



# **Instrumented Bike Share Team 1**

Chen, Guoyu Fang, Pengkai Zhang, Ai Zhang, Jingwei



### Introduction

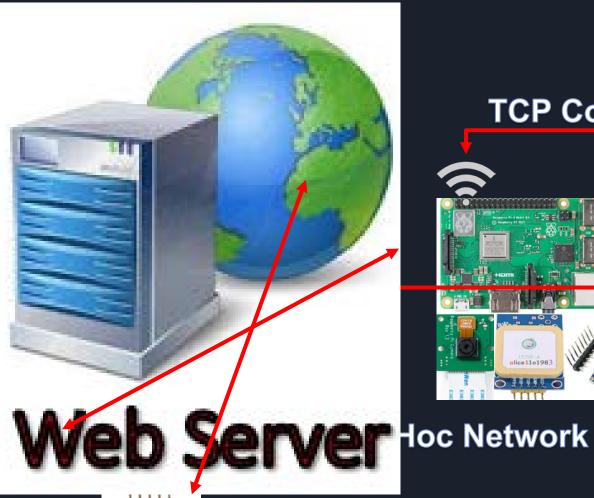
## **Client: Dr. Chun-Hsing Ho**

- Civil and Environmental Engineering
- MS, National Kaohsiung University of Applied Sciences, Taiwan MPA (airport operations), University of Montana-Missoula
- Ph.D., University of Utah

## **Mentor: Dr. Kyle Winfree**

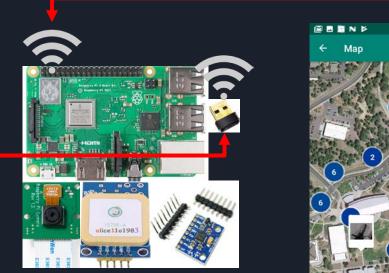
- School of Informatics, Computing, and Cyber Systems
- Ph.D., Biomechanics and Movement Science, University of Delaware
- MSE, Robotics, University of Pennsylvania BS, Physics, Northern Arizona University

### **GTA: Demetria Shepherd**



### Web GIS

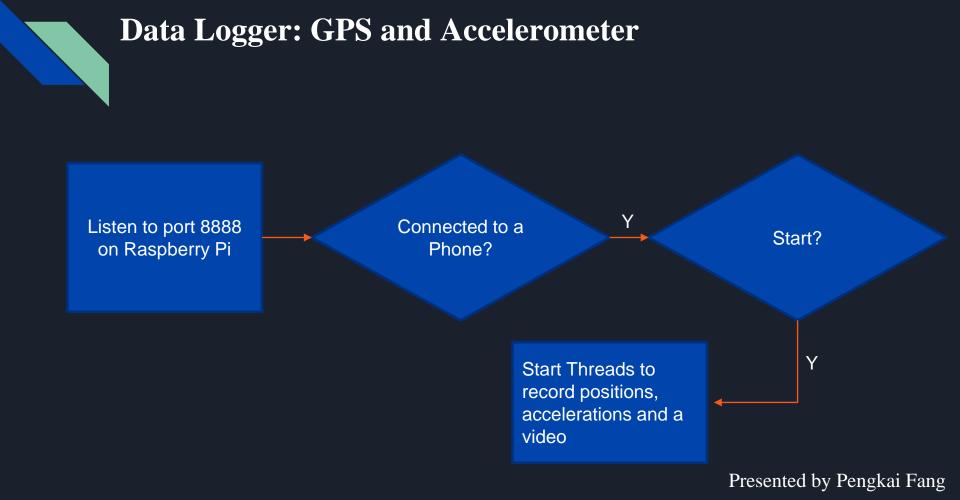
### **TCP** Control Flow



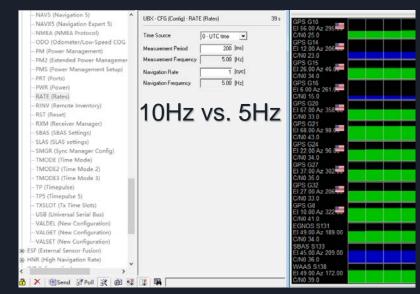


### **Data Logger: GPS and Accelerometer**

No.	Task	Description	Deliverables	People Responsible
1.1.1	GPS	Collect raw data of positions with GPS module	<ol> <li>Record time and positions from satellite to a text file;</li> <li>Connect GPS to raspberry pi properly;</li> <li>Write a python code to receive data from the module.</li> </ol>	Pengkai fang
1.1.2	Accelerometer	Collect raw data of acceleration of the vertical axis.	<ol> <li>Record accelerating data into the same file of positions;</li> <li>Connect accelerometer to raspberry pi properly;</li> <li>Write python code to initiate module and record data.</li> </ol>	Pengkai Fang



### **Data Logger: GPS and Accelerometer**



#### raw3.txt

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### **Raspberry Pi Desktop**

