Instrumented Bike Share Team 1

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

Content

Introduction
- Client and Mentors
- Motivation of Our Project
- An Overview of Our Project

Subsystems
- 1/3: Data Collection
- 2/3: Information Share in Local Areas
- 3/3: User App and Remote Information Share

Prototypes
- Hardware
- Software

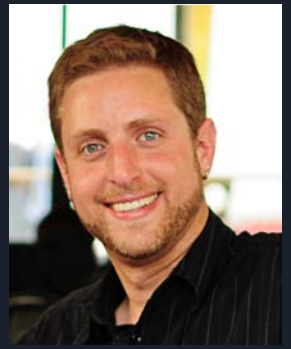
Summary
- A Brief Conclusion

Presented by Guoyu Chen

Introduction: Client and Mentors

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 Mentor: Dina Ghanaimiandoab

Presented by Guoyu Chen

Introduction: Motivation of Our Project

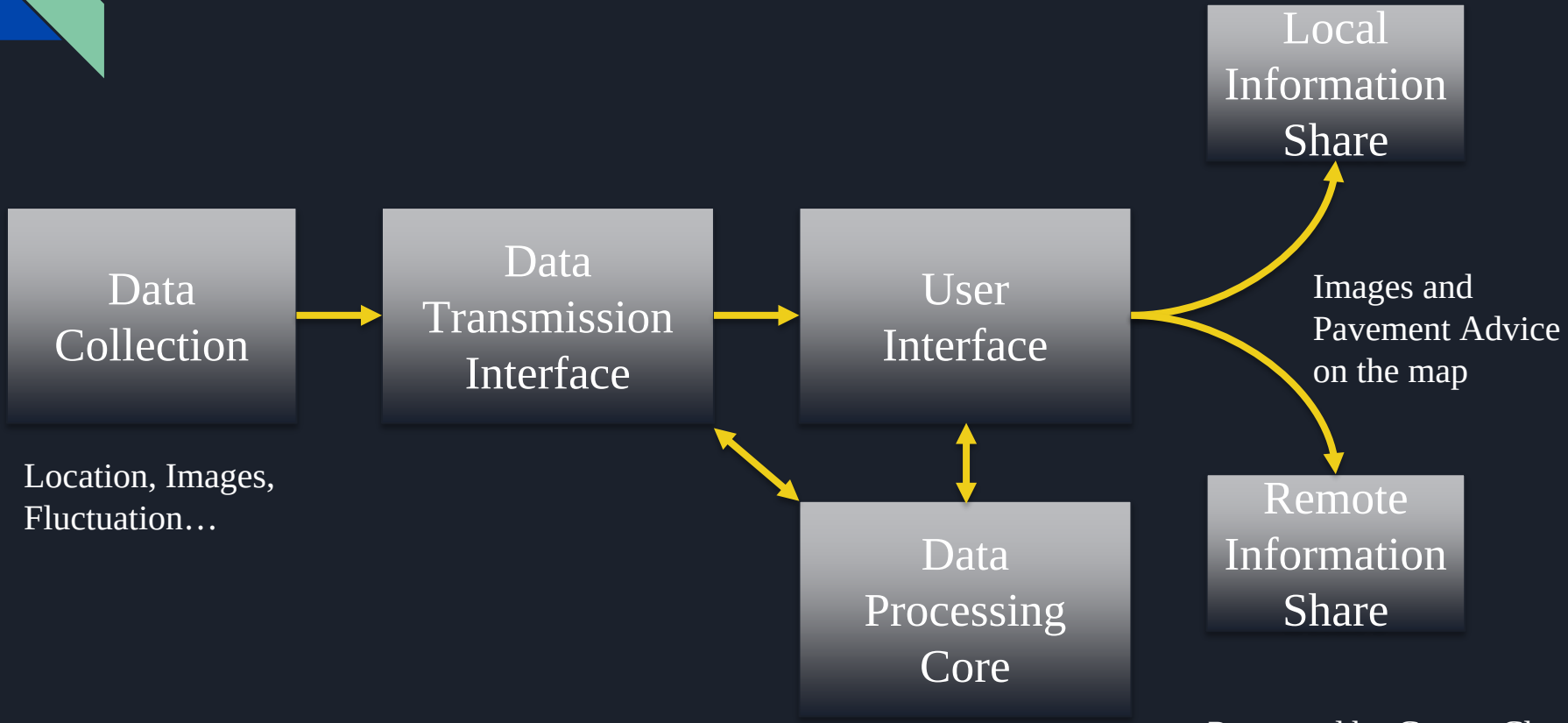
https://www.google.com/url?sa=i&source=images&cd=&cad=rja&uact=8&ved=2ahUKEwiFnOmjjfveAhWyCjQIHcLLCMkQjRx6BAgBEAU&url=https%3A%2F%2Fwww.mdpi.com%2F1424-8220%2F16%2F12%2F2067&psig=AOvVaw3eSvirzl-nWbONdsRFtEU&ust=1543632466935275

