



GadgEon
Engineering Smartness



Ultra Low Cost IoT Home Gateway with IPv6 support

Worldwide leader in universal control and sensing technologies wanted a ultra low cost IoT Home Gateway with associated cloud and mobile applications for securing home against fire, flood and freeze.

Project Size: 15 members

Project Duration: 9 months

Technology Used: MT7688, Zwave, SubGHz RF, OpenWRT, IoTivity, Node.js, iOS/Android, AWS

Challenge

- Bringing down the overall cost of the system down to few tens of dollars

Outcome

- Simple and reliable Hub at a very low cost for securing home against fire, flood and freeze
- Supports multiple wireless technologies for sensor and actuators ie 433MHz and Z-wave
- Uses the home router for connection to the internet either using WiFi or ethernet

WHAT DID GADGEON DO?	PLATFORMS/ TECHNOLOGIES USED
1) Architecture for complete system including Hub, Cloud and mobile application	<ul style="list-style-type: none"> ▪ Requirements Gathering & Analysis, Uses cases, Architecture development, identification of functional components.
2) Hardware design with low cost optimization, prototyping, board bring up	<ul style="list-style-type: none"> ▪ Cadence allegro ▪ Feasibility analysis for meeting sub 20\$ BoM cost . Comparing multiple MCU and MPU based system designs to arrive at the lowest cost option. ▪ Identifying pin compatible alternatives for memory with different capacities (SPI flash and DDR) for future proofing the software.
3) Hub Firmware	<ul style="list-style-type: none"> ▪ Low level linux ▪ U boot customization for the specific RAM and flash memory on the custom board. ▪ Openwrt porting to the custom board ▪ Board bringup using JTAG. Modifying JTAG scripts for custom hardware. ▪ Board manufacturing test software with testing for all interfaces ▪ Power on self test ▪ Driver integration for the Z-wave ▪ Application software ▪ Porting and Integration of Z/IP Gateway for Z-wave interface on MT7688 ▪ Development of protocol stack for handling communication with the PIC MCU ▪ Running custom protocol on 433MHz. Mt7688 communicates to PIC over UART interface. ▪ Integration of MQTT stack for communication with AWS IOT cloud service. ▪ Integration of SQLite DB ▪ Modifying the openwrt firmware upgrade to support fail safe firmware upgrade ▪ Security – Support for mutual authentication with cloud



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