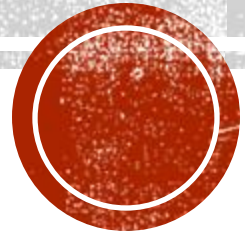
DESIGN AND IMPLEMENTATION OF HETEROGENEOUS SENSOR-BASED EMBEDDED SYSTEM FOR FLOOD MANAGEMENT

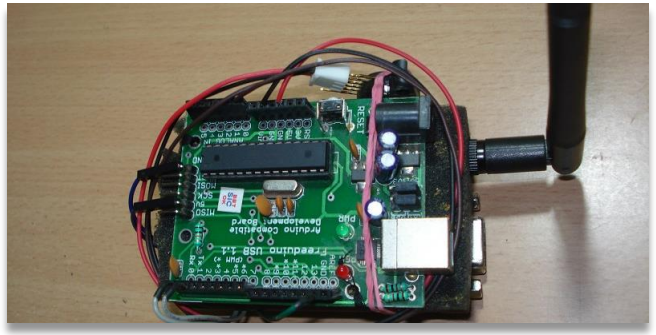


- by **Subhajit Sahu** (110EC0181)
- under the guidance of **Prof. D. P. Acharya**

OBJECTIVE

- To design and implement a **modern, internet-based** flood management system, that is **simple, cost effective, easy to deploy and use**.

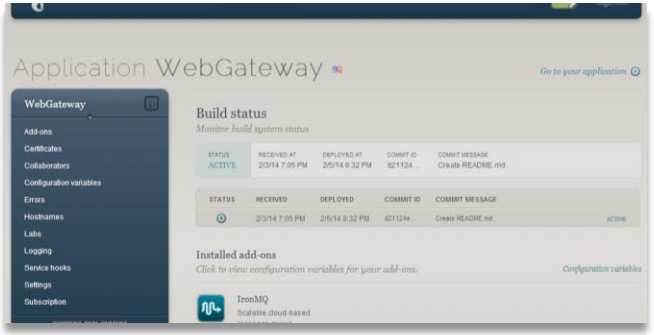
PROJECT OUTPUT



Heterogeneous Sensor Module

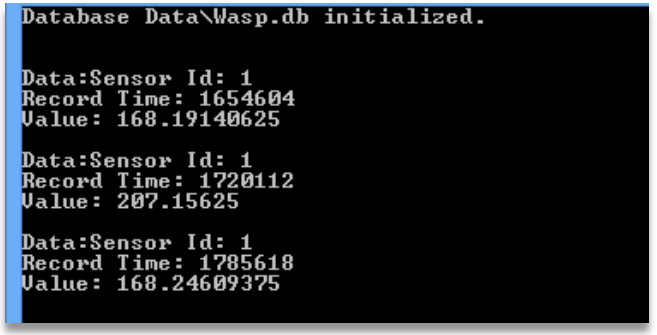
Wireless Sensor Module –
(ATmega328, FLY900)

Firmware -
(C++, Arduino)



Cloud-based Gateway

Cloud Server Software -
(C#, ASP.NET)



Local Host Storage Module

Local Host Software –
(C#, SQLite)

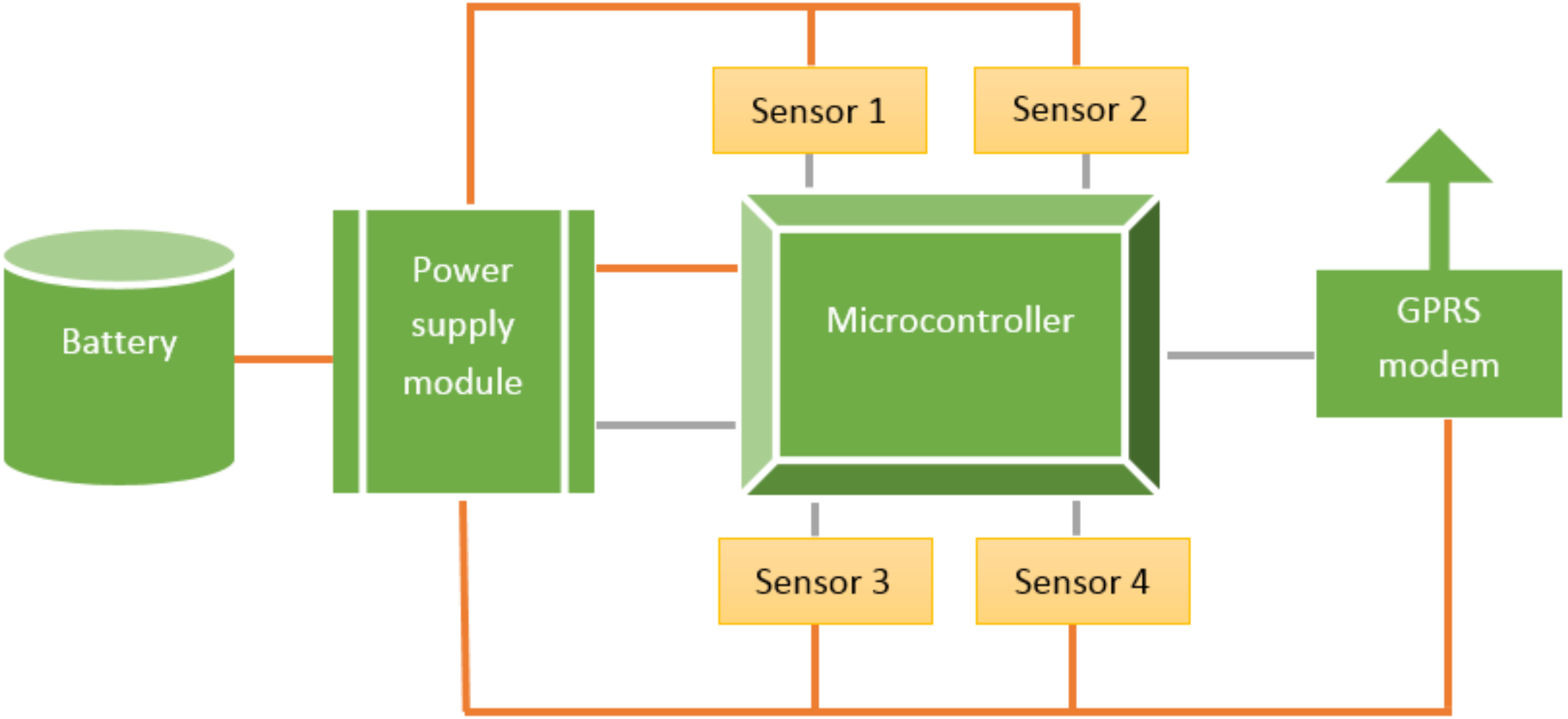
FEATURES

- Low Power – **20mW**
- Low unit cost - **₹ 3000**
- Low usage cost - **₹ 20 / month**
- **Compact** and Portable
- Easily **Scalable**
- **Simple** to use

PROJECT DESCRIPTION

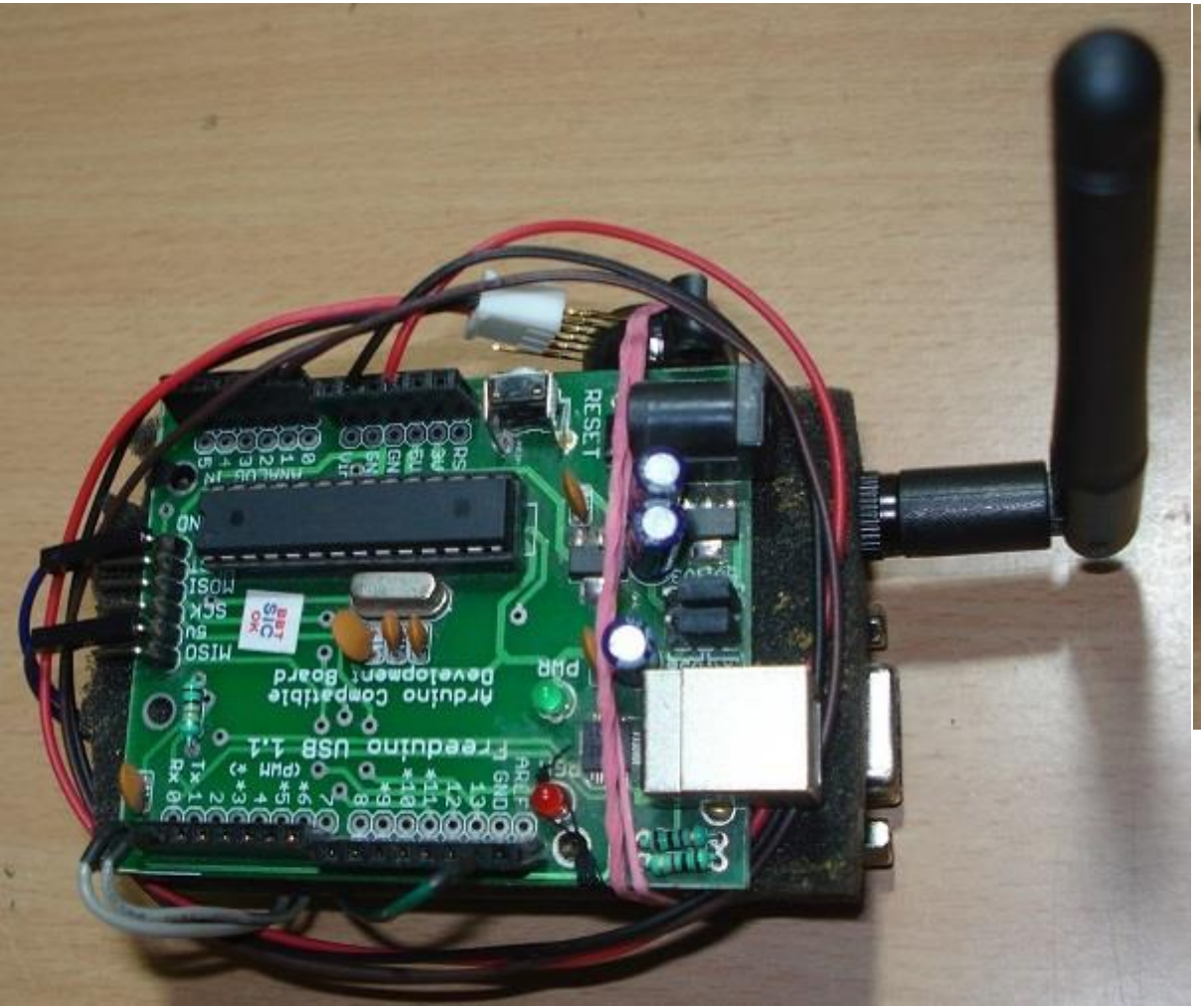
- Hardware Architecture
- Software Architecture
- System Data Flow
- System on Single PCB

