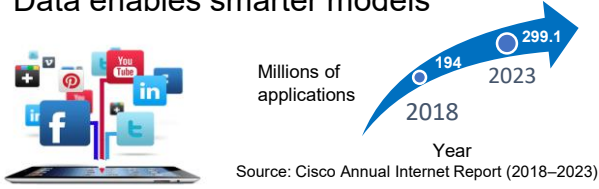# An Adaptive Federated Meta-Learning Framework for Autonomous Systems

Zhengxin Yu, Neeraj Suri (PI), Lancaster University

Background
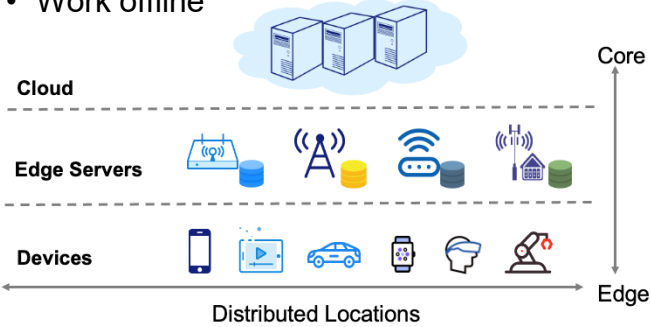
Data is born at the edge
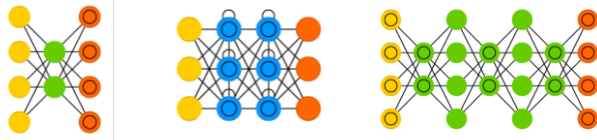- Billions of smart devices generate data
- Data enables smarter models

Millions of applications

194 2018

299.1 2023

Year

Source: Cisco Annual Internet Report (2018–2023)

Data processing is moving on edges
- Improved service latency
- Work offline

Cloud — Core

Edge Servers

Devices

Distributed Locations — Edge

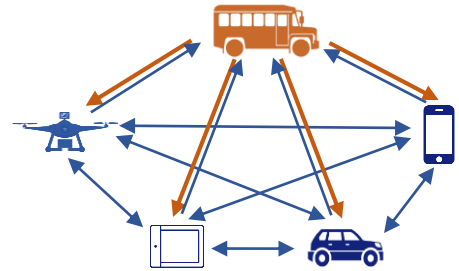### Emerging machine learning technologies

Challenges

- High mobility of ASs
- Diversity of the AS environment
- Non-IID data distribution among ASs
- Security and privacy risks

Methods

- **An adaptive meta-learning architecture** is proposed to adapt to new environment.
- A **peer-to-peer FL framework** is developed to reduce privacy risks and support mobility of ASs.
- An initial shared model and personalized models for ASs are trained in the framework.
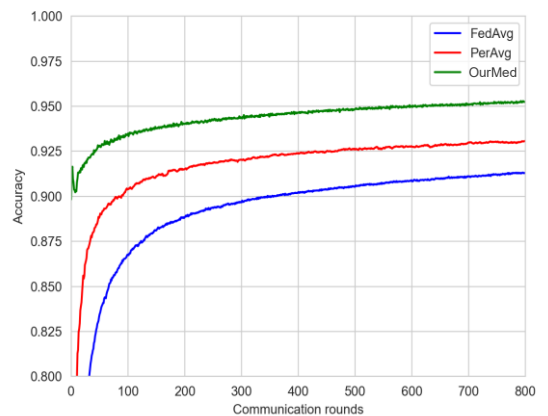

Model Training

Each node

Updated Model

Download Model

Local Dataset

Model Aggregation $\sum$
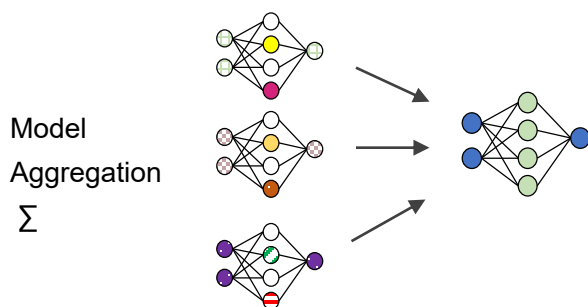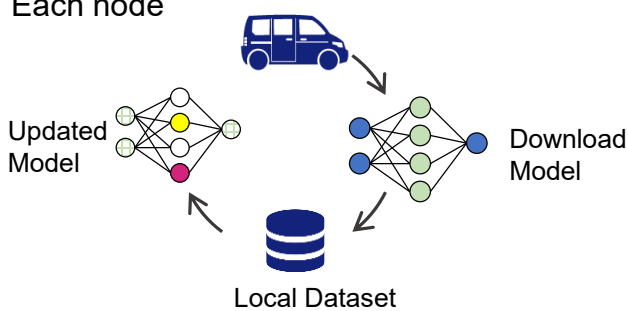
Experimental Results

Acknowledgements