

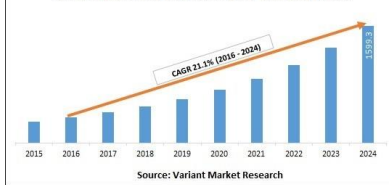
# DAC YF Validating a reliability simulation framework for IoT networks

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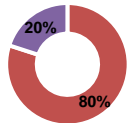
## Motivation

Global IoT market valued \$1600 bn in 2024

Global IoT Market Size and Forecast, 2015 - 2024 (US\$ Billion)



Failure in IoT networks is expensive



- Maintenance cost of IoT devices
- Other operational costs

## Reliability model

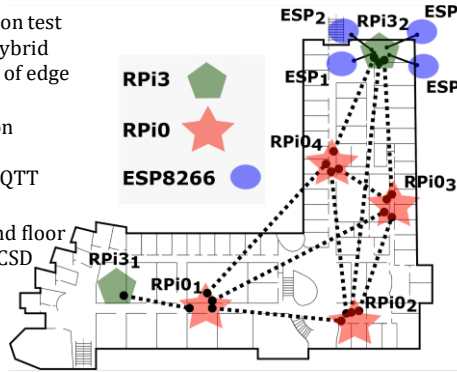
$$MTTF = \int_0^{\infty} R(t) dt; R(t) = e^{-\lambda_f t}$$

MTTF = Mean Time To Failure;  
R(t) = Reliability;  $\lambda_f$  = Failure rate

- Reliability decreases exponentially with increase in failure rate

## Validation framework

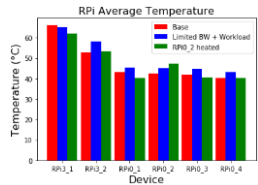
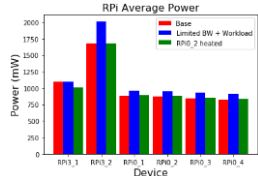
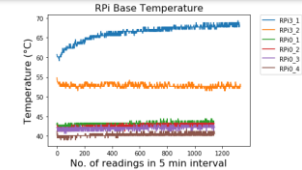
- Built a validation test bed having a hybrid mesh network of edge devices
- Communication in multi-hop network via MQTT protocol
- Setup in the 2nd floor CSE Dept. at UCSD



## Experimental setup

- Captured time-series power and temperature data in 5 min intervals
- Scenario 1: Room temperature
- Scenario 2: Limited bandwidth and running workloads
- Scenario 3: Higher ambient temperature on Raspberry Pi Zero #2

## Results



- 10% error between simulation & real-world setup