HARDWARE ARCHITECTURE

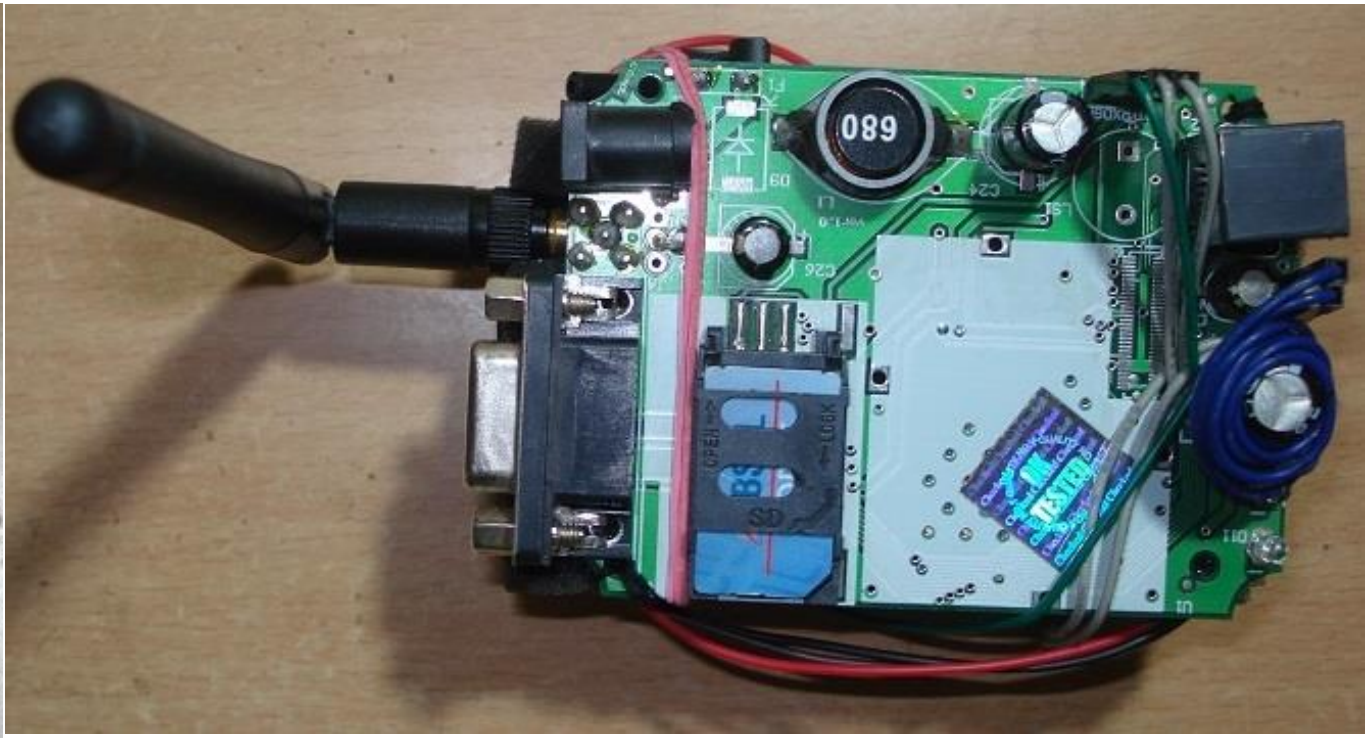


HARDWARE: IMPLEMENTATION

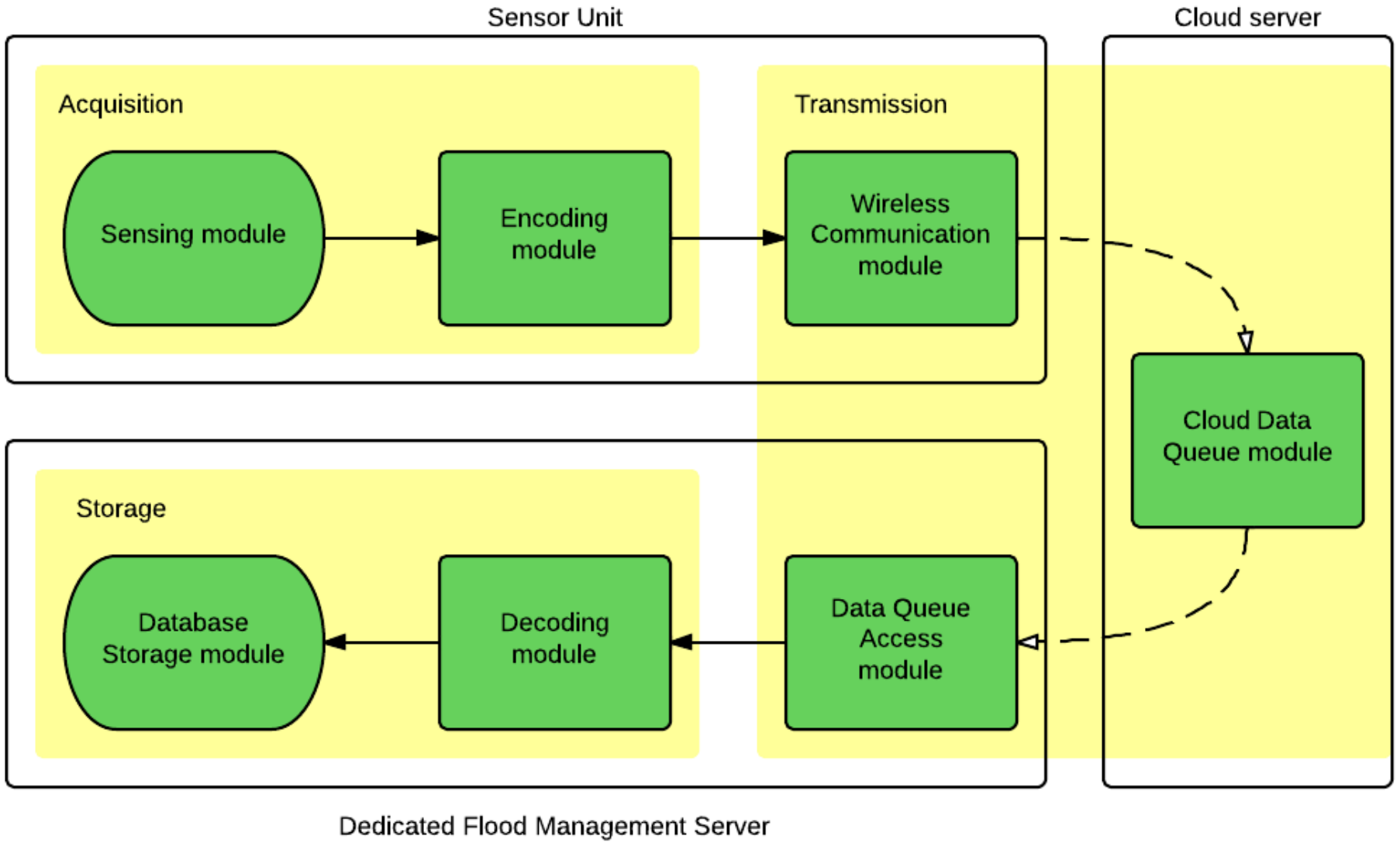
Microcontroller Side



Wireless GSM & GPRS Side

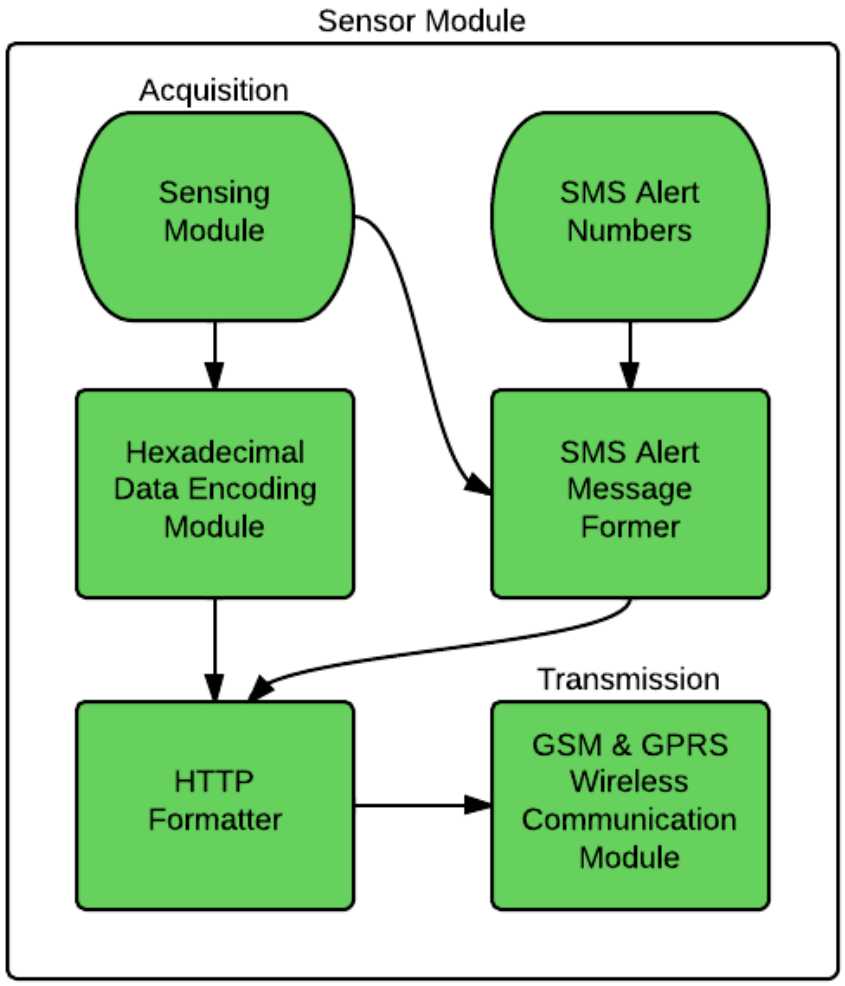


SOFTWARE ARCHITECTURE