Asphalt Pavement Detection

The Instrumented Bike Completed Last Year

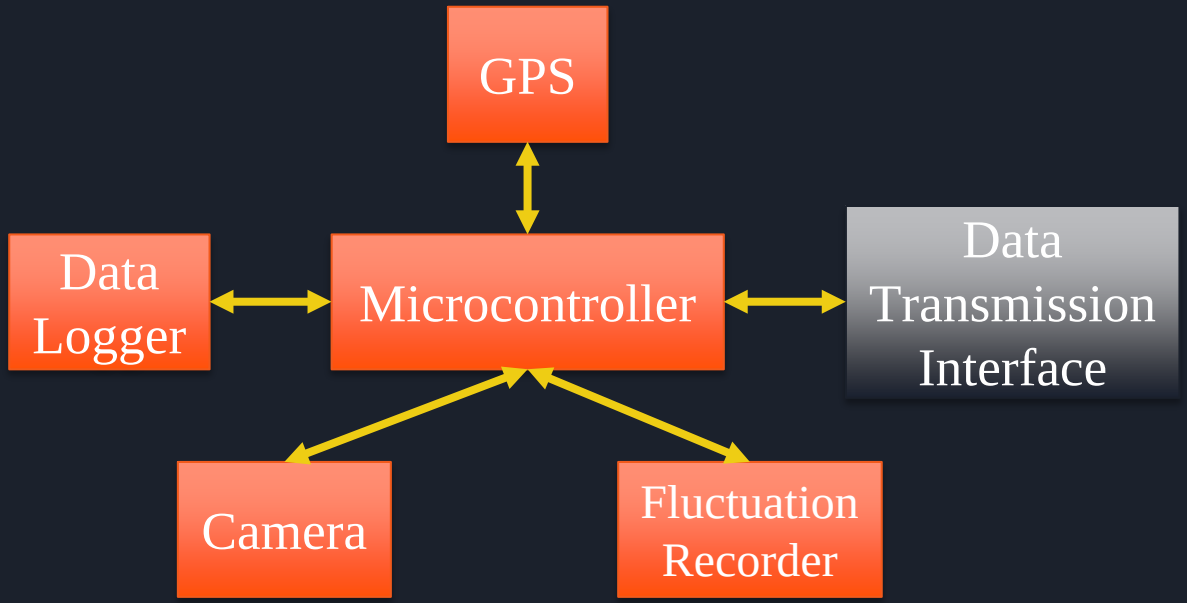
Presented by Guoyu Chen

Introduction: An Overview of Our Project



Presented by Guoyu Chen

Subsystem 1/3: Data Collection



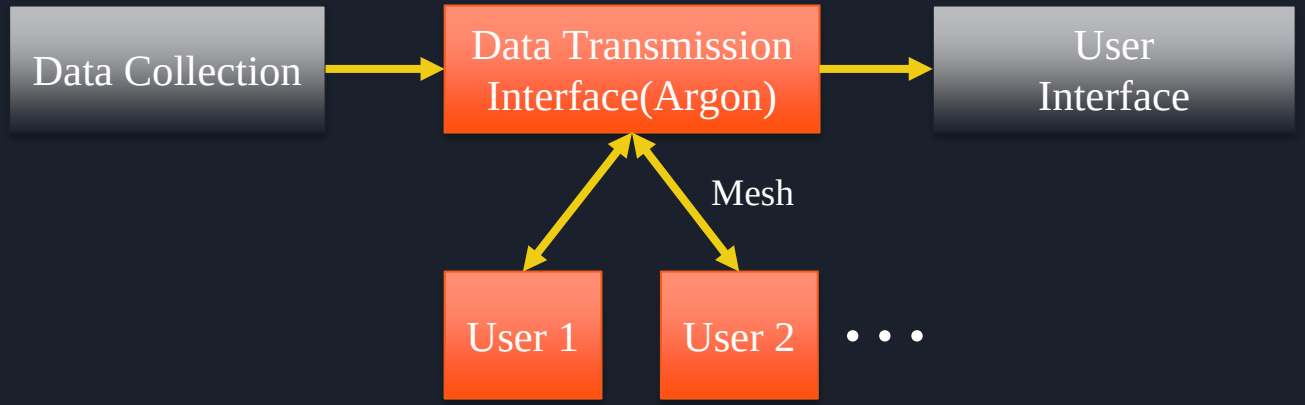
STM32F407 Discovery Kit

https://www.st.com/content/ccc/fragment/product_related/rpn_information/board_photo/17/e9/78/47/7c/f4/42/e1/stm32f4_discovery.jpg/files/stm32f4_discovery.jpg/_jcr_content/translations/en.stm32f4_discovery.jpg

