NazberryPi

Hello Pi Team!

I wanted to get in touch following your suggestion on Twitter about a project that is rather dear to my heart, and takes the Raspberry Pi to new heights (or, rather, depths). First, some history. I'm a doctor from Northern Ireland, and back in 1993 I worked at the Nazareth Hospital for a couple of months as a medical student on an elective trip. Since then I have been out a few times on the bike to help raise money for various projects at the hospital.

"The English Hospital", Nazareth

Nazareth is a mainly Arab city in the north of Israel, and the hospital has been catering for the health needs of the local population for over 150 years, regardless of religion or identity, often in the midst of conflict and turmoil. It's an oasis of peace and co-operation in a region of division and strife. It was founded by a Scottish charity in 1861 in Ottoman Palestine, and is actually the oldest hospital in Israel-Palestine.

#NazberryPi taped to my trusty steed, ready to log data, and displaying the Jordanian flag on the Sense HAT.

In March 2018 a group of us journeyed on our bikes from Petra in Jordan to Nazareth in Israel, via the Dead Sea, both on and off-road over 350km. I had been inspired by the amazing work done by the Raspberry Pi team and ESA with Tim Peake up on the Space Station, and I felt that if science could be done using the *highest* Raspberry Pi in the Earth-Moon system, then I should be able to do something with the *lowest* Raspberry Pi on the surface of our home planet.

The Dead Sea is over 400m below sea level - the lowest point on Earth - so that's an extra 400 metres' worth of atmospheric pressure bearing down on us! I reckoned that a Raspberry Pi kitted out with a Sense HAT (like the Astro-Pi) would be a great way to gather data on our ride - especially the descent from the Jordanian plateau, about 800m above sea level, to the Dead Sea itself.

Happy little #NazberryPi, in the desert mountains with the Dead Sea valley stretching out in the background.

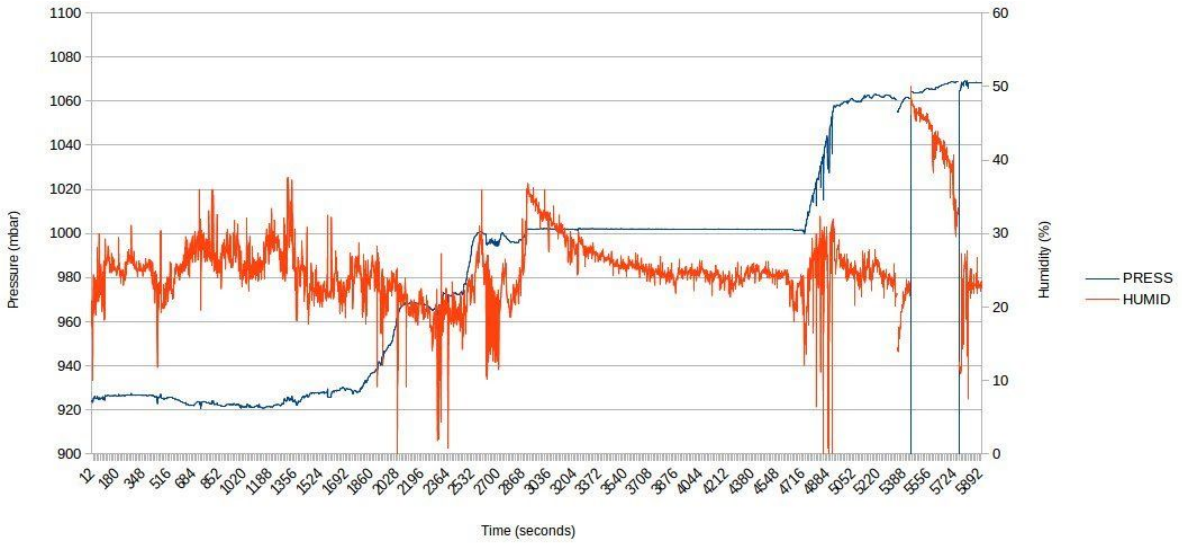
The Dead Sea valley is geologically interesting in itself, so I wrote a very simple little Python program to log data from the magnetometer, gyro and accelerometer, as well as atmospheric pressure, temperature and humidity. The #NazberryPi is a basic Raspberry Pi 3 Model B v1.2 with a Sense HAT attached, and powered from a fairly cheap 5v power bank. I found that this delivers plenty of power for several hours. I kept the Pi and Sense HAT separate from the battery in a little snack box that I had hacked for the purpose - this was to make changing the battery easy, and to give me more options for attaching to the bike with normal electrical insulation tape.

Out in the desert it can be a pain to carry a screen and keyboard around, so I connected via my phone hotspot using SSH in order to set the scripts running. This was a bit of a faff, but it worked, and meant I was travelling super-light. I'm thinking of writing a pure Sense HAT interface that starts up when the Pi powers on, which will be useful for getting going quickly.

I recorded Strava data for the trip too, so I can, in principle link each reading to a GPS co-ordinate (I haven't sorted this out yet). Since we were heading for Nazareth, I called the project the "Nazberry Pi", with the hashtag #NazberryPi. The plan all along was to make the data freely available in case anyone wanted to do anything with it. I have set up a github page containing the data at https://github.com/shanemuk/nazberry and will be trying to develop this over time. I'm hoping to get back to the magnetometer data in particular, to see if that tells us anything about the rocks edging the valley as we made our descent.

Logging #NazberryPi data in the Jordanian Dead Sea mud, 400m below sea level. Needs a salinity sensor, but our skin is now very soft.

In March 2019 we'll be going back to cycle the "Three Seas Challenge", taking in the Mediterranean (sea level, of course), Jerusalem (750m above), Dead Sea (-400m) and Sea of Galilee (-200m). So once again, my #NazberryPi will be the lowest on the planet! And it'll be on a bike, mostly off-road, so plenty of useful gyro and accelerometer data too. We also have room for more riders - if anyone would like to join us, we can arrange that, although they'll have to cover their costs and we hope they can do some fund raising for the hospital. More details at https://www.nazarethtrust.org/nazareth-challenge-2019/ or I'm happy to chat with anyone about it. Pi optional, but strongly encouraged!



And now for some data! Pressure and humidity on the descent from the plateau (900m above sea level) to the Dead Sea (400m below), with a lunch stop in between.

Fair warning - the Nazareth Trust is a Christian mission organisation, but the great thing about the hospital is that it has staff and patients from all religions and none, and we've had Jews, Muslims, Christians and Humanists on the ride (personally I am not a religious believer). It's a really friendly bunch with no political or religious axes to grind - just people working together to bring healthcare to those who need it.

I would absolutely *love* to have the support of the Pi community for this, and I would also be very keen to try running some of the code for the ISS Astro Pi in the harsh environment of the Middle East - as far away (vertically, anyway) from the ISS as it's possible to get! Again, I'm happy to correspond or consider ideas or share some of my own. Thanks so much for rekindling the fun and potential I remember from my younger days messing around on a ZX Spectrum.

With very best regards, and keep on codin' and rollin'
-Shane

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