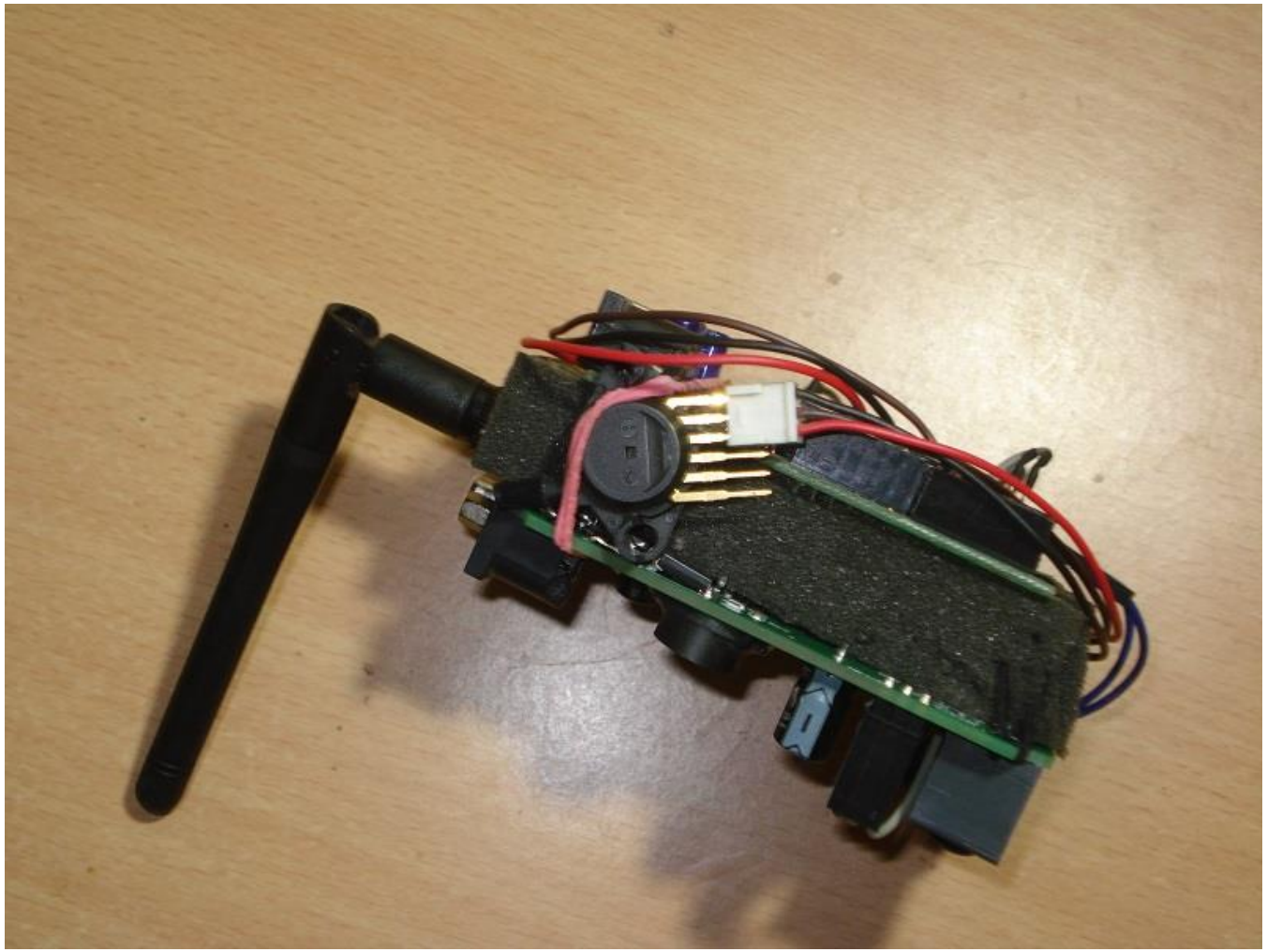


DATA FLOW: ORIGIN

Block Diagram

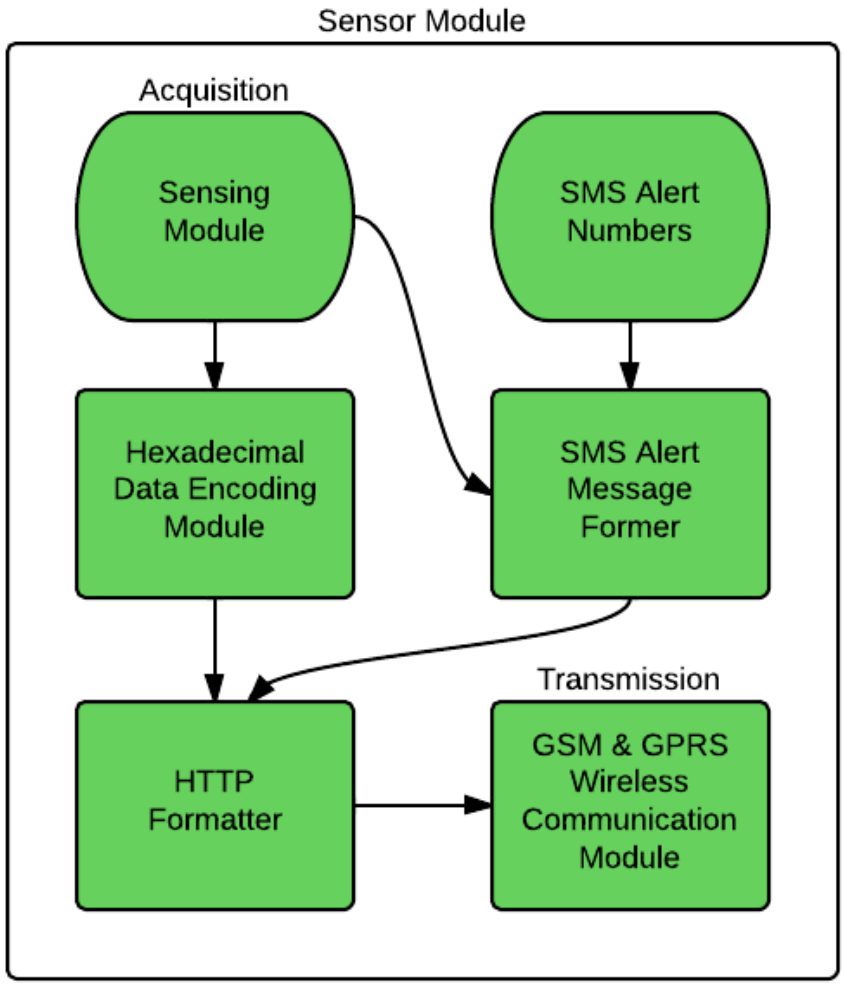


Operation

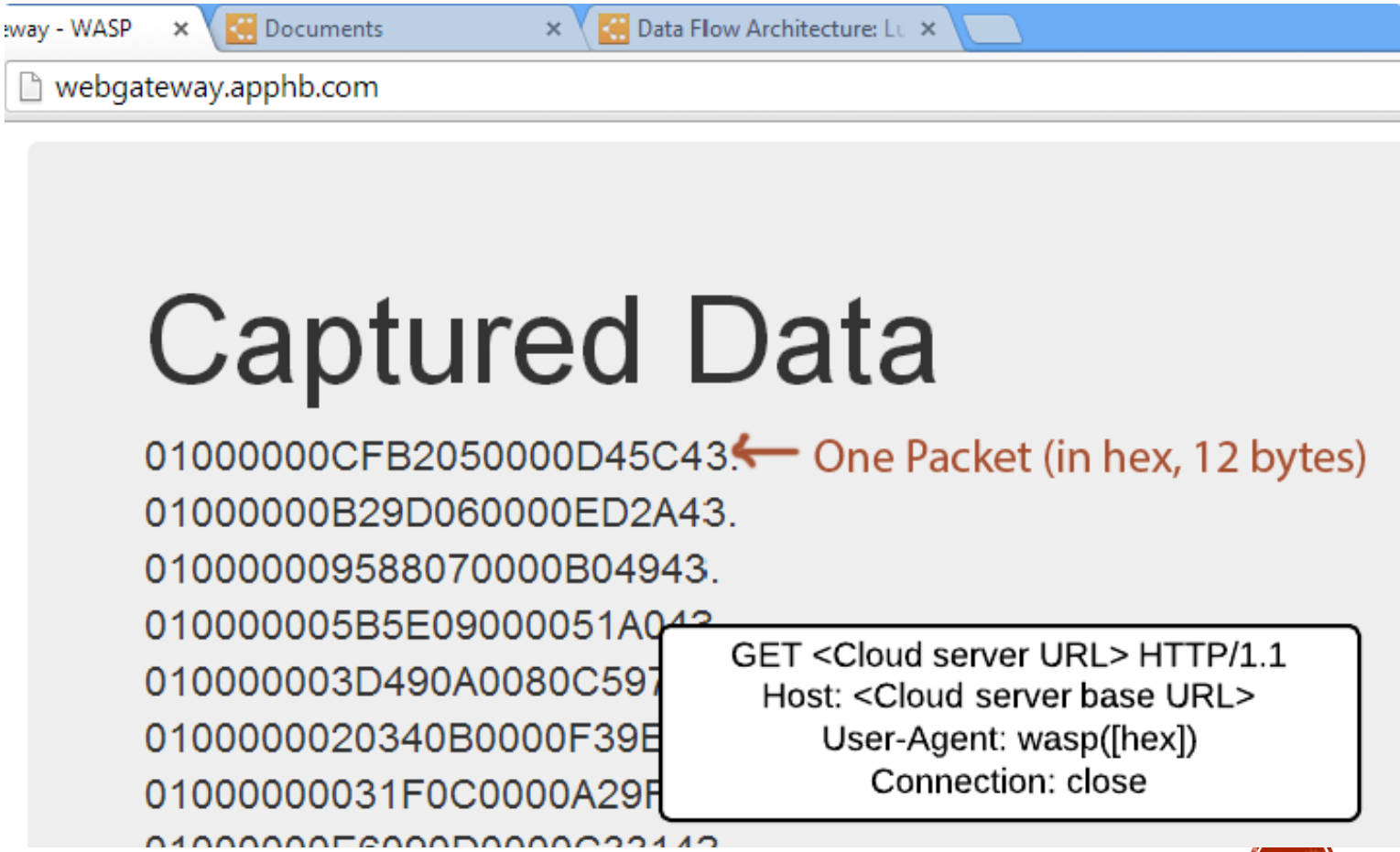


DATA FLOW: ENCODING AND FORMATTING

Block Diagram

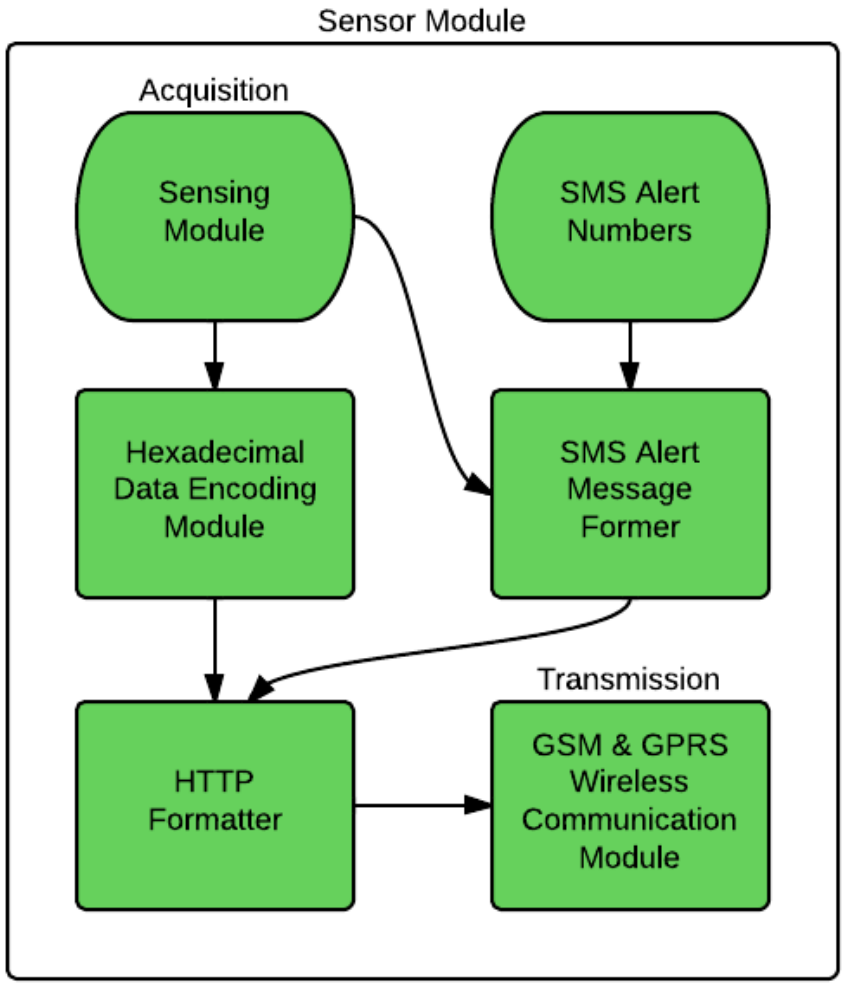


