

OBJECTIVE

Implement a mesh network of nodes (ESP32s + sensor modules) using LoRa using Doug Park's SBNPL algorithm into bodies of water to collect data about the health of the lake.

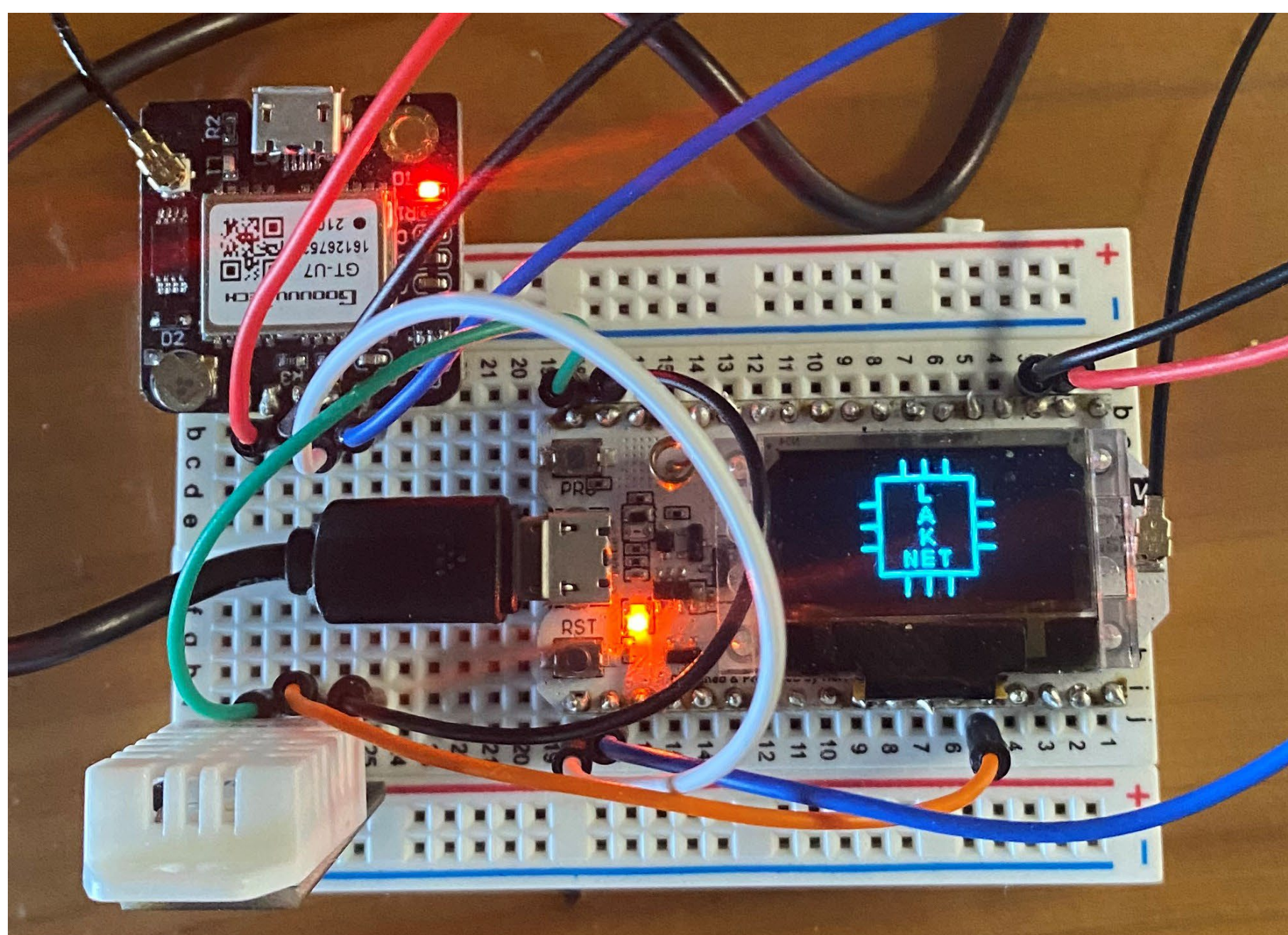
BACKGROUND

The lakes and waters of North Idaho and the surrounding areas need environmental monitoring in order to assess and maintain the health of the lake. There is a need to create a network of microcontroller nodes to be implemented into the lakes of North Idaho to collect environmental data.

