

# **Higher Order Logic( HOL) Based Configuration & Verification of Smart Watches – A Short Communication & Novel Suggestion to Develop an Informatics Framework.**

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## **Abstract :**

In this short communication we focused on Higher Order Logic(HOL) based configuration and verification of hardware in the java virtual machine environment(JVM) using HOL-Isabelle system. Smart Watches are fast becoming excellent information processing devices to monitor health.Hence we wish to communicate our idea in the context of circadian systems and informatics applications.

**keywords :** HOL/JVM/Circadian Systems/Smart Watches/Hardware Configuration&Verification

## Introduction & Inspiration :

“We observe that millions of people are using smartphone apps, bedside monitors, and wearable items (including bracelets, smart watches, and headbands) to informally collect and analyze data about their sleep. Smart technology can record sounds and movement during sleep, journal hours slept, and monitor heart beat and respiration. By using a companion app, data from some devices can be synced to a smartphone or tablet, or uploaded to a PC. To state further, other apps and devices make white noise, produce light that stimulates melatonin production, and use gentle vibrations to help us sleep and wake.” We have been inspired by the following articles describing many interesting aspects of sleep studies and its effects on health :

“Tracking Sleep Through Smart Technology” is an important aspect involving multidisciplinary approach based on Engineering/Physics/Biology/Medicine/Informatics/Mathematics etc.... It is in this context, we have decided to put forward or suggest this topic in the form of short communication.

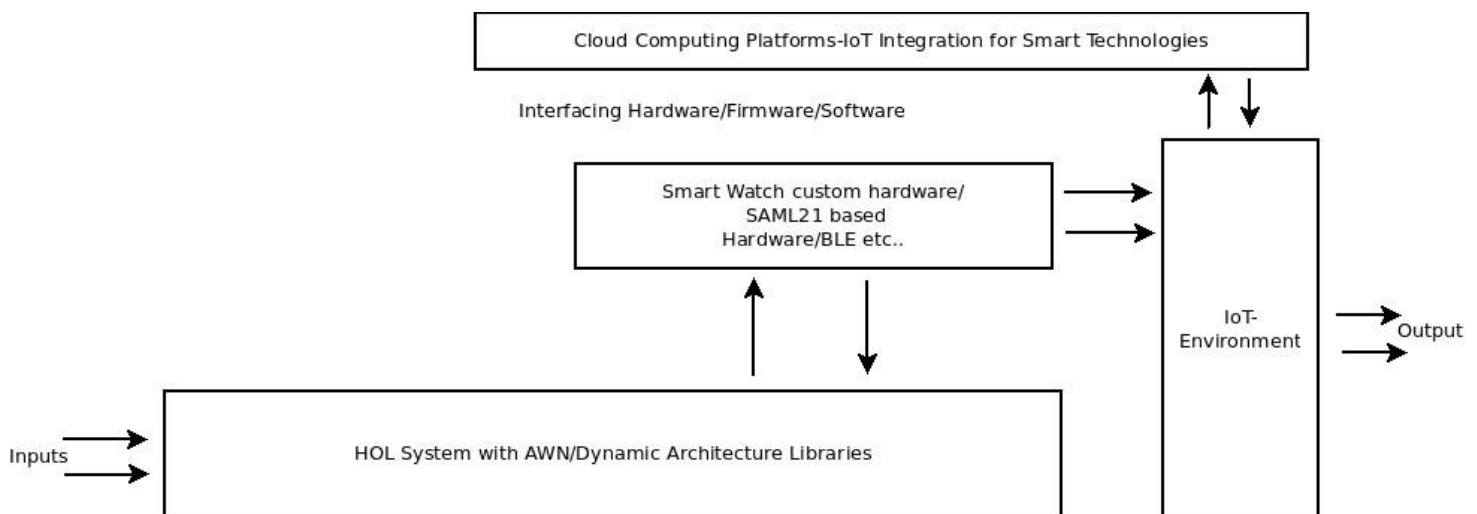
**Sources :** <https://www.ninds.nih.gov/Disorders/Patient-Caregiver-Education/Understanding-Sleep>

: [https://www.isa-afp.org/browser\\_info/current/AFP/AWN/document.pdf](https://www.isa-afp.org/browser_info/current/AFP/AWN/document.pdf)

: <https://www.isa-afp.org/entries/DynamicArchitectures.html>

: <http://www.ntnu.edu/documents/221360533/1261827882/Polysomnography.pdf/a2c20da2-d659-4bc9-9717-63a3935716ca>

## Informatics Framework Design & Implementation :



**Figure [a] : Approximate Informatics & Computing Framework to Probe Smart Devices/Systems and Process Circadian Data.**

## **Concluding Remarks :**

In this short communication, we have highlighted the possible interaction of HOL System with Smart Watch (our custom made device) in the context of Linux/Windows/RIOT/Wireless Networks/Internet of Things (IoT)/Cloud Computing Environments. Explored some ideas as algorithms to design, test and implement smart devices to probe circadian systems and data processing aspects. Testing in Progress at the time of submission.

## **Acknowledgement/s :**

No competing financial interest/s is/are declared in preparing this manuscript. This manuscript is meant to inspire others to develop more advanced hardware configuration and verification based on HOL/RIOT/IoT-OpenLAB etc. The Author/s strictly abide by all copyright agreements in using open source software or other such technologies used in this paper. Special thanks to all who made this happen. We thank FAPESP R&D funding via Versor Innovations/Tech 4 People Project, Santo Andre, SP, Brazil for generously supporting our research work.

## **Additional Information on Software & Mathematics Used :**

[a] <http://www.cl.cam.ac.uk/research/hvg/HOL/>

[b] <http://www.cl.cam.ac.uk/research/hvg/Isabelle/>

[c] <https://www.isa-afp.org/entries/AWN.html> ; <https://www.isa-afp.org/>

[d] [http://doc.riot-os.org/group\\_\\_cpu\\_\\_saml21.html](http://doc.riot-os.org/group__cpu__saml21.html)

[e] <http://riot-os.org/>

[f] <https://www.iot-lab.info/>

## **Please Note :**

Readers are requested to follow all the references, figures, additional references on software and mathematics to proceed further in your R&D work w.r.t Hardware/Firmware/Software/IoT/HPC/Cloud Computing Platforms.

## References :

[1] <http://www.vixra.org/pdf/1709.0146v1.pdf>

[2] <http://www.vixra.org/pdf/1710.0065v1.pdf>

[3] <http://www.vixra.org/pdf/1710.0095v1.pdf>

[4] [https://www.sciencedaily.com/terms/circadian\\_rhythm.htm](https://www.sciencedaily.com/terms/circadian_rhythm.htm)

[5] [http://www.ece.uah.edu/~jovanov/papers/C2015\\_Jovanov\\_smartwatches.pdf](http://www.ece.uah.edu/~jovanov/papers/C2015_Jovanov_smartwatches.pdf)

[6] <http://www.sciencedirect.com/science/article/pii/S0167739X15003015>