Operation

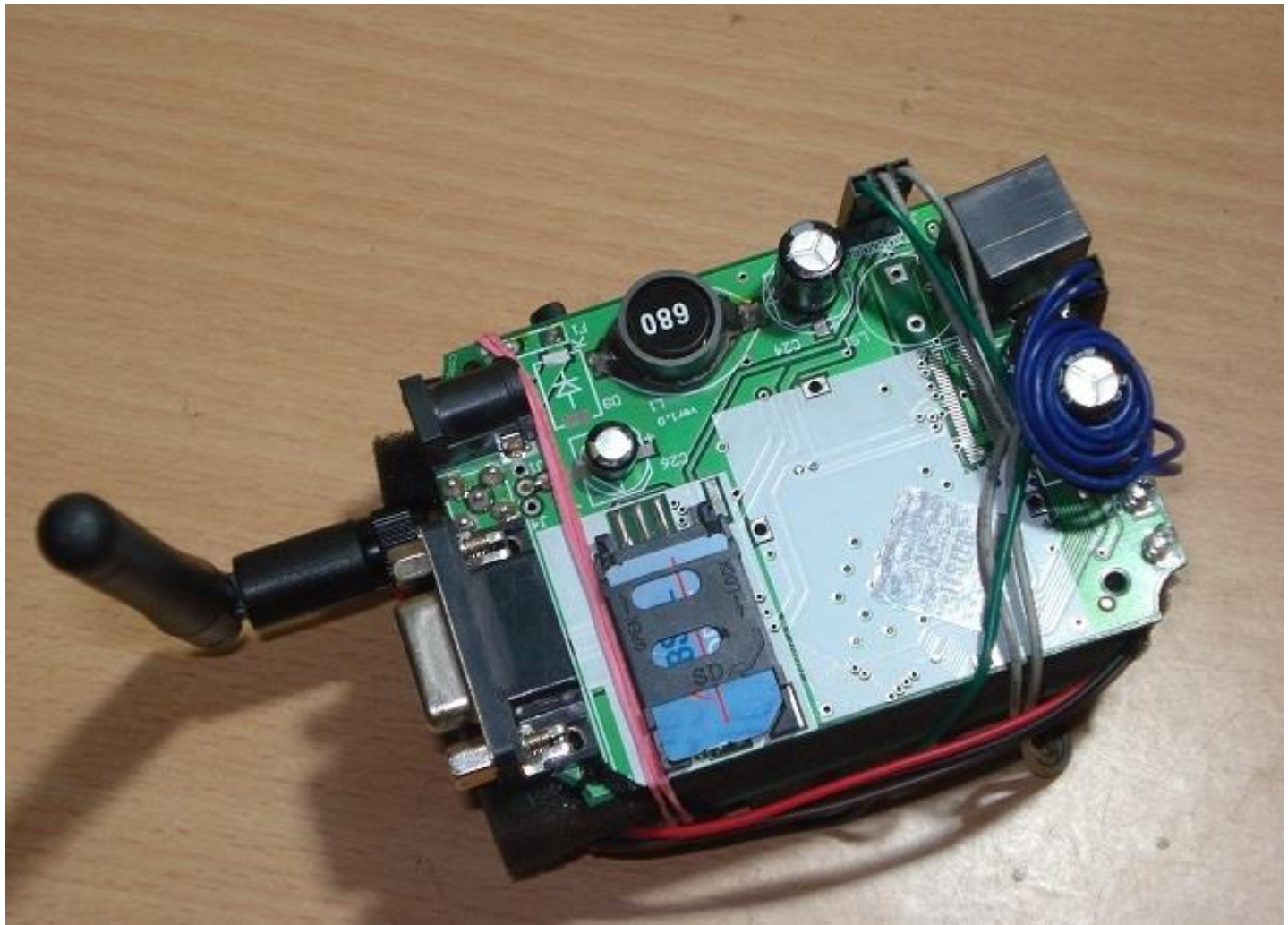


DATA FLOW: WIRELESS TRANSMISSION

Block Diagram

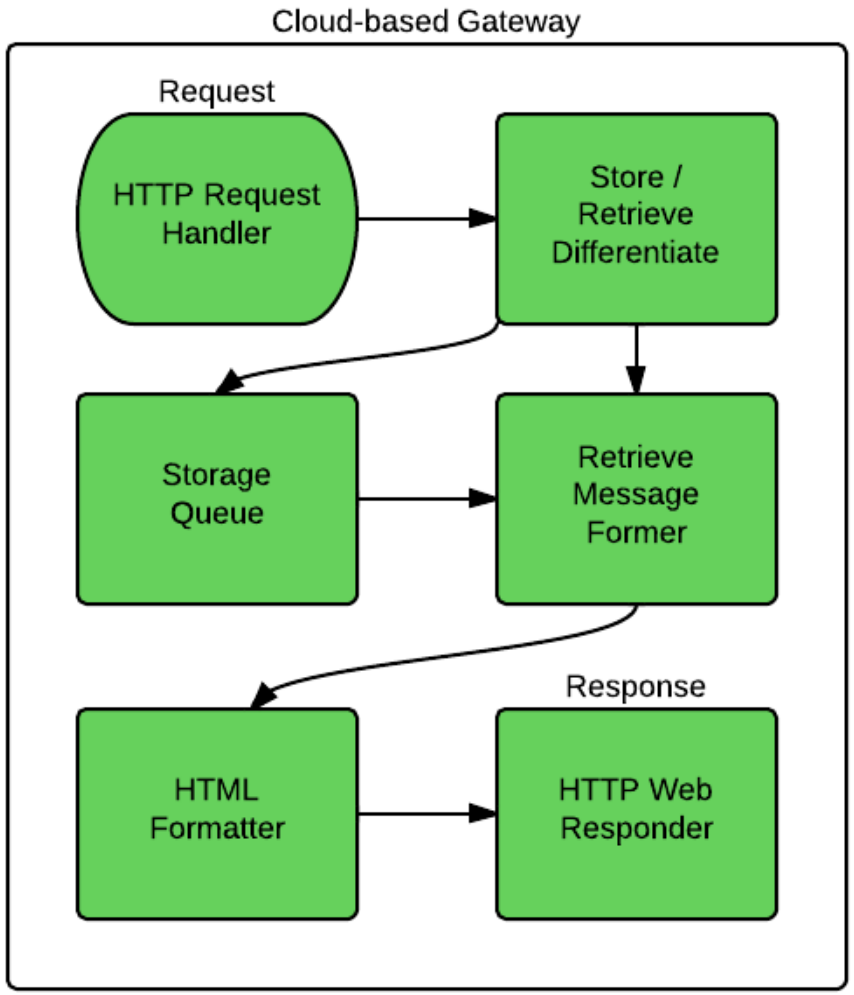


Operation

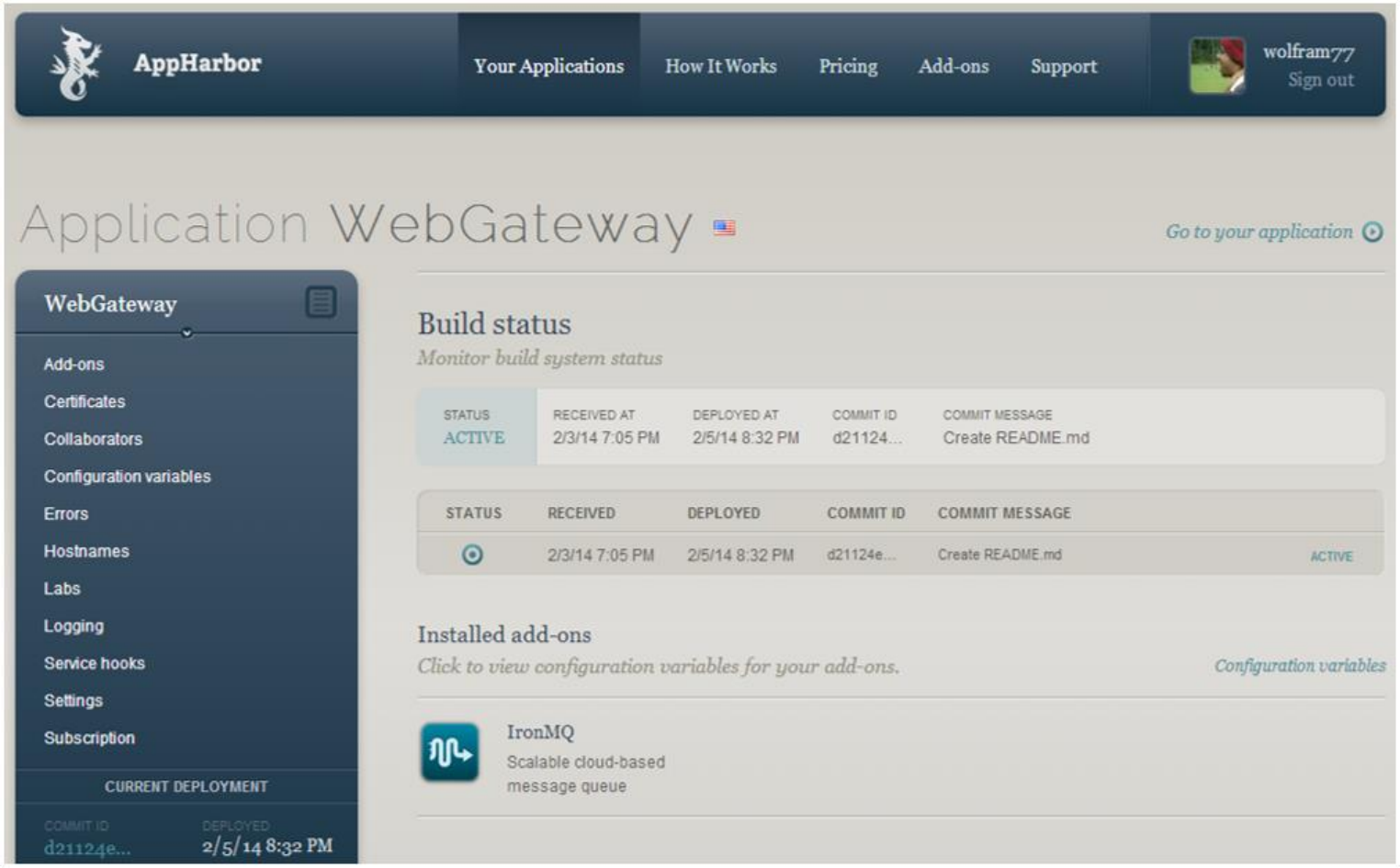


DATA FLOW: INTERMEDIATE GATEWAY

Block Diagram