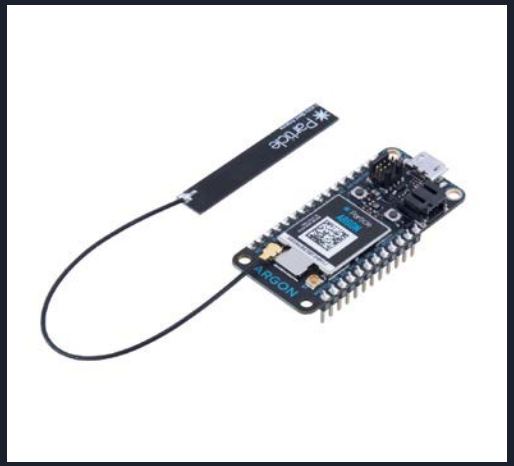
Presented by Guoyu Chen

Subsystem 2/3: Information Share in Local Areas

- Set up a mesh network in the form of Bluetooth.
- The function is information transmission and data aggregation
- It is sent locally to smartphones and watches via Bluetooth.
- Pro: It can transfer data offline.
- Con: Within a few hundred meters, it also depends on the number of users.



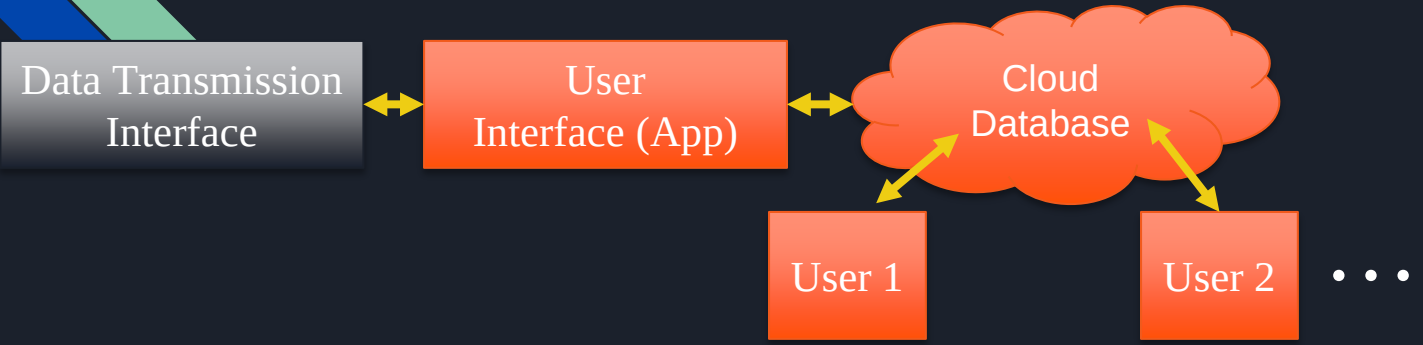
Argon(WiFi+Bluetooth+Mesh)



https://store.particle.io/products/argon

Presented by Pengkai Fang

Subsystem 3/3: User App and Remote Information Share



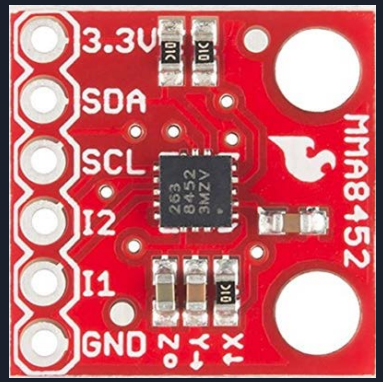
https://www.android-apk.com/2013/11/goophone-smart-watch

http://www.estronger.cn/industry/1836.html

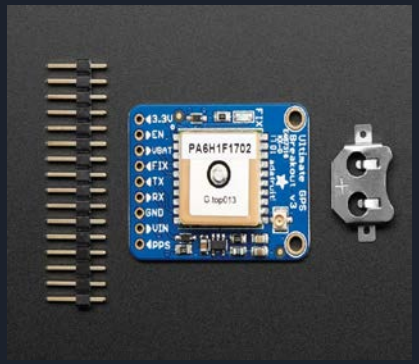
- For software development, we use Android because we are more familiar with it although the difficulty of software development still brings us trouble.
- App can be used on both smartphones and smartwatches.
- Remote data sharing with the help of the cloud.
- The information collected by the mobile phone and the watch is analyzed to determine the pavement information.

