Advancing Research with Autonomous Boats : Collecting Aquatic Sensorial Data

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Abstract

The Project aims to develop an innovative autonomous data collection system for aquatic environments. This system utilizes a fleet of specialized boats equipped with OBU's to receive valuable data from different sensors, such as water quality, weather conditions, and marine life monitoring. The boats are designed to operate efficiently and effectively, providing a cost-effective solution for gathering crucial information.

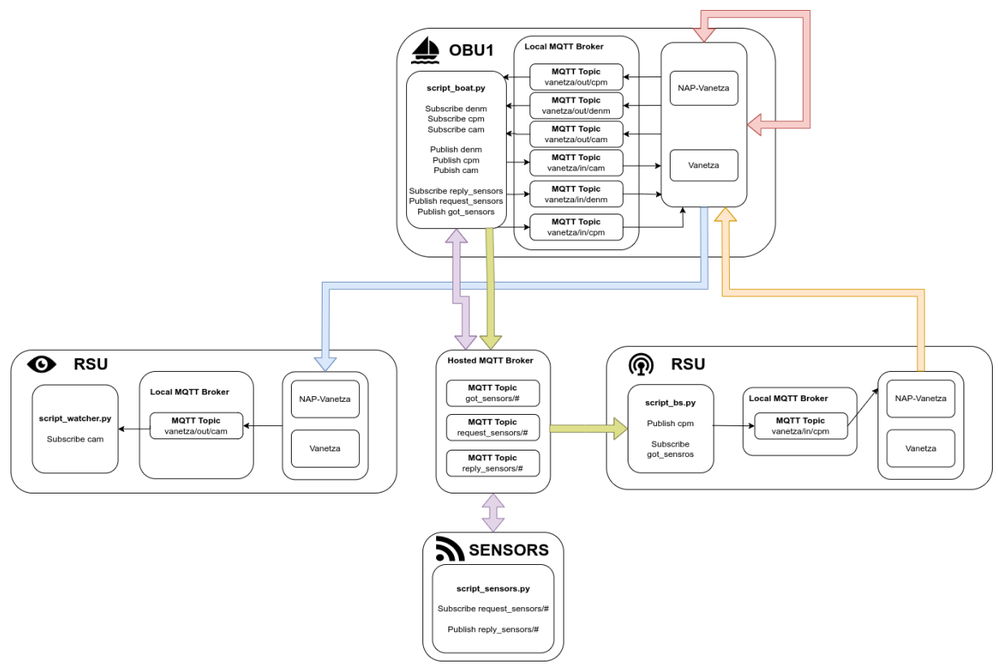

Fig 1- Diagram of Implementation

Methods

The OBUs communicate with the RSU and receive sensor locations. Each OBU evaluates the proximity of the sensors and selects one. Conflict resolution mechanism ensures fair allocation and prevents duplication if multiple OBUs choose the same sensor. OBUs exchange messages to resolve conflicts. Upon receiving these messages, the boats are able to resolve this conflict. OBUs navigate to chosen sensor locations and collect data. They check already chosen sensors shared by other boats to avoid redundancy. The ships do this until there are sensors available. Finally, the OBUs return to the RSU and send the collected data.

Between OBUs	
cam	Send current and future position
denm	Send the picked sensor position
cpm	Send unavailable sensors
RSU to OBUs	
cpm	Send location of sensor in the water
OBUs to RSU	
got_sensors	Sends the data collected from the sensors
Between OBUs and Sensors	
request_sensors	Sends the location of the desired sensor
reply_sensors	Replies with the data collected by the requested sensor

Fig 2- Message types

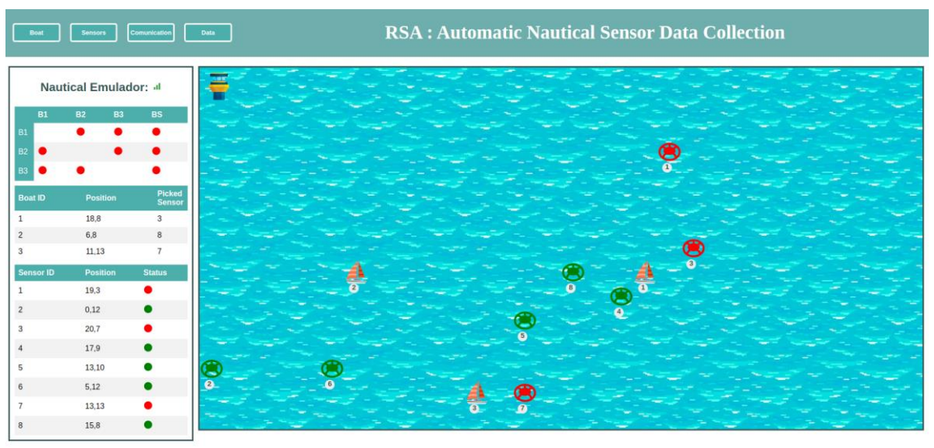

Fig 3- Emulator interface

Conclusion

Our methodology utilizes the VANETZA-NAP, extending Vanetza with MQTT and JSON capabilities for efficient data collection in aquatic environments. Autonomous boats with OBUs enable effective sensor selection, conflict resolution, and information sharing. The integration of MQTT facilitates seamless boat-RSU communication. This approach benefits applications like environmental monitoring and research.

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