START  
Sunday 9/19/2021 @ 10:30AM

Infrared Sensors for Parking

Reference on differing types (Magnetometer, IR, ultrasonic, and radar)

<https://hk.element14.com/smart-parking-solutions-the-iot-sensors-space-race>

<https://ops.fhwa.dot.gov/publications/fhwahop06006/chapter_6.htm>

Since we are going for magnetometer

Sensor I found is

# TLV493DA1B6HTSA2

DATASHEET

[https://media.digikey.com/pdf/Data%20Sheets/Infineon%20PDFs/TLV493D-A1B6\_Rev1.1\_4-9-19.pdf](https://media.digikey.com/pdf/Data Sheets/Infineon PDFs/TLV493D-A1B6_Rev1.1_4-9-19.pdf)

Infineon 3 axis sensor

[https://www.digikey.com/en/products/detail/infineon-technologies/TLV493DA1B6HTSA2/5891933?utm\_adgroup=Position%20Sensors%20-%20Angle%2C%20Linear%20Position%20Measuring&utm\_source=google&utm\_medium=cpc&utm\_campaign=Shopping\_Product\_Sensors%2C%20Transducers\_NEW&utm\_term=&utm\_content=Position%20Sensors%20-%20Angle%2C%20Linear%20Position%20Measuring&gclid=EAIaIQobChMIw7eKgrWL8wIVSW1vBB19vgAcEAQYAyABEgI0AvD\_BwE](https://www.digikey.com/en/products/detail/infineon-technologies/TLV493DA1B6HTSA2/5891933?utm_adgroup=Position Sensors - Angle%2C Linear Position Measuring&utm_source=google&utm_medium=cpc&utm_campaign=Shopping_Product_Sensors%2C Transducers_NEW&utm_term=&utm_content=Position Sensors - Angle%2C Linear Position Measuring&gclid=EAIaIQobChMIw7eKgrWL8wIVSW1vBB19vgAcEAQYAyABEgI0AvD_BwE)

Pricing tier

1 for $2.11

1000 for $0.88/per

To make it match up

# KITXMC2GOXMC1100V1TOBO1

Infineon dev board with XMC1100 chip on board (recommended in their datasheet)

[https://www.digikey.com/en/products/detail/infineon-technologies/KITXMC2GOXMC1100V1TOBO1/4832815?utm\_adgroup=Evaluation%20Boards%20-%20Embedded%20-%20MCU%2C%20DSP&utm\_source=google&utm\_medium=cpc&utm\_campaign=Shopping\_Product\_Development%20Boards%2C%20Kits%2C%20Programmers&utm\_term=&utm\_content=Evaluation%20Boards%20-%20Embedded%20-%20MCU%2C%20DSP&gclid=EAIaIQobChMIhb6At7aL8wIV4zo4Ch1Fmg7xEAQYAiABEgI56fD\_BwE](https://www.digikey.com/en/products/detail/infineon-technologies/KITXMC2GOXMC1100V1TOBO1/4832815?utm_adgroup=Evaluation Boards - Embedded - MCU%2C DSP&utm_source=google&utm_medium=cpc&utm_campaign=Shopping_Product_Development Boards%2C Kits%2C Programmers&utm_term=&utm_content=Evaluation Boards - Embedded - MCU%2C DSP&gclid=EAIaIQobChMIhb6At7aL8wIV4zo4Ch1Fmg7xEAQYAiABEgI56fD_BwE)

1 for $6.38

This uses UART communications

UART, or universal asynchronous receiver-transmitter

Make sure ALL components can take the weather swings

Looked into a RAK4200 eval board and breakout board  
-40C = -40F

105C = 221F

<https://www.thethingsnetwork.org/docs/lorawan/frequencies-by-country/>

Need to make sure that we are getting the right frequencies for the US

|  |  |
| --- | --- |
| United States of America (USA) | US902-928 |

Used in USA, Canada and South America

Uplink:

1. 903.9 - SF7BW125 to SF10BW125
2. 904.1 - SF7BW125 to SF10BW125
3. 904.3 - SF7BW125 to SF10BW125
4. 904.5 - SF7BW125 to SF10BW125
5. 904.7 - SF7BW125 to SF10BW125
6. 904.9 - SF7BW125 to SF10BW125
7. 905.1 - SF7BW125 to SF10BW125
8. 905.3 - SF7BW125 to SF10BW125
9. 904.6 - SF8BW500

Downlink:

1. 923.3 - SF7BW500 to SF12BW500 (RX1)
2. 923.9 - SF7BW500 to SF12BW500 (RX1)
3. 924.5 - SF7BW500 to SF12BW500 (RX1)
4. 925.1 - SF7BW500 to SF12BW500 (RX1)
5. 925.7 - SF7BW500 to SF12BW500 (RX1)
6. 926.3 - SF7BW500 to SF12BW500 (RX1)
7. 926.9 - SF7BW500 to SF12BW500 (RX1)
8. 927.5 - SF7BW500 to SF12BW500 (RX1)
9. 923.3 - SF12BW500 (RX2)

<https://www.thethingsnetwork.org/docs/lorawan/limitations/>

Need to understand any limitations with LoRa WAN that COULD make it a bit more cumbersome (like the not-real-time data).

Question now: Is purchasing a ‘pre made’ package a good idea? This will probably depend on the CS team in how they want to manage the app and data.

How the duty cycle will affect our sending/receiving to/from sensors to server.

<https://www.thethingsnetwork.org/docs/lorawan/duty-cycle/>

Modulation and Data Rate

<https://www.thethingsnetwork.org/docs/lorawan/modulation-data-rate/>

Glance thought: Having these modules on the light posts to mitigate time loss, data/package loss, and the ability to send more data, and use less power on each LoRa WAN module.

LoRa WAN Modules

https://www.google.com/search?q=LoRa+WAN+Arduino&client=firefox-b-1-d&channel=nus5&biw=1440&bih=807&tbm=shop&ei=koZHYcOiFuO7qtsPjqqLmAc&oq=LoRa+WAN+Arduino&gs\_lcp=Cgtwcm9kdWN0cy1jYxADMgQIABANMgYIABANEBgyBggAEA0QGDIICAAQDRAeEBgyCAgAEA0QHhAYMggIABANEB4QGDIICAAQDRAeEBgyCAgAEA0QHhAYMggIABANEB4QGDIICAAQDRAeEBg6BwgAELADEBg6CQgAELADEA0QGDoLCAAQsAMQDRAeEBg6BAgAEBg6CggAEBYQChAeEBg6CAgAEBYQHhAYOgwIABANEAUQChAeEBg6CggAEA0QBRAeEBg6CggAEAgQDRAeEBg6BQgAEIAEOgsIABCABBCxAxCDAToICAAQ6gIQjwE6BAgAEEM6BAgAEAM6BwgAEIAEEAo6BAgAEApKBAhBGAFQkbwCWLuWA2CvmwNoAnAAeACAAVuIAbgMkgECMjOYAQCgAQGwAQrIAQbAAQE&sclient=products-cc&ved=0ahUKEwjDs5up2ovzAhXjnWoFHQ7VAnMQ4dUDCAo&uact=5

END

Sunday 9/19/2021 11:59am