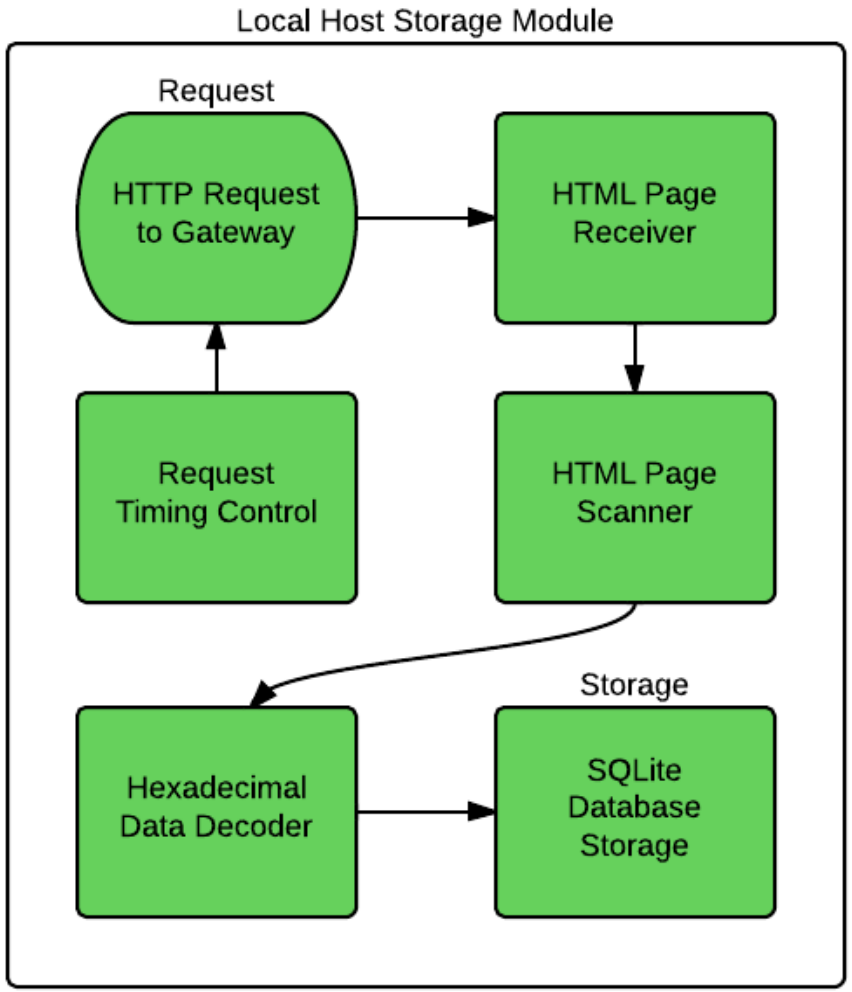


Operation

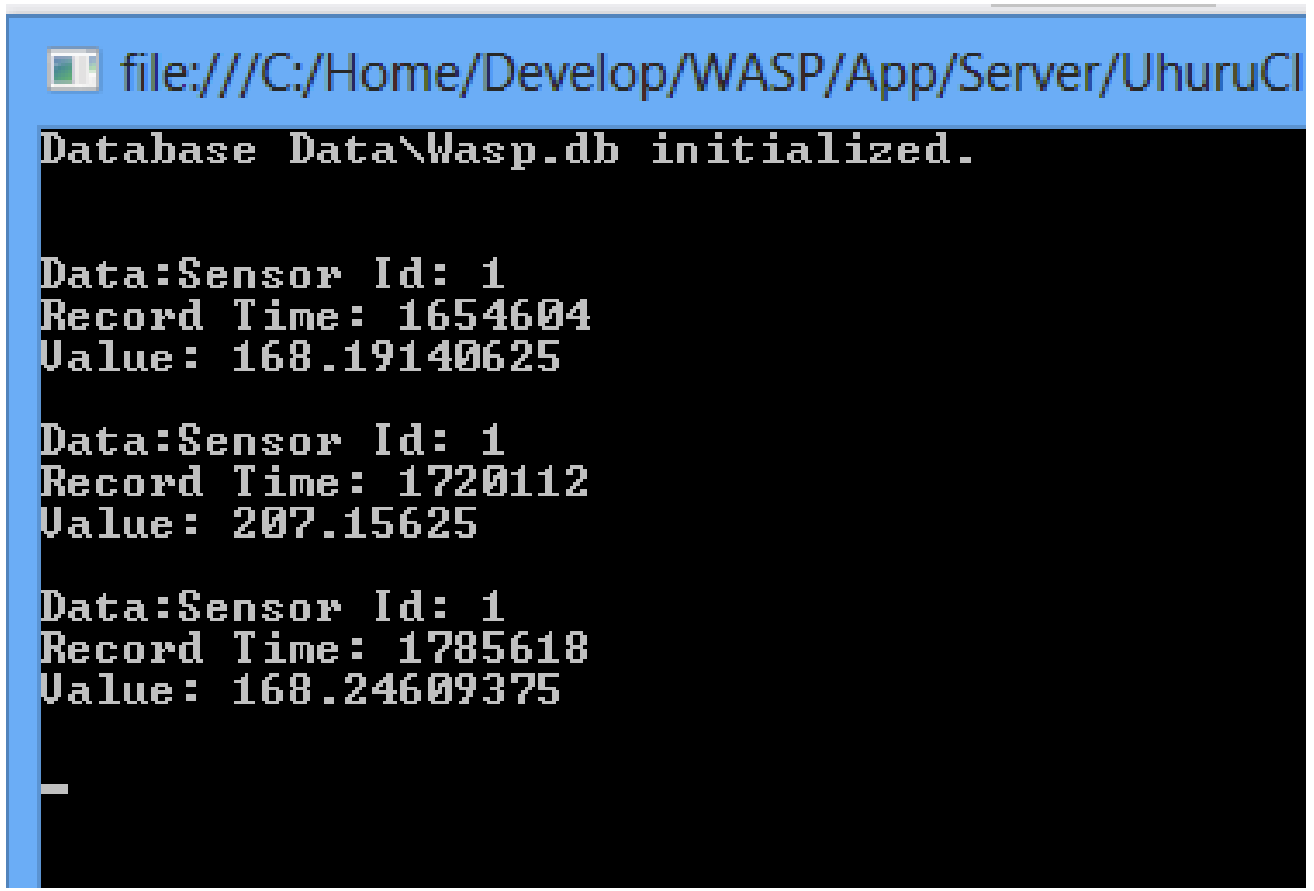


DATA FLOW: RETRIEVAL FROM GATEWAY

Block Diagram

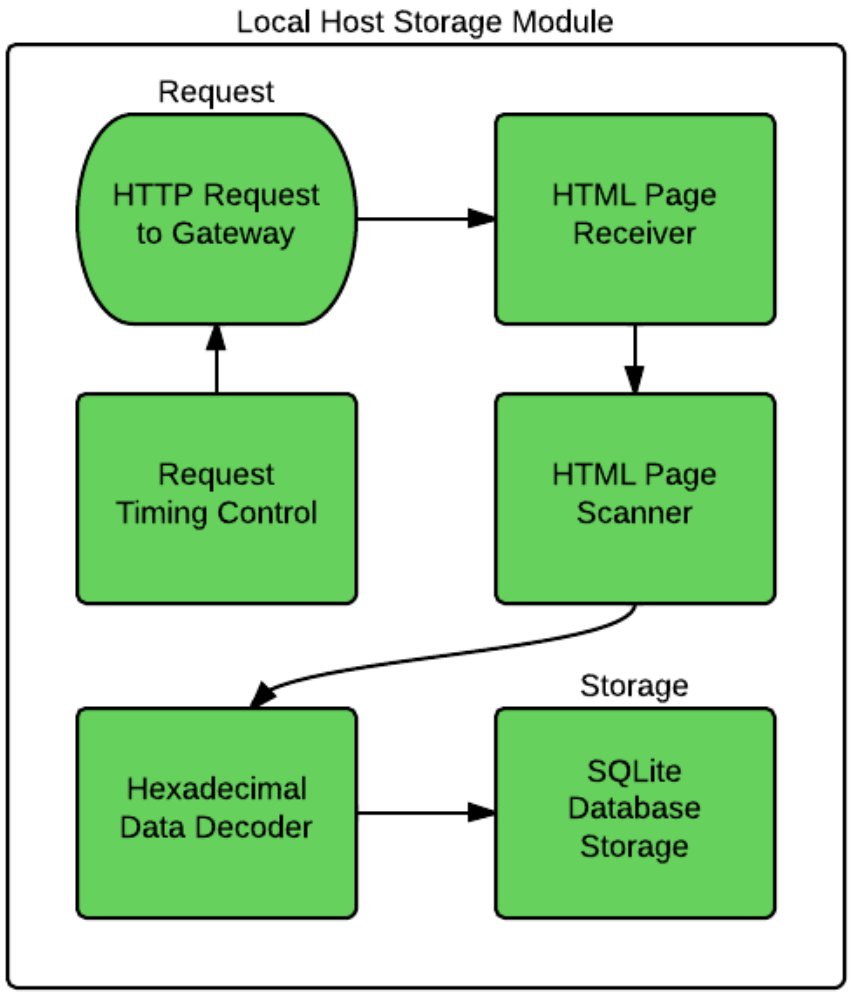


Operation

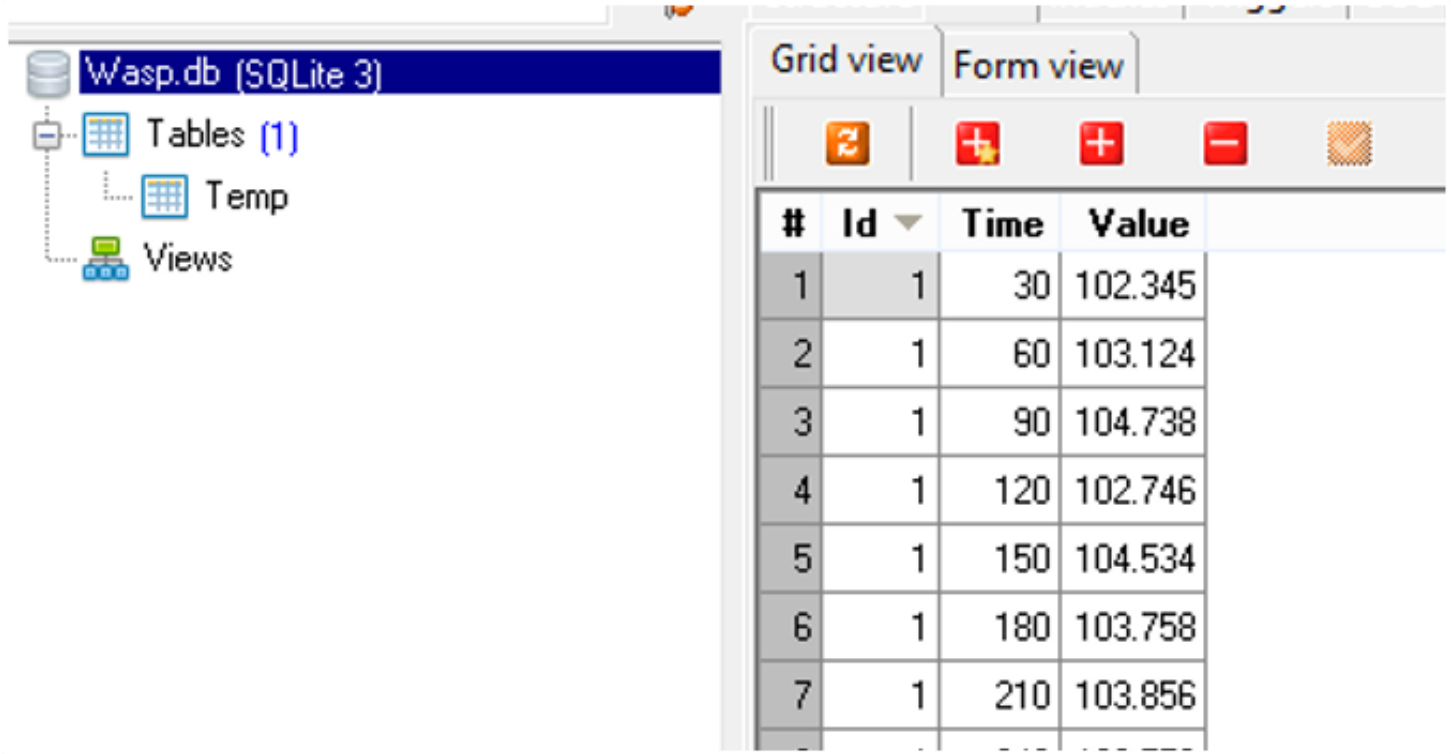


