Akhilesh Moghe

Senior Engineering Lead

Mobile: +91-8446140906
Email: akhileshmoghe@live.com
LinkedIn: linkedin.com/in/akhilesh-moghe/
Website: https://akhileshmoghe.github.io/

Result-oriented software engineer focused on the Architecture, Design and implementation of IoT/Edge device/Cloud applications for device, data & software updates management. Successfully delivered 3 IoT projects in last 3.5 years with AWS IoT, Ayla IoT Networks cloud platforms on Nvidia Jetson + x86 CCB + STM32 devices. Overall, 10 years of IT services industry experience in IoT, Cloud, Telecomm & Multimedia domains.

Software Development:
Broker Architecture, Client-Server Architecture, Agile, Test Driven Development, Design Patterns, REST, Service Oriented Architecture
Technologies Frameworks:
NodeJS, Robot Operating Systems (ROS1 & ROS2)
Cloud Platforms:
AWS, Azure, Ayla IoT Platform, Firebase, PubNub, Mender.io
AWS Services:
AWS IoT, Greengrass, Lambda, API Gateway, SNS, Robomaker, S3
Azure IoT Hub, IoT Edge, Device Update, Azure Stack Hub, ML Deployment, Storage, Container
Programming Languages:
C, C++, C++11, Python, JavaScript, Shell Script
IoT Protocols:
MQTT, D-Bus, DDS, ZeroMQ, AMQP, Serial, MAVLink, TCP-IP, UDP, HTTPS
Databases:
MongoDB, MongoDB Realm, InfluxDB, SQLite
Continuous Integration:
Git, Docker, Kubernetes
Build Tools:
Make, CMake

Soft Skills:
Attention to details, Connecting the dots, Analyzing and inferencing, Time Management, Communication, Teamwork

Experience:
- Senior Engineering Lead at Persistent Systems (Oct 2021 – Present)
- Engineering Lead at Persistent Systems (Jan 2019 – Sept 2021)
- Module Lead at Persistent Systems (Jan 2016 – Dec 2018)
- Senior Software Engineer at Persistent Systems (June 2014 – Dec 2015)
- Software Engineer at Persistent Systems (July 2011 – May 2014)

Education:
- **Post Graduate Diploma in Embedded Systems and Design**
  Centre for Development of Advanced Computing (CDAC), Hyderabad
- **B.E. in Electronics and Telecommunication**
  Rashtrasant Tukadoji Maharaj Nagpur University

Projects:

1. **Edge IoT Framework primarily for Life Sciences Use-cases**
   - **Role:** Solutions Architect (3 Months)
   - **Accomplishments:**
     - Worked on common ***Edge IoT use-cases***, various possible scenarios considering data flows, data types, data restrictions, privacy, latency, bandwidth consumptions, connectivity restrictions, etc., primarily revolving around Life Sciences projects and devices.
     - Evaluated Open-Source Edge Projects such as ***KubeEdge***, ***ioFog***, ***EdgeX, LF-Edge*** Umbrella projects against identified use-cases.
     - Evaluated suitability of ***AWS IoT Greengrass*** and ***Azure IoT Edge*** + other AWS/Azure on-premises services for various Edge computing scenarios, presented pros & cons of both public cloud platforms and created various possible use-cases architecture/design with AWS/Azure as primary components of framework.
     - Architecting a common framework based on open-source Edge projects which can complement the public cloud services in on-premises Edge computing scenarios.

2. **Jetson Nano based Healthcare IoT Device as a Guided Pipetting Tip Sensing System**
   - **Role:** Systems Engineer (6 Months)
   - **Accomplishments:**
     - Carried out PoC tasks like **flashing boards** to simulate mass flashing at factory, **customizing RootFS**, **Secure Boot**, **Bootloader Splash Screen**, Interfacing **Bluetooth module** with NVIDIA L4T BSP software for **Jetson Nano**. All these PoC tasks resulted in concrete plan to be executed at factory manufacturing.
     - Designed and implemented firmware, application, configuration and system update mechanism based on **Mender-Yocto** Open-Source project.
     - Designed and implemented device side IoT connectivity features like device registration, status, identity, user-device association, certificates management, file and device shadow upload/download.

