00:00

Hi my name is Damian and I am an EE undergrad for the smart park team.

00:04

My role for the project was to optimize our signal reliability between devices utilizing the lora protocol.

00:09

To fulfill my role, I used this semester to study the LoRa protocol and understand the factors that effect packet forwarding of parking space statuses. I also installed and configured our own personal gateway.

00:19

Here you can see a sender test program is being uploaded to our Arduino lora module.

00:24

Upon running this program a join Over the Air Activation request (OTAA for short) will be sent to a SmarkPark gateway configured using a raspberry Pi with a rak 2245 LoRa module.

00:34

Once the gateway accepts the join request we can begin to forward packets to our gateway.

00:39

The OTAA method requires that our sensor package receives a downlink of a join accept.

00:42

Understanding how OTAA works has allowed us to mitigate authentication issues by simply placing devices closer to the gateway only during join requests.

00:50

Here you can see that we have successfully connected and we can begin to forward packets as well as position our sensor in its desired location away from the gateway.

01:03

Through the ChirpStack application server hosted on the raspberry pi, I can conveniently collect the signal noise ratio and the received signal strength indicator to determine factors that degrade or improve our data transmission.

01:14

We can also utilize our application to decode base 64 encoded messages to ensure we received the original payload.

01:38

To further demonstrate demodulation of the original message we can send hello world to the application server.

01:51

Here you can see the link margin of our communication. The link margin is the difference between the received signal strength and the receiver sensitivity.

02:07

As you can see here our “hello world” message was successfully decoded.

02:32 cut and transition in between 02:07 – 02:32

From the ChirpStack application, packets are forwarded to a database called thingsboard where the value of the parking stall is stored.

02:42

From here is where our app development team takes over the forwarded packet, by making an API call to the database and updating the status of the stall.

02:50

END