DATA FLOW: STORAGE TO DATABASE

Block Diagram



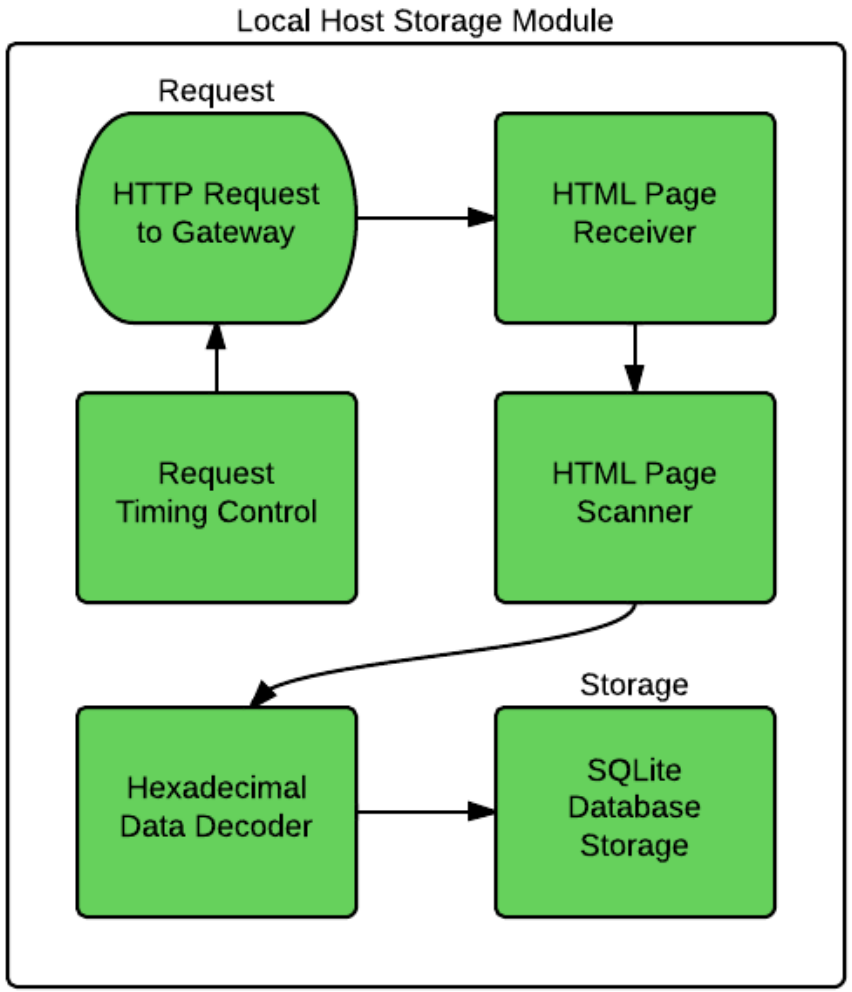
Operation



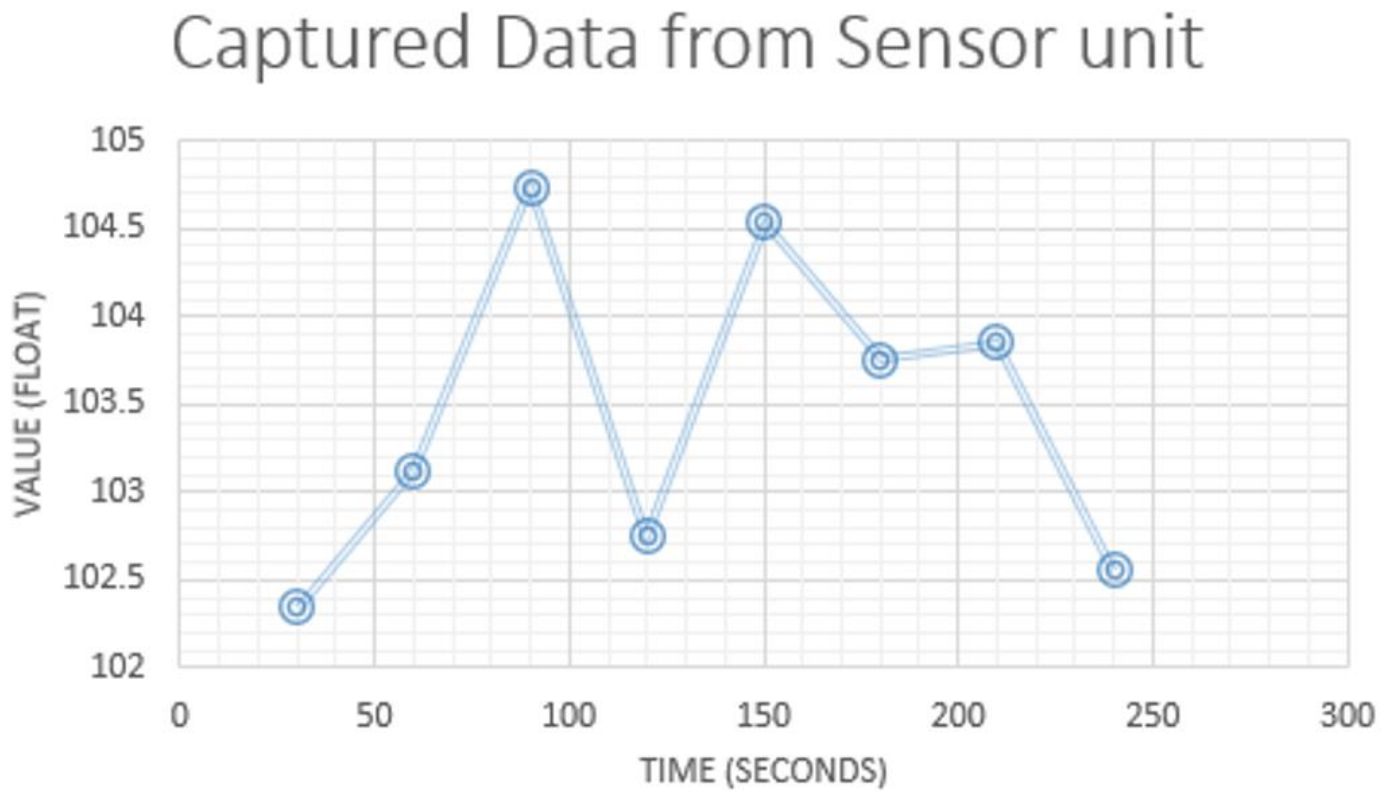
#	Id	Time	Value
1	1	30	102.345
2	1	60	103.124
3	1	90	104.738
4	1	120	102.746
5	1	150	104.534
6	1	180	103.758
7	1	210	103.856