3. **STM32 MCU based Portable COVID-19 Diagnostic device kit**
   - **Role:** Firmware Developer (4 Months)
   - **Accomplishments:**
     - Designed and Implemented **STM32F407** based MCU firmware to achieve USB communication with Android app using Virtual COM Port, Flash memory read/write, PWM generation.
     - Created a dummy test application in Python to automate the testing of STM32 firmware.
     - Received "***Bravo Award***" for the delivering the project in *3 months*.
     - Client Received $2 Million funding to continue development based on our Project

4. **OTA Firmware Updates for a STM32 MCUs and full OS Updates for x86 carrier boards**
   - **Role:** IoT Developer (14 Months)
   - **Accomplishments:**
     - Designed and implemented custom bootloader with Dual Active/in-Active bank strategy for **STM32F407** MCU to achieve robust firmware update requirements. **MAVLink** communication protocol and checksum verification were few of the other key features implemented.

- Designed & developed Python3 module to achieve **OTA firmware update** for multiple STM32 MCUs connected to main CCB. **AWS IoT Jobs**, **Device Shadow**, **Secure Cloud communication** and UART based serial communication were few other key features.
- PoC for **full OS image** and **Application update** using **Mender.io** Open-Sorce project. Full OS OTA updates with Mender server hosted on EC2. Also, same kind of updates with USB and over LAN were also achieved with local Python server.
- Evaluated and finalized **Ayla IoT platform** for early market release without full fledge cloud development. Device provisioning, status, firmware updates to multiple devices, sensor data streaming were key features achieved in *4 months duration*.
- Designed and implemented a **NodeJS module** for Data Synchronization between device and cloud using **MongoDB Realm** and **MongoDB Atlas** cloud databases. Understanding of new platform and successful delivery was achieved in *3 months*.

5. Drone-based Asset Inspection with AWS IoT Greengrass & AWS Robomaker Services

- **Role:** Robotics, IoT Developer (8 Months)
- **Accomplishments:**
  - Demos were successfully showcased at CERAWeek 2019 and AWS re:MARS 2019 events
  - Drone simulation around oil-rig running in background in AWS official Tech Talk
  - Understanding of the new to be launched or recently launched **AWS Services** like **Robomaker**, **Greengrass, AWS IoT** and their use-cases for Robotics projects were achieved in *3 months* with demonstratable applications as an outcome.
  - Robotics Drone applications had features like Rust and leakage detection Machine learning models deployments with **AWS IoT Greengrass** to multiple devices as drone, mobile robots and x86 machine. **AWS IoT device shadow** updates and **IoT Jobs** for firmware update were also used.
  - Drone application had features to capture and upload the thermal and normal camera videos to **AWS S3** buckets, which were consumed by **AWS Sagemaker** for machine learning training.

6. WebMeeting (Screen Sharing Application) for MAC and Windows

- **Role:** Backend Developer (26 Months)
- **Accomplishments:**
  - Received "***You Made a Difference Award***" for the extensive work done in the initial phase of the project, which helped the team to scale up and gain Client's Confidence.
  - Understood the Chromium Projects relevant modules, build systems which can be reused to create a **cross-platform** Screen Sharing application which used **VP8 video codec** and **WebM packetizer**. Demonstrated the key functionality of screen sharing in couple of months.
  - Evaluated and AWS S3, Dropbox, Google Drive for file sharing capabilities, but Client did not pursue another cloud platform and file share was implemented with Firebase & PubNub.
  - Designed and developed HTTP transport modules for screen sharing data + Chats + Files sharing modules with **Firebase** & **PubNub** cloud platforms.
  - Later, it was developed into a full-fledged product with multiple browsers supports + Chat, file share, recording capabilities. The core screen sharing product is still in production.
  - PoC application was developed for **Image & Text Detection** in screen share data using an open-source library.

7. IBM Content Collector (part of IBM Enterprise Content Management)

- **Role:** Module Lead Engineer (18 Months)
- **Responsibilities:**
  - Module Lead Engineer for IBM Content Collector for Email (primarily for IBM Notes/Domino).
  - Developed Domino & Notes Application for Content Collector Expiration Manager module using Lotus Scripts.
  - Debugged and resolved multiple server-side crashes, which improved stability of the product. resulting in retaining the customer to continue use IBM Domino/Notes applications.
  - Solved crucial Application Recovery issue with Email Connector module, that had seriously hampered overall product usability in case of unavoidable server-side crash.
  - Debugged and solved build issues with JNI exports in DLLs that caused intermittent application hang problem.
  - Thoroughly Analyzed the crash reports and provided sufficient evidence to prove the issues with 3rd party components/APIs.
  - Debugged ANT based build structure to resolve build issues.