Prototype: Hardware

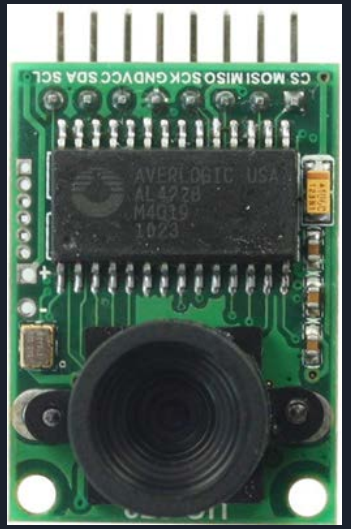
All the four prototypes are controlled by STM 32 microprocessor. The aim of these hardware is to collect and analyze the data.



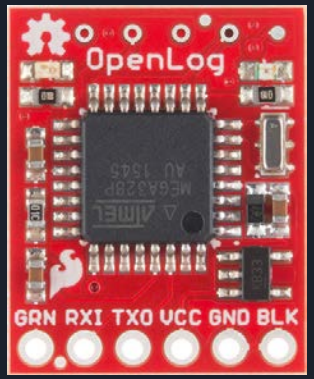
Prototype 4：
Accelerometer



Prototype 1:
GPS Module



Prototype 2:
STM 32 Camera

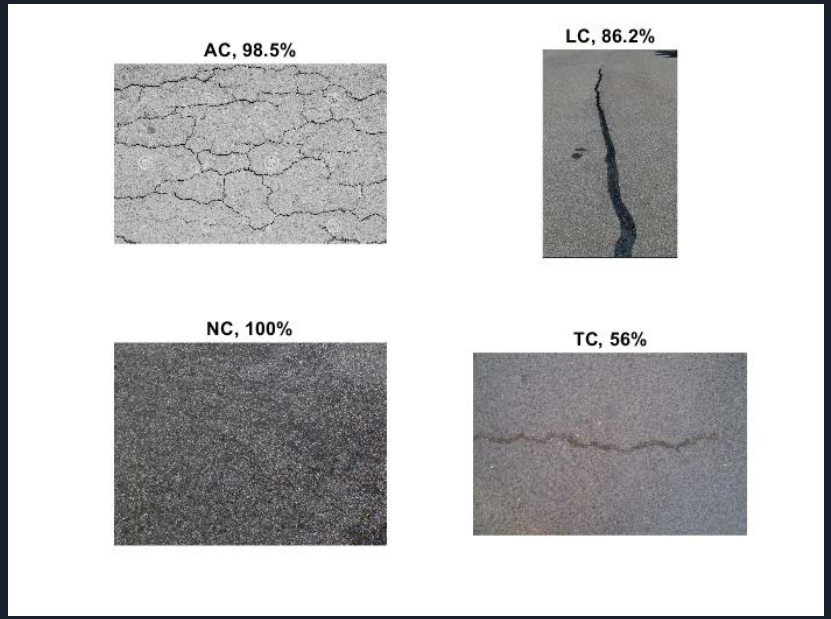


Prototype 3:
Data Logger

https://www.adafruit.com/product/746
https://www.amazon.com/Arducam-Module-Megapixels-Arduino-Mega2560/dp/B012UXNDOY/ref=sr_1_1?s=electronics&ie=UTF8&qid=1541545380&sr=1-1&keywords=stm32+camera
https://www.sparkfun.com/products/13712
https://www.sparkfun.com/products/12756

Presented by Ai Zhang

Prototype 5: Software



- Google Neural Network (Artificial Intelligence method)
- We get the algorithm from Matlab software
- AC=Alligator Crack ,
- LC=Longitudinal Crack ,
- NC=Non-crack ,
- TC=Transverse Crack

Summary

Internet of Things

Hardware

Software

Data Collection

Data Transmission

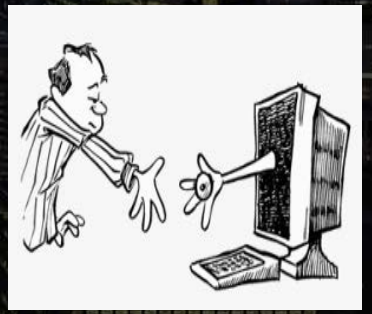
Data Processing

Friendly user interface

https://www.futurelearn.com/courses/data-science

https://www.helmholtz.de/en/technology/the-fastest-wireless-data-transmission

http://www.enterprisefeatures.com/6-important-stages-in-the-data-processing-cycle/



https://qarea.com/blog/5-tips-for-creating-user-friendly-interface

Presented by Jingwei Zhang

Thanks for your listening!
Q & A