### **GPS Configuration Tool**

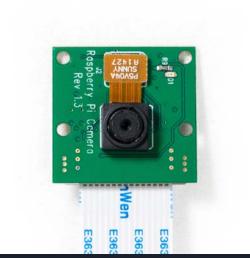


### **Data Logger: Camera**

No.	Task	Description	Deliverables	People Responsible
1.1.3	Camera	Collect road pictures	<ol> <li>Trigger the camera to take pictures when the accelerating value reaches a threshold;</li> <li>Save pictures into a single file with positions and accelerating information;</li> <li>Use the python code to implement the functions above.</li> </ol>	Jingwei Zhang



### **Data Logger: Camera**



https://www.google.com/url?sa=i&source=images&cd=&cad =rja&uact=8&ved=2ahUKEwib14bE8K\_hAhXKGjQIHQq3BM UQjRx6BAgBEAU&url=https%3A%2F%2Fwvw.dexterindust ries.com%2Fproduct%2Fraspberry-picamera%2F&psig=AOvVaw0mlIkr076UfbuHwt7nfIVM&ust=1 554241923441875



Presented by Jingwei Zhang



### **Data Sharing**

No.	Task	Description	Deliverables	People Responsible
1.3	Data Sharing	Share the processed data with nearby users.	<ol> <li>Transfer files of pictures with positions and accelerating data; with nearby raspberry pi;</li> <li>Duplicate files will not be shared;</li> <li>Raspberry Pi can automatically add to a nearby network</li> </ol>	Jingwei Zhang
1.3.1	Ad Hoc Network	Create a Wi-Fi mesh for sharing data.	<ol> <li>Build an ad hoc network;</li> <li>Make internal and external networks compatible.</li> </ol>	Jingwei Zhang
1.3.2	Assign static addresses	Write code in the interface file to configure network interfaces	<ol> <li>Interfaces file;</li> <li>Raspberry pi scripts for configuring interfaces.</li> </ol>	Jingwei Zhang
1.3.3	Write code in the DHCP configuration file to configure Wi-Fi mode.	Adjust the onboard wireless adapter into ad hoc mode.	<ol> <li>DHCP configuration file;</li> <li>Raspberry pi scripts for configuring Wi-Fi modes.</li> </ol>	Jingwei Zhang
1.3.4	External wireless network adapter	Configure the external Wi-Fi module into AP mode so as to connect raspberry pi with Android devices.	<ol> <li>Transfer files</li> <li>between raspberry pi and Android devices;</li> <li>DHCP function;</li> </ol>	Jingwei Zhang

Presented by Jingwei Zhang



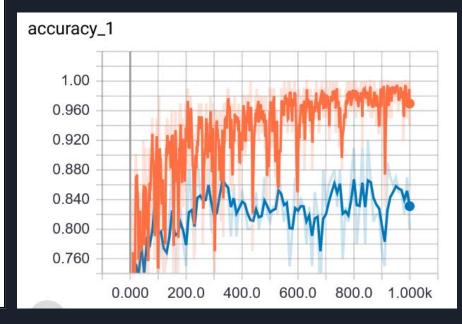
### **Data Sharing**

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SX# interfaces(5) file used by ifup(8) and ifdown(8)	64 bytes from 172.18.30.3: icmp_seq=2 ttl=64 time=4.81 ms 64 bytes from 172.18.30.3: icmp_seq=2 ttl=64 time=2.65 ms
<pre># Please note that this file is written to be used with dhcpcd # For static IP, consult /etc/dhcpcd.conf and 'man dhcpcd.conf'</pre>	64 bytes from 172.18.30.3: icmp_seq=3 ttl=64 time=4.38 ms ^C
<pre># Include files from /etc/network/interfaces.d: source-directory /etc/network/interfaces.d</pre>	3 packets transmitted, 3 received, 0% packet loss, time 2003ms rtt min/avg/max/mdev = 2.655/3.952/4.817/0.935 ms pi@raspberrypi:~ \$ []
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Ad Hoc Interface Configuration	Ad Hoc Network Ping Test

### **Data Processing**

No.	Task	Description	Deliverables	People Responsible
1.2.1	Train neural network models	Use existing datasets to train a neural network for classifying different roads with different conditions.	<ol> <li>Find an appropriate model for transfer learning;</li> <li>Train models with Python;</li> <li>Reach more than 80% of the accuracy of recognition.</li> </ol>	Guoyu Chen
1.2.2	Validate neural network models	Run the trained neural network on Raspberry Pi.	<ol> <li>Run time less than 1 second;</li> <li>Label new images with an accuracy of over 80%;</li> <li>Computing is within memory range.</li> </ol>	Guoyu Chen

### WBS: Guoyu Chen



### 

## Win10 Command Window



### **Data Processing**

No.	Task	Description	Deliverables	People Responsible
1.2	Data Processing of Raspberry Pi	Process collected pictures and store into database.	<ol> <li>Label collected pictures with road conditions;</li> <li>Apply deep learning technique;</li> <li>Arrange processed data in good order for sharing.</li> </ol>	Guoyu Chen requires data collection modules from Pengkai Fang and Data sharing system from Jingwei Zhang.



