landover #2

- Vienna 3 10:19:23 AM
- Vienna 15 10:31:23 AM

Locate Me
MyeTransit

Stations and Stops

Metrorail Nearby

- Greenbelt

30500: Paintbranch Dr & Stadium Dr

- Add to Favorites
- Show on Map
- Show ShuttleTrac Web

Cancel

MIND
The Maryland Information and Network Dynamics Lab
Remember a Spot of Interest

- Parking Location
- See how to get there from anywhere
MyeSpot
MyeSpot
MyeBuildings

- Information about all buildings on campus
- Location on the map
- More to come
Mye Buildings

A.V. Williams Building
Adele H. Stamp Student Union...
Agriculture/Life Sciences Sur...
Allegany Hall (Dorm)
Animal Science/Agricultural...
Annapolis Hall
Anne Arundel Hall (Dorm)
Architecture Building
Art-Sociology Building
Art-Sociology Building
Aurora Ondolay-K Vetterini
Usage of MyeVyu

- Log from 7 month period
  - 1,052,124 log entries
  - 1029 distinct IP addresses

- Session of a mobile application-
  - If the inter-click time between two application access is less than 15 minutes, it is considered one session
  - Some outliers (>200,000 clicks in a session) removed
  - 1365 sessions
  - Average Number of Clicks/session = 28.61
Most Frequent Sessions

<table>
<thead>
<tr>
<th>Session Type</th>
<th>Count</th>
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<tbody>
<tr>
<td>['metro', 'shuttle']</td>
<td>845</td>
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<tr>
<td>['metro']</td>
<td>227</td>
</tr>
<tr>
<td>['hoff', 'meal']</td>
<td>80</td>
</tr>
<tr>
<td>['meal', 'misc']</td>
<td>44</td>
</tr>
<tr>
<td>['hoff', 'metro', 'shuttle']</td>
<td>34</td>
</tr>
<tr>
<td>['hoff']</td>
<td>32</td>
</tr>
<tr>
<td>Session</td>
<td>Number of Clicks</td>
</tr>
<tr>
<td>---------------------------------</td>
<td>------------------</td>
</tr>
<tr>
<td>['hoff', 'metro', 'shuttle']</td>
<td>36</td>
</tr>
<tr>
<td>['metro', 'shuttle']</td>
<td>35</td>
</tr>
<tr>
<td>['metro', 'misc', 'shuttle']</td>
<td>29</td>
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<tr>
<td>['metro']</td>
<td>25</td>
</tr>
<tr>
<td>['meal', 'metro', 'shuttle']</td>
<td>22</td>
</tr>
<tr>
<td>['hoff', 'metro', 'misc', 'shuttle']</td>
<td>22</td>
</tr>
<tr>
<td>['hoff', 'meal', 'metro', 'shuttle']</td>
<td>14</td>
</tr>
<tr>
<td>['metro', 'misc']</td>
<td>13</td>
</tr>
<tr>
<td>['meal', 'metro', 'misc']</td>
<td>11</td>
</tr>
<tr>
<td>['hoff', 'metro', 'misc']</td>
<td>10</td>
</tr>
<tr>
<td>['shuttle']</td>
<td>8</td>
</tr>
<tr>
<td>['hoff', 'meal']</td>
<td>6</td>
</tr>
<tr>
<td>['hoff']</td>
<td>5</td>
</tr>
<tr>
<td>['hoff', 'meal', 'misc']</td>
<td>5</td>
</tr>
<tr>
<td>['meal']</td>
<td>4</td>
</tr>
<tr>
<td>['hoff', 'metro']</td>
<td>4</td>
</tr>
<tr>
<td>['misc']</td>
<td>3</td>
</tr>
<tr>
<td>['meal', 'misc']</td>
<td>3</td>
</tr>
<tr>
<td>['hoff', 'misc']</td>
<td>3</td>
</tr>
<tr>
<td>['hoff', 'meal', 'metro']</td>
<td>3</td>
</tr>
</tbody>
</table>
V911 - Public Safety

Sources of information
- Video
  - Static Cameras – CCTV
  - Mobile – Squad Cars
  - Alerts
- Sensors
- Databases
- Web

Resources
- People
  - Roles
  - Capabilities
- Equipment
- Specialized

Common Situational Awareness
Commander’s Console

- Information from multiple sources
- Available resources
- Issuing commands/tasks
- Real-time monitoring

- Distributed implementation
- Dynamic reporting
- Delegation
MyeVyu Commander’s Console
MyeVyu Status

IP – Patent application has been filed
  ◦ Two patents for location technologies have been issued.

