Smart management of remote IoT WSN

May 2016

Ihsan Lami, Alnoman Abdulkhudhur
Department of Applied Computing, Buckingham, UK
Outline

- Internet of Things?
- Wireless Sensor Networks?
- The Proposed Scheme
- SMART what?
- Low Power Wide Area Networks?
Internet of Things (IoT)?

- Growing network of objects that can communicate with each other and complete tasks without any human involvement having to take place.

- Gradually coming to market, where tens of billions of devices around the home, cars, trees, etc will communicate with each other.
Wireless Sensor Networks consist of numerous sensor nodes that are deployed in a geographical region for the purpose of monitoring, gathering and transferring the sensed data to a server via gateways/AP/Basestations.

Cloud

Gateway

Can be a Single Sensor or a cluster Station of Nodes
Exist: Many Energy Efficient WSNs

- Clustering techniques (fixed or dynamic) can be based on location, distance, energy level, etc.
• Introduce cloud based management for an IoT-WSN
• Deep-learning **Smart** monitoring and control, **on the go**
• Hierarchical clustering to enable use of Cheap/Dumb sensor nodes at Very low bit rate
• Connectivity “activity” between nodes and areas influence clustering and frequency of connectivity
• Power usage and legacy recorded data influence **path chosen**
• Diversity algorithm to enable multi-protocol communication
• WPT? Harvesting?
Deep learning?

- Learn about the information/legacy information data
- Analyse nodes behavior/activity & important or not
- Develop decision strategies for USER and POWER, for clustering, routing, scheduling of transmission, etc.
Smart Hierarchy?

Cloud based controller with unlimited resources

Cloud

Gateway

Clusters can be based on power or location

Routing paths can be based on activity or power

Cooperative wireless technology

Clusters can be based on load of data or activity

Sensor Nodes

Convenience

Cooperative wireless technology

Learned intelligence

Maximise network lifetime

Fit-Fit with activity

TIME, LOCATION, TYPE OF NODE, ENERGY LEVEL, BEST PERFORMANCE, ETC.
Low Power Wide Area Networks?

- A new market is now emerging with the deployment of Low Power Wide Area Networks (LPWAN)
  - Expected to bridge the gap between current LAN and WAN
  - Target low-cost machine-to-machine communication for IoT

- LPWAN Technologies
  - LoRa
  - Weightless
  - SigFox

- Lora is our testbed for building our Smart Scheme
Low Power Wide Area Networks?

- LoRa technology

- Long range 15 – 20 km
- Millions of nodes
- Long battery life over 10 years
Thank you for your Suggestions!