### **Extract Images from Video**

### **Classify Images**



### WBS: Guoyu Chen

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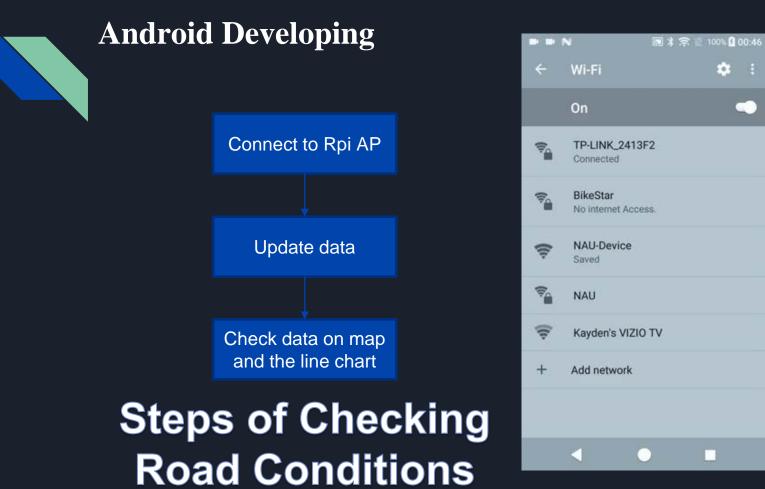
# **Raspberry Pi Desktop**



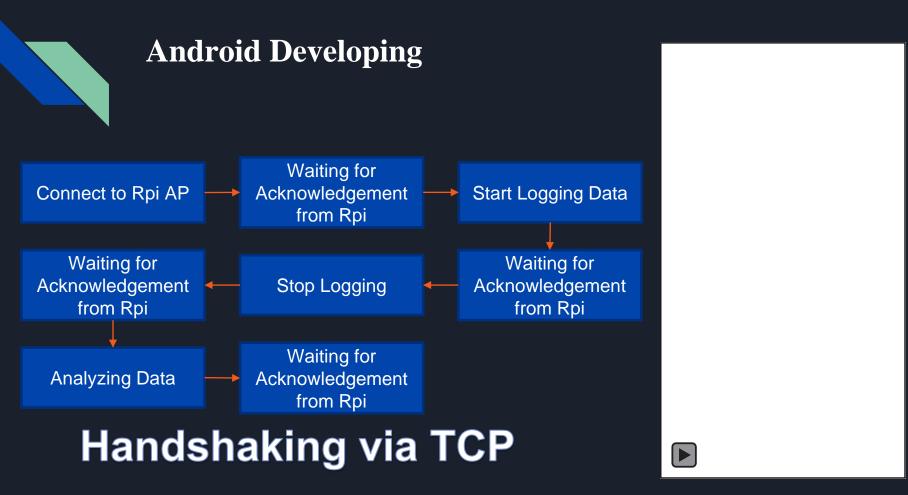
### Ai Zhang

No.	Task	Description	Deliverables	People Responsible
2.1	Graphical User Interface	Design and test	<ol> <li>Use float view;</li> <li>Add appropriate icon for each class;</li> <li>Put our logo at the top.</li> </ol>	Ai Zhang
2.1.1	Main interface	Display the fundamental information like location and comments	<ol> <li>Combine card view and recycler view;</li> <li>The interval of each card is equal;</li> <li>All interface can be scrolled smoothly.</li> </ol>	Ai Zhang
2.1.2	Setting interface	Some professional data about the device	<ol> <li>Add IP;</li> <li>Add port number;</li> <li>Manage the shared files.</li> </ol>	Ai Zhang

### Presented by Ai Zhang

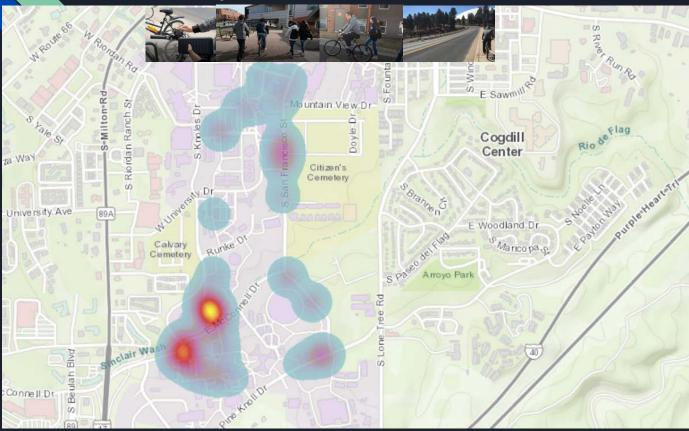


Presented by Ai Zhang



Presented by Ai Zhang







### Get Crashed! Needs to get fixed soon...

Presented by Guoyu Chen

### **Geographical Information System**

# Thanks for your listening! Q & A

