











Smartphone	Galaxy Tab 10	Galaxy S2	HTC
<i>Estimated Frequency</i>	12 Hz	3.6 Hz	3.8 Hz
<i>Time</i>	0.08s	0.27s	0.26s

## V. CONCLUSION

main objective of this study is to propose a method to identify the performance of various Smartphone's embedded sensors, like Galaxy Tablet10, Galaxy Tablet7, Galaxy S2 and HTC for our experiments. The technical tools of Android platform have two classes UI Thread and AsyncTask, which are exploited to achieve our purpose. Two experiments have been conducted and we have ensured a sufficient time: The first one is to develop a method to store the acquired data with a frequency 200Hz. The second one is to identify the acquisition frame-rate of the embedded sensors (accelerometers and gyrometers). We found that the closer for the frequency is the better for the performance.

Three communication modes are elaborated for acquiring data via Wi-Fi, via USB and via local database. The local database mode is not considered in this study, for the frequency of acquired data because it consumes more time to deal with the memory of the device and Database engine at the same time. By a high speed of data, the received data was not written. For the pre-defined frequency of 200 Hz via Wi-Fi, both classes AsyncTask and UI Thread are efficient to send and store all acquired data completely. For the second experiment *Acquisition framerate of the embedded sensors*, is performed to check the performance of Smartphone data reception and compare different devices at this frequency, in order to determine its impact during a period of time.

To ensure that the performance of the sensor is determined by the processors, not by the Android system, we will take into account another Smartphone (Galaxy S5) to compare and confirm the additional results. In additional, by the knowledge of the Smartphone's context hardware, this allows us to estimate and identify a hybrid solution for data acquiring by their embedded sensors. For our future works, we will evaluate the performance of the Smartphone's sensors for failure detection (sensors faults, false alarms, transport accident case, etc.) to be able to distinguish between the sensors that correctly measure the structural data, and sensors that may fail to correctly measure the structural ones in real-time.

## REFERENCES

[1] L.;Bao and S.S.Intille. Activity recognition from user-annotated acceleration data. In *proceedings of the 2<sup>nd</sup> International Conference on Pervasive Computing (PERVASIVE)*, volume 3001 of *Lecture Notes in Computer science*, pages 1-17. Springer-Verlag, 2004.

[2] S.Consolvo, D.W.McDonald, T.Toscos, M.Y.Chen,J.Frohlich, B.Harrison, P.Klasnja, A.LaMarca, L.LeGrand,R.Libby, I.Smith, and J.A. Landay. Activity sensing in the wild: a field trail of ubifit garden. In *CHI' 08: Proceeding of the twenty-sixth annual SIGCHI conference on Human factors in computing systems*, pages 1797-1806, New York, NY, USA, 2008.ACM.

[3] <http://www.droidforums.net/forum/htc-rezound-general-discussions/207230-how-do-i-share-data-mysamsung-tab-2-7-0-a.html>.

[4] A what is google android? android news - android google phone forums, July 2010. <http://www.talkandroid.com/google-android-faq>.

[5] <https://mbed.org/platforms/mbed-LPC1768>.

[6] J. Krumm and E. Horvitz. LOCADIO: Inferring motion and location from Wi-Fi signal strengths. In *Proceedings of the 1st International Conference on Mobile and Ubiquitous Systems (MobiQuitous)*, pages 4 - 14. IEEE, 2004.

[7] K. Muthukrishnan, M. Lijding, N. Meratnia, and P. Havinga. Sensing Motion Using Spectral and Spatial Analysis of WLAN RSSI. In *Proceedings of the 2nd European Conference on Smart Sensing andContext (EuroSSC)*, pages 62-76,. Springer, 2007.

[8] T. Iso and K. Yamazaki. Gait analyzer based on a cell phone with a single three-axis accelerometer. *Proceedings of the 8th conference on Human-computer interaction with mobile devices and services*, pages 141-144, 2006.

[9] D. Lazer, A. P. L. Adamic, S. Aral, A.-L. Barab\_asi,D. Brewer, N. Christakis, N. Contractor, J. Fowler, M. Gutmann, T. Jebara, G. King, M. Macy, D. R. 2, and M. V. Alstynne. Computational social science. *Science*, 323(5915):721-723, 2009.

[10] C. Song, Z. Qu, N. Blumm, and A.-L. Barab\_asi. Limits of predictability in human mobility. *Science*, 19(5968):1018-1021, 2010.

[11] G. Bieber, J. Voskamp, and B. Urban. Activity recognition for everyday life on mobile phones. In *Proceedings of the 5th International Conference on Universal Access in Human-Computer Interaction (UAHCI)*, pages 289-296, 2009.

[12] T. Brezmes, J.-L. Gorricho, and J. Cotrina. Activity recognition from accelerometer data on a mobile phone. In *Workshop Proceedings of the 10<sup>th</sup> International Work-Conference on Arti\_cial Neural Networks (IWANN)*, pages 796-799, 2009.

[13] E. Miluzzo, N. D. Lane, K. Fodor, R. Peterson, H. Lu, M. Musolesi, S. B. Eisenman, X. Zheng, and A. T. Campbell. Sensing meets mobile social networks: the design, implementation and evaluation of the CenceMe application. In *Proceedings of the 6th ACM conference on Embedded network sensor systems (SenSys)*, pages 337-350, New York, NY, USA, 2008. ACM.

[14] Y. Zheng, Y. Chen, Q. Li, and W.-Y. Xie, X. Ma.Understanding transportation modes based on gps data for web applications. *ACM Transactions on the Web*, 4,1, 2010.

[15] Y. Zheng, Q. Li, Y. Chen, X. Xie, and W.-Y. Ma. Understanding mobility based on gps data. In *Proceedings of the 10th international conference on Ubiquitous computing*, pages 312-321, 2008.

[16] L. Stenneth, O. Wolfson, P. S. Yu, and B. Xu. Transportation mode detection using mobile phones and gis information. *Proceedings of the 19th ACM SIGSPATIAL International Conference on Advances in Geographic Information Systems*, pages 54-63, 2011.



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