# Remote Monitoring of an Analog Signal

## Objective

Continually sample an analog signal using the PIC32 ADC and publish signal characteristics to an MQTT broker.

## Specifics

* Use the Waveform Wavegen tool to apply a periodic signal to the AN2 input of the PIC32, single-ended and referenced to board ground. The signal should have a dc offset of 1 V and a maximum peak-to-peak voltage of 2 V. This will require carefully removing the stepper motor cable. Blowing out the analog input will result in an unpleasant experience for all! (Pro-tip: you can configure and preview the signal without connecting the Analog Discovery module.)
* Unfortunately, I don’t think we can use DMA to empty the ADC buffer[[1]](#footnote-1). Instead, I suggest using an interrupt to empty the ADC buffer to a temporary location. Then use the PIC32 DMA controller to transfer the data to a processing area in memory. Using the accumulated data, calculate the signal frequency and peak-to-peak voltage.
* Publish these measurements to HiveMQ public broker using the following topic: drj443/xyyy, where “x” represents the last number in your station’s IP address and yyy represents the last three octets of your station’s MAC address. Example: Dr. J’s board is publishing from 129.101.222.22 with a MAC address of 00:04:A3:53:75:0F, so my topic would be drj443/2253750F.

## Grading

* Beyond “getting it working”, more points will be awarded based on measurable frequency range.
* Extra points will be awarded if you use TLS for publishing.
* Even more points will be awarded if you also subscribe to a topic that allows changing the ADC configuration.

**Game on!**

1. <http://dr-j-digital-fun.blogspot.com/2021/12/adc-discoveries.html> [↑](#footnote-ref-1)