DATA FLOW: DATA VISUALIZATION

Block Diagram

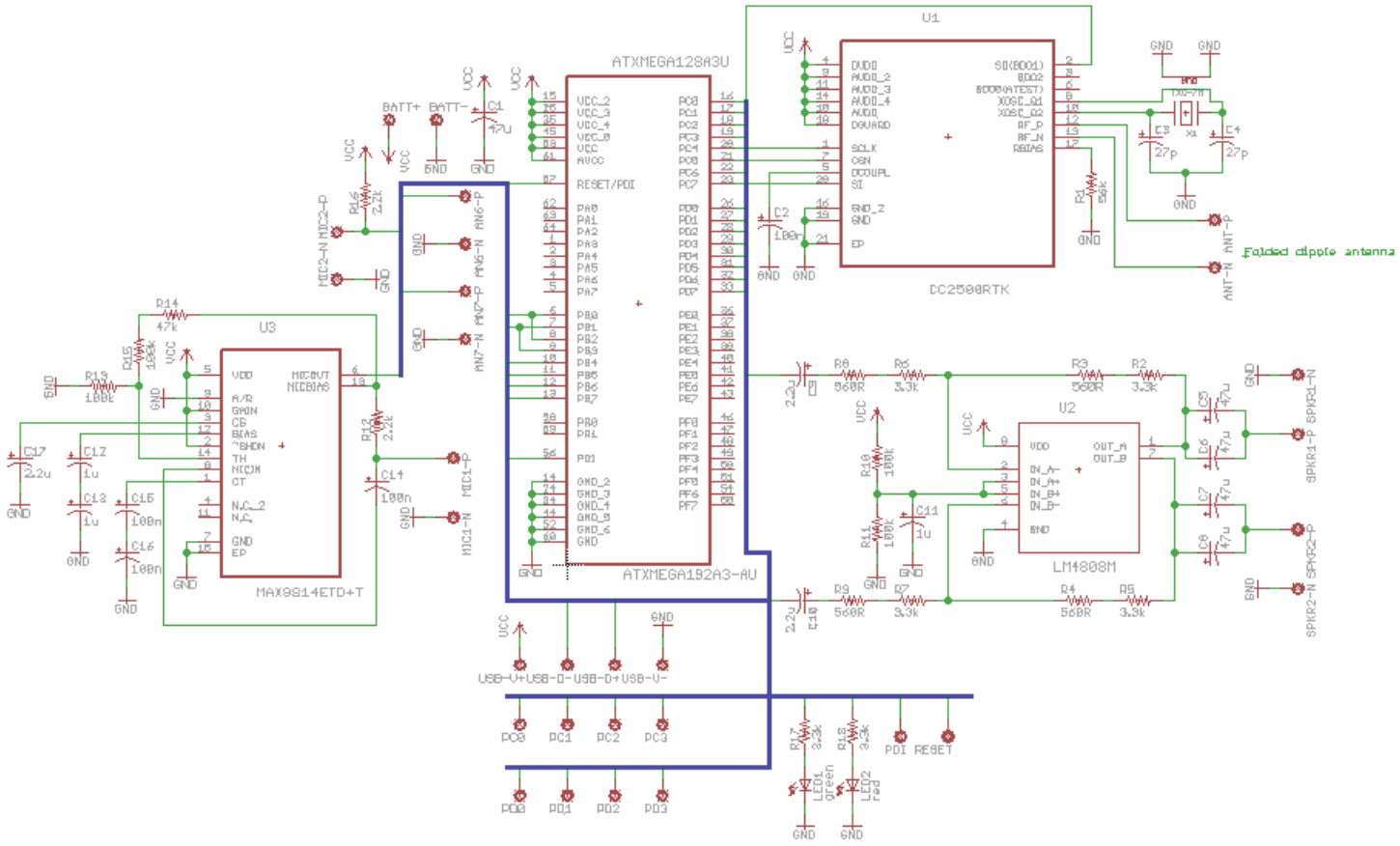


Operation

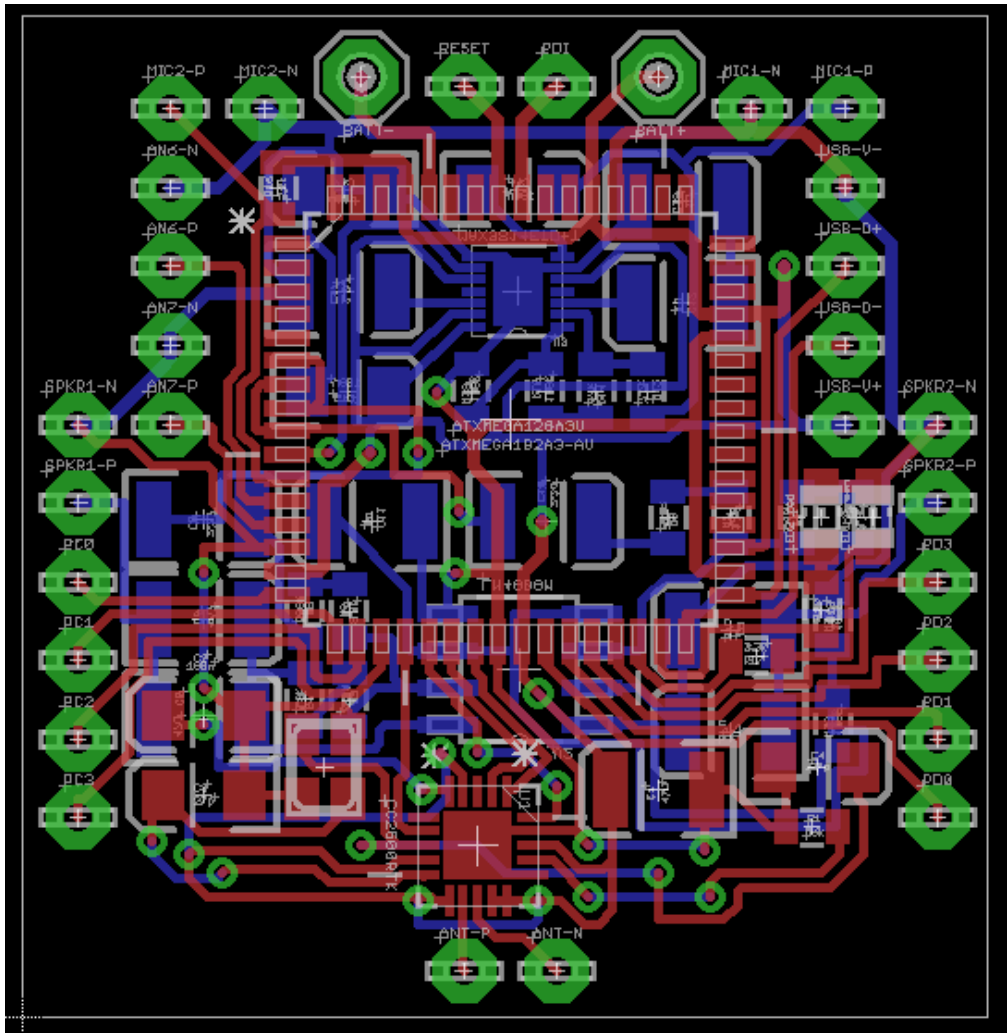


SYSTEM ON SINGLE PCB: DESIGN

Schematic Design

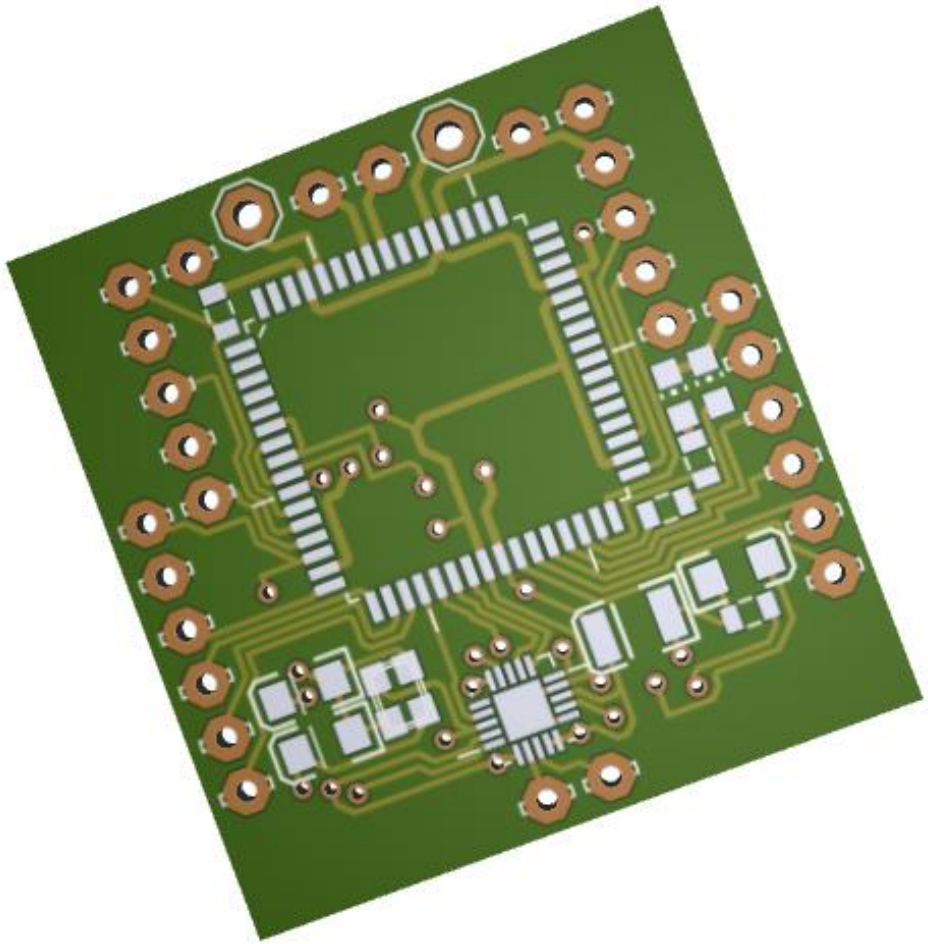


PC Board Layout

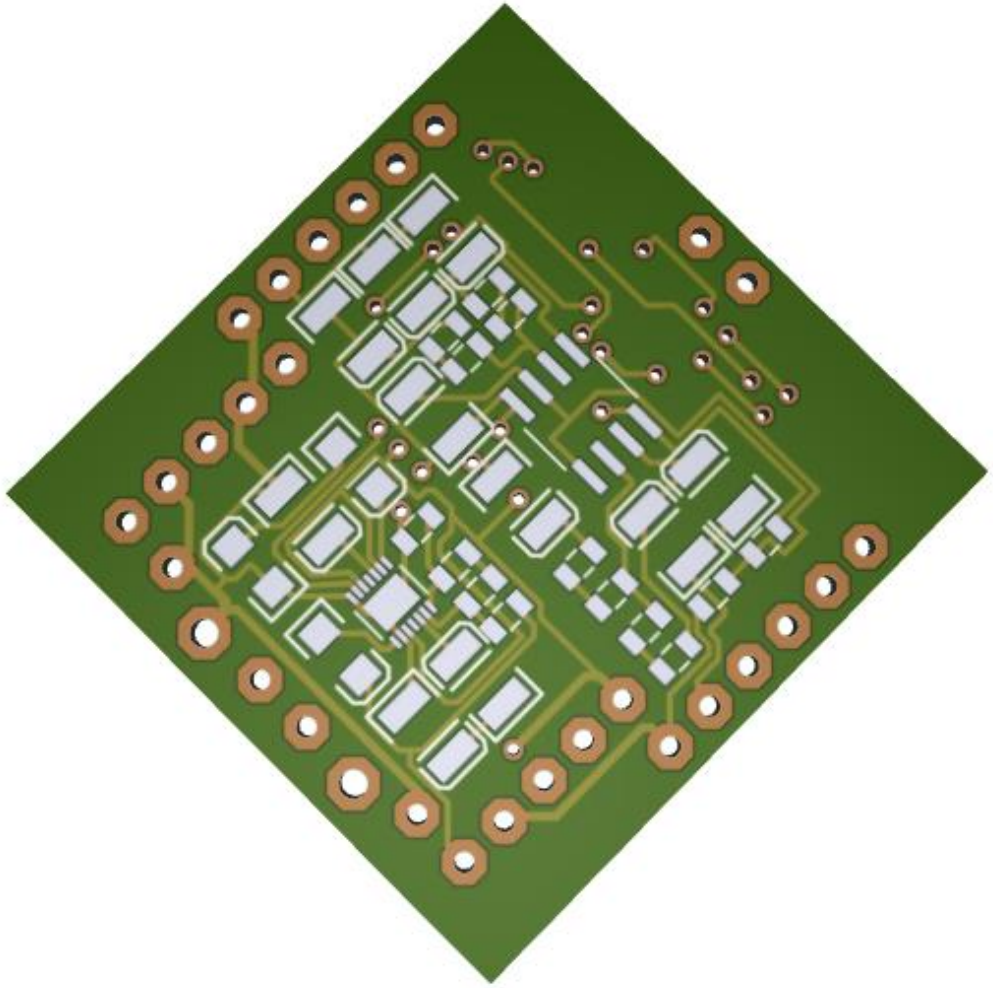


SYSTEM ON SINGLE PCB: DESIGN

Component Side - Gerber 3D



Solder Side - Gerber 3D



SOFTWARE / IDES USED

Heterogeneous Sensor Module

C / C++

Arduino IDE

Atmel Studio

Cloud-based Gateway

.NET 4.5

Visual C#

Visual Studio

SOFTWARE / IDES USED

Local Host Storage Module

Data Searching and Usage

CONCLUSION

- An **internet-based** heterogeneous-sensor **flood management system** was developed that **measures a parameter** (air pressure) and delivers it **wirelessly, wherever desired** (office).

MAJOR REFERENCES

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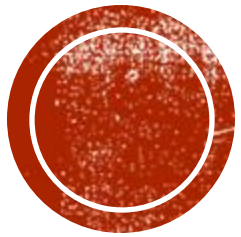
- V.V. Krzhizhanovskaya, G.S. Shirshov, N.B. Melnikova, R.G. Belleman, F.I. Rusadi, B.J. Broekhuijsen, B.P. Gouldby, J. Lhomme, B. Balis, M. Bubak, A.L. Pyayt, I.I. Mokhov, A.V. Ozhigin, B. Lang, R.J. Meijer. Flood early warning system: design, implementation and computational modules. International Conference on Computational Science, ICCS 2011.
- W. Al-Sabhan, M. Mulligan, G.A. Blackburn. A real-time hydrological model for flood prediction using GIS and the WWW. Computers, Environment and Urban Systems 27 (2003), 9-32.



THANK YOU