KEY REQUIREMENTS

- At least 4 nodes in a mesh network using stateless LoRa protocol
- Gateway for data to Internet
- Database for retrieved information
- Network design to prevent data loss

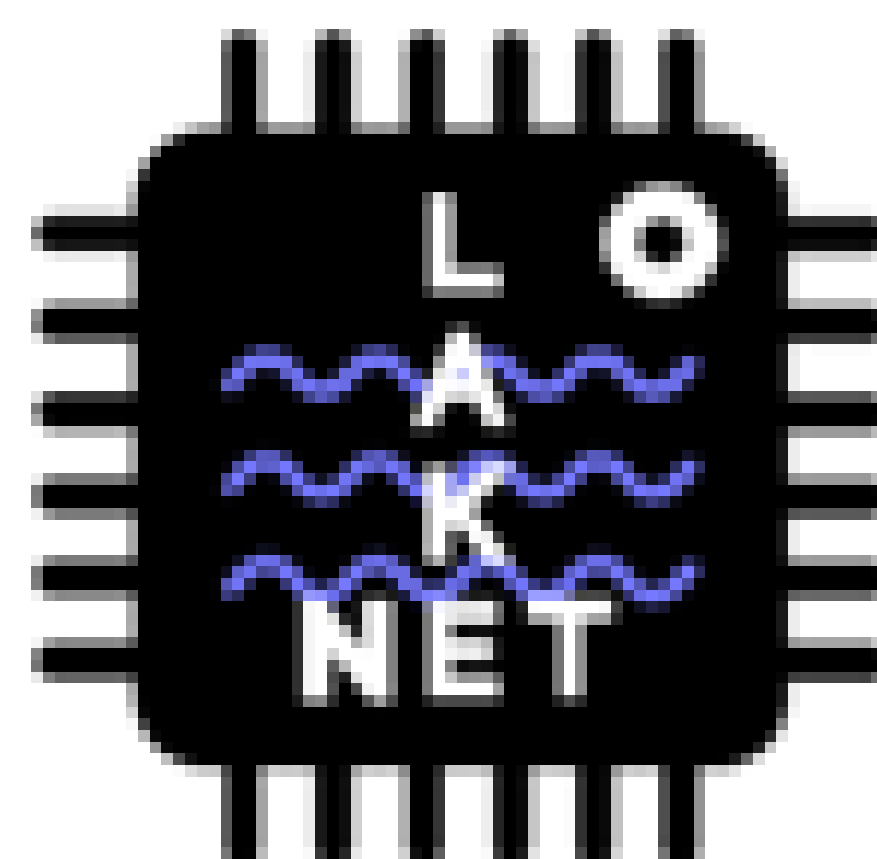
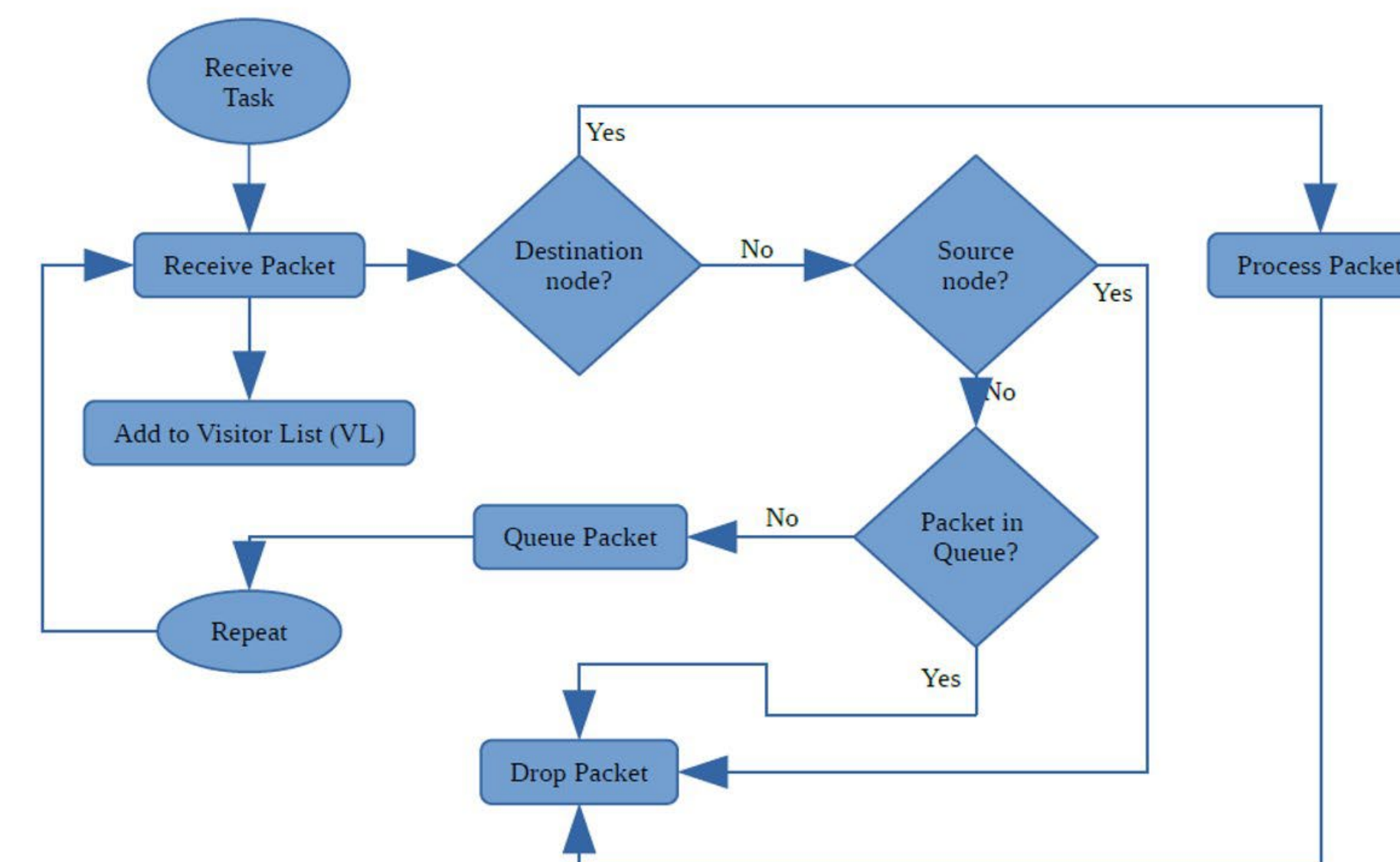
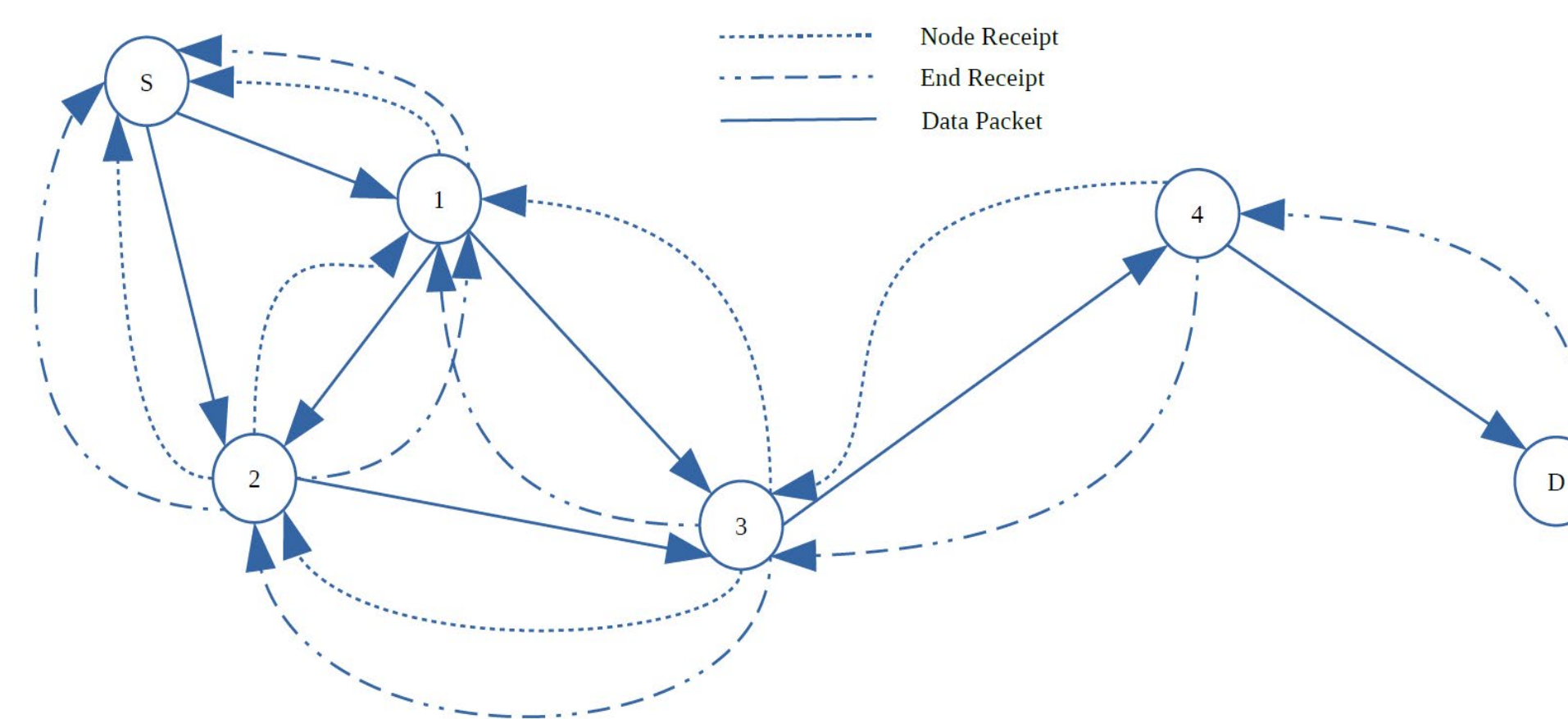
THE FINAL DESIGN



Heltec LoRa WiFi ESP32 v.2

CONCEPT DEVELOPMENT

- ESP32 FreeRTOS Implementation
- MySQL database
- Apache web server
- Stateless Broadcast Network Protocol for LoRa (SBNPL)



VALIDATION

Test	Date	Result
Node--Send and Receive Packet	11/15/2020 4/7/2021	Transmit LoRa packet
Create Packet	12/10/2020	Unique packet identifiers (nodes)
Sensors	2/27/2021	Collected Temp, Humidity
Send data to Database	4/20/2021	Website visualization

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

The mesh network we created based Doug Park's SBNPL algorithm accurately collects, transmits, and preserves data from sensors collected in the nodes. Our team proved that this mesh network works.

Future recommendations and project suggestions are the following:

1. Additional sensors
2. Power management
3. Sleep function
4. Buoy design

ACKNOWLEDGEMENTS

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