UAV based SDN system for wireless sensor networks

ABSTRACT

Abstract goes here.

1 INTRODUCTION

Introduction goes here.

2 RELATED WORK

Introduction goes here.

3 ARCHITECTURE

The architecture of the UAV based SDN system for wireless sensor networks.

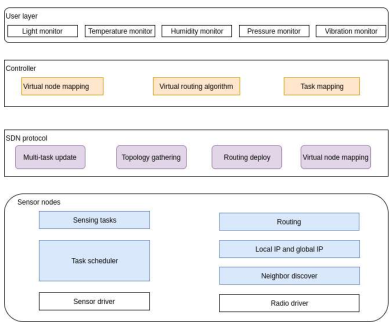

Figure 1: Architecture of the system.

4 NETWORK CONSTRUCTION

4.1 Sensor selection

ssss Physical topology : uniform distribution (Density ffi).

Sensor selection algorithm:

1) A simple cluster algorithm: threshold -The distance between sensors && the overlapping of sensing area && the similar neighbor list.
2) SRSSS Algorithm (AAAI-16) - trained by an AI model based on the collected data.

Output : Redundant nodes

4.2 Topology Mapping

Redundant nodes are mapped to a virtual node. They can awaken each other according to their residual energy. When:

$$ResidualEnergy(i) \leq \xi \cdot ResidualEnergy(j) \quad turn\ node\ i\ to\ node\ j$$

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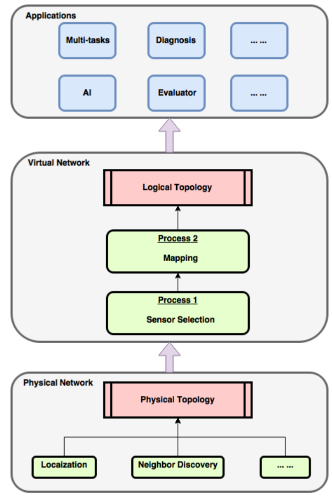

Figure 2: Implement modules.

Table 1: System API

Function	Description
Sensor Control API	
switchSensor(node,state)	Turn on or turn off the sensor
getSensorInfo(node)	Get sensor's information, including sensor's position, duty cycle, power, etc.
setSensorAttribute (node,attribute,value)	Set node attribute, including duty cycle, radio strength, etc.
getNeighborList(node)	Get the neighbor list of a node
Application API	
Routing	
getTopology()	Get the topology of the network
setParentNode(Cnode,Pnode);	Set Pnode as the parent of Cnode
setRoutingTable(node,table);	Set the routing table of a node
AI prediction	
getData(nodeset,datatype)	Get the data of the nodeset
trainModel(dataset)	Train the AI model online
predictData(pos)	Predict the data at any position
Evaluator	
Deploy(nodeset,file,layer)	Deploy a file to the layer of the nodeset
Evaluator(nodeset,metric)	Evaluate the metric of the nodeset

These virtual nodes are called critical nodes in the logical topology while other nodes are called ordinary nodes.

4.3 Logical routing

Critical nodes first (CNF) algorithm

5 APPLICATIONS

Design the following applications and provide APIs to users.

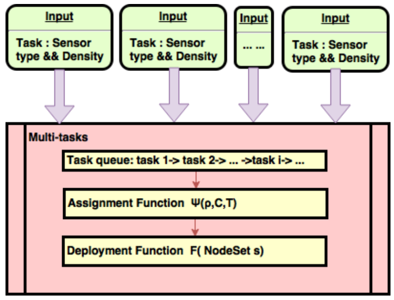

Figure 3: Multi-tasks.

5.1 Multi-tasks

Each task has a deployment density ρ.

Assign tasks to the sensors with less tasks first.

Assign tasks to critical nodes fitst

5.2 Evaluator

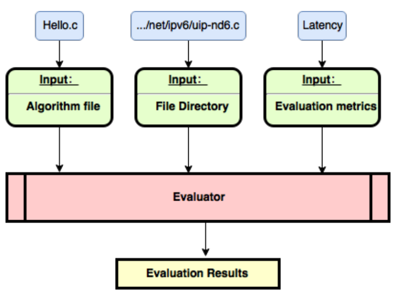

Figure 4: Evaluator.

Provide APIs for users to update network algorithms through OTA.

Input: the algorithm function and its location/standard name(tell where to replace it)

Evaluate the performance of the new algorithm.

Input: the evaluation metrics

In our implementation, we will take neighbor discovery algorithms for experiments.

5.3 Diagnosis

5.4 AI

AI helps creating smarter sensor systems.

AI systems have been improving, [4] and new advances in machine intelligence are creating seamless interactions between people and digital sensor systems.

In sensor systems, applications can be found for a variety of tasks, including selection of sensor inputs, interpreting signals, condition monitoring, fault diagnosis, machine and process control, machine design, process planning, production scheduling, and system configuring. Some examples of specific tasks undertaken by expert systems are: * Assembly [44] * Automatic programming [41] * Controlling intelligent complex vehicles [42] * Planning inspection [46] * Predicting risk of disease [48] * Selecting tools and machining strategies [45] * Sequence planning [43] * Controlling plant growth. [47]

AI can increase effective communication, reduce mistakes, minimize errors, and extend sensor life.

The tools and methods described have minimal computation complexity and can be implemented on small assembly lines, single robots, or systems with low-capability microcontrollers. These novel approaches proposed use ambient intelligence and the mixing of different AI tools in an effort to use the best of each technology. The concepts are generically applicable across many processes.

minimum energy, data loss, reliability, robustness, etc., in place during the design and operation of wireless sensor networks

a specific set of protocols for medium access, localization and positioning, time synchronization, topology control, security and routing are identified based on the current configuration of the network, the requirements of the application and the topology of their deployment.

6 IMPLEMENTATION

Implementation goes here.

7 EVALUATION

Evaluation goes here.

8 CONCLUSION

Conclusion goes here.