

Review of “IoT Based eHealth Management System Using Arduino and Google Cloud Firestore”

Stewart Schuler
George Mason University ece508
sschule@gmu.edu

I. SUMMARY

In this paper the researches develop an Internet of Things (IoT) based system to transmit Electrocardiogram (ECG) data to a cloud database for storage, and to a host machine for data processing. The proposed system uses an ESP8266 micro controller to read commercially available ECG sensor data. The data would then be sent over some wireless communication protocol (i.e. WiFi or Zigbee) for expert diagnosis and automated processing.

Due to a lack of access to live patients the experiment conducted by the authors involved processing a publicly available ECG dataset. Using Proteus they were able to replay the dataset and send it to the microcontroller in lieu of the physical sensors at a representative sample rate. Once received on the microcontroller the data was then transmitted via wireless TCP/IP to Google Cloud Firestore and to a host machine running their processing code. The processing code was developed to take advantage of preexisting Mathworks functions specifically for characterizing ECG datasets.

II. PRAISE

There is very little to praise about this paper. Given the authors lack of communication ability presenting their generalized procedure in a concise list format is beneficial for anybody attempting to re-conduct their experiments.

III. CRITICISM

The most glaring issue with the paper is the writing. There is a grammatical error in nearly every paragraph, these can sometimes be minor but there are multiple cases where the authors were unable to get their point across. This is a huge hindrance to the goal of the paper, if the desire is to share the technological achievements, the report must be understandable to the target audience.

In *Section IV.B* the authors are discussing the experiments they conducted. In the first experiment they are sending the prerecorded ECG dataset from computer acting as a pseudo-sensor to the microcontroller. From their figures 9 and 10 it can be seen that the data is transmitted digitally over some serial interface. The authors make the erroneous claim “Arduino read the signal from file through the 10 bits ADC and store one-second samples in form of an array”. Since the data is sent to the microcontroller digitally there is no analog

signal. The original analog signal, was captured using an ADC when the ECG dataset was created, but by the time the authors are working with it, the dataset contains only the digital representation of the signal. No ADC on the microcontroller is used during their experiment. Additionally, the microcontroller’s ADC *might* be used the sensor they choose to collect live data has an analog interface. However the authors never capture any data themselves, which I believe further hinders the report. If their claim is that they created an IoT system, a key component of that is a sensor to measure physical data. It might be reasonable to assume connecting a sensor is a trivial problem compared to the networking challenges they solve, but it should still be demonstrated.

In the results section the authors throw 6 figures at the reader with next to no discussion about any of them. They are presented as if they are the results of the experiment. But the figures all portray the results of the ECG post processing. Which the authors are simply using a commercially available algorithm for Mathworks. The algorithms performance was not their product. The goal the authors set out to accomplish was to design and end-to-end IoT system, a far better metric for success would’ve been to present IoT specific measurable, things such as, system power, size, weight, or data throughput.

As a last point of criticism, the authors claim they are using a free online dataset, but do not indicate which dataset they are using. If somebody wanted to exactly recreate their experiments, and their figures they would be unable to.

IV. REFERENCES

- [1] H. Varshney, A. S. Allahloh and M. Sarfraz, “IoT Based eHealth Management System Using Arduino and Google Cloud Firestore,” *2019 International Conference on Electrical, Electronics and Computer Engineering (UPCON), Aligarh, India, 2019*, pp. 1-6, doi: 10.1109/UPCON47278.2019.8980238.