Public Safety

Next Steps
  ◦ Devices –
  ◦ Location
  ◦ GIS
  ◦ Public safety
  ◦ Handicap Support
  ◦ Visitors
- Goal: TagMeAR is a mobile system which aims to be a personal information browser utilizing augmented reality to deliver relevant information/services to users at the right time and place.

CONCEPT. Ideas

**Augmented Reality User Interface**
- Query without keyword → useful for “What is THAT building?”
- Mitigating information overloads by using device orientation
  - It might be faster if user knows where to point the device
- Recommendation Setting
  - Toggling dynamic filters (context entity, service, thresholds, amount of information and so on)
- Getting feedback from user → Updating MLN
**FixTerp**

**Tandeep Sidhu, Awalin Sopan, Andreea Olea**

### Concept

**The Problem:**
- Faculty and students come across many small problems on campus.
- They do not know where to go for help.
- Problems may happen when they do not have access to a computer.

**The Solution:**
- Create a unified issue tracking system.
- Mobile app that faculty/students can use to report problems.
- The underlying system will figure out where to direct the problem based on the information provided by the user.

### Web interface

**System:**
- Track incoming issues.
- Users see, edit, and delete tickets.
- Use mobile app to submit issues to our Issue Tracking System.

**Possible enhancements:**
- Interactive map of campus issues.
- Admins manage mobile app categories.
- Different levels of administration.

### Mobile app

Users can do the following:
- Submit new issues.
- Track submitted issues.

Users can describe their problem using:
- Free text.
- Categorizing the issue.
- Picture/Video of the problem.

Users can specify the location of the problem (can augment this with information from Rover).

Users will be identified by a username in our system.

**System Users**
- Faculty/Staff/Student: Will use the mobile app to submit issues.
- **FixTerp admins:** Will use web-interface.
  - Will manage issues in the issue tracker.
  - Update status of the issue.

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University of Maryland, Computer Science  www.cs.umd.edu
StarNET – Transient Social Networks
K. Ashwin Kumar, Arijit Biswas, Udayan Khurana, Ashok Agrawala
University of Maryland, College Park

Scenario
- Let me find company for lunch today
- Bill
- Feel like eating Mexican food at lunch
- Sara
- Janet
- Alok
- John

Communication
- People can be busy
- Call many, need few
- Spam
- Organize preferences?
- No need for 1-1 with each friend
- No spam
- Organize
- Help you decide

Summary
- Transient social groups formation
- Need and Time based groups
- Use – Lunch, Soccer Practice, Party, Group Study, Carpool, Movie......
- Reduces – Effort, Spam, Overload
- Helps – Connect, Decide, Schedule

Results
<table>
<thead>
<tr>
<th>User</th>
<th>Cuisine preference</th>
<th>Time preference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jack</td>
<td>Chinese, Thai</td>
<td>1-2 pm</td>
</tr>
<tr>
<td>Sara</td>
<td>Lasagne, French</td>
<td>12:30-1:30 pm</td>
</tr>
<tr>
<td>Arijit</td>
<td>Indian, Thai, Chinese</td>
<td>1:30-2:30 pm</td>
</tr>
<tr>
<td>Ashwin</td>
<td>Indian cuisine, Spanish</td>
<td>12-12:30 pm</td>
</tr>
<tr>
<td>Janet</td>
<td>Dosa, Italian, Chinese</td>
<td>1-2 pm</td>
</tr>
</tbody>
</table>

This work is a part of course CMSC818G
Acknowledgments: Christian Almazan

Interface
- Query interface
- Result interface
- Register