

Fitness Wearables: Indispensable Assistant or Useless Gadget?

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Abstract—Nowadays the IoT importance is growing not only economically but also in our daily life. Among these objects wearables, namely the fitness trackers are introduced with great success, mostly but not only in developed countries. But little is known about the attitudes of physical education students about their most important features and how useful they are perceived. This communication presents the results of an exploratory study aimed at a better understanding of the situation with an initial portrait.

Keywords—IoT, wearables, smartwatch, fitness trackers.

I. INTRODUCTION

Bandyopadhyay & Sen (2011) view the IoT at the convergence of the **things**-oriented (objects, sensors, transmitters, etc.), **internet**-oriented (IP connectivity, web, etc.) and **semantic**-oriented (smart middleware, reasoning technologies, etc.) visions. Miorandi et al. (2012) define smart objects as characterized by the following:

- Have a physical embodiment;
- Have a minimal set of communication functionalities;
- Possess a unique identifier;
- Are associated to at least one name and one address to communicate;
- Possess some basic computing capabilities.
- May possess means to sense physical phenomena (e.g., temperature, light, etc.)

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An approach to classification suggests to consider their maturity in a model of Etwaru (2016), from dumb to smart objects. The level of smartness is defined by Jain (2014) as follow:

1. **Passive: Communicate only when queried. Passive RFID, QR codes**
2. **Active:** Communicate when needed. Sensors. Home automation (*1-4 sense*)
3. **Aware:** Action based on simple computation. E.g., tele-health (*5-sense*)
4. **Autonomous:** Can make decisions based on rules. E.g., autonomous cars, smart grid (*Human*)

Among the many equivalent classifications of application domains available, Texas Instrument (2016) distinguishes between building & home automation, smart cities, smart manufacturing, automotive, health care and wearables. Alrige & Chatterjee (2015) suggest a classification based on

application, form and functionality. A more detailed grouping is suggested by Dlodlo et al. (2012) as following: medical technology/health, retail/logistics and supply chain management ; transport; insurance; energy; information security, home automation; environment monitoring; manufacturing; agriculture; education; telecommunication. Health is often grouped with fitness while fitness is under wearables.

Wearable technologies with body sensors would also be of great value when appropriately used in a classroom, assisting students with disabilities and collecting data from these devices to assess a global portrait of the classroom (Borthwick, 2015).

The global wearable technology market is forecasted to grow from 0.75 billion in 2012 to 5.8 billion in 2018 (Statista, 2016). The global smart wearable fitness market is expected to grow at a compound annual rate of over 25% by 2020 (Technavio, 2016). Almost 20 million of fitness trackers were shipped in first Quarter of 2016 (an increase of 67% over same quarter of last year) according to IDC (2016). Chamberlin (2014) from IBM predicted for 2015 that smartwatches and fitness trackers would be among the main wearable trends to watch in. Jesdanun (2015) suggest that despite the actual growing sales, the enthusiasm for fitness trackers can fade with time as it has already been observed by Endeavour Partners, “who estimates that about a third of these trackers get abandoned after six months”.

Despite this growing popularity, too few studies have been conducted to better understand user perceptions and attitudes (Kim & Shin, 2015). More specifically, market research are usually targeted toward consumers in general while people actually performing physical education are not distinguished, namely students despite they may be good representatives of innovation introduction in the courses potentially needing one of these devices. The purpose of this communication is then to partially fill this hole by drawing a portrait of fitness devices most attracting characteristics and most important perceptions toward their use by this subpopulation.

II. BACKGROUND

The main features of these devices do not have the same importance for everyone, as the need may vary with the complexity or intensity of the fitness tasks, the athletes’ needs being much more sophisticated than those of the jogger. Nowadays these devices are not only technological object but also fashion ware, so their design and appeal, and social

marker, maybe important in relation to the intention to use them.

Among the other variables potentially related to intention to use such devices, the perceived usefulness and perceived ease of use are candidates often associated with technology acceptance and decision to use.

Clearly more knowledge is needed on fitness trackers and this work in progress paper aims to fill partially this hole. We propose the diagram below for our framework. This exploratory study will draw a portrait of the perception of physical education students as a preliminary step to a better understanding

III. METHODOLOGY

In order to get data rapidly, and given the fact that the topic is already well documented, a questionnaire was preferred to interviews. The questionnaire comprises 2 sections: attitude toward the devices, measure by 5 points Likert scales, ranging from 1=totally disagree to 5=totally agree. Perceived usefulness of main functions; socio-demographic. The first section is made of 12 questions taken from the instrument of Kim & Shin, (2015). Most of the constructs are measured by only one item. The second section contains 17 features of

tracking devices, that the respondent must assess in terms of importance for their use, in a five-point scale, varying from 1= not at all important to 5 of the greatest importance. Finally the questionnaire asks for gender and how important is the cost in their potential decision to buy a device.

The questionnaire was administrated to junior high school student of a private and most important university of Philippines. Among the 186 questionnaires received , we count 110 females (63.1%) versus 66 males (36.9%).

IV. RESULTS

The data analysis was performed with SPSS version 20. The main results are presented below, in Table 1..

As it appears from Table 1, the most popular functions are the continuous monitoring of heart rate (mean=3.84), the impermeability to water (mean= 3.67) and the clock (mean=3.57). The least useful functions seem to be the measurement of flock climbed (mean=2.70), with the barometer (mean=2.78) and the auto-sleep detector (mean=2.81). No function appear to be a winner, able to give enthusiasm.

TABLE I APPRECIATION OF THE FEATURES

features	Valid	Missing	Mean	Median	Mode	Std. Deviation
continuous heart rate	184	1	3.84	4	3	0.959
swim proof	184	1	3.67	4	5	1.122
clock	185	0	3.57	3	3	1.004
multi-sport	185	0	3.39	3	3	0.921
music control	185	0	3.38	3	3	1.117
steps, calories, distance	185	0	3.36	3	3	0.923
active minutes	185	0	3.28	3	3	0.935
text notification	185	0	3.21	3	3	1.075
reminders to move	185	0	3.18	3	3	0.97
caller ID	184	1	3.17	3	3	1.062
sleep tracking	184	1	3.11	3	3	1.002
connected GPS	185	0	3.11	3	3	1.193
auto exercise recognition	185	0	3.06	3	3	0.959
auto sleep detection	184	1	2.81	3	3	1.072
barometer	184	1	2.78	3	3	0.855
floors climbed	183	2	2.70	3	3	0.955

The Table 2 presents the perceptions of the respondents in regard of their intention to buy or use such a device

TABLE II
PERCEPTIONS OF RESPONDENTS IN REGARD OF ATTITUDE

perceptions	Valid	Mean	Median	Mode	Std. Deviation
such a fitness device is expensive	185	3.69	4.00	3	.938
Overall, using such a fitness device seems beneficial	185	3.64	4.00	4	.802
these devices would be helpful in my personal life (even if not in my work)	184	3.59	3.00	3	.943
I plan to use such a fitness device	182	3.55	4.00	3	.870
I thing that such a fitness device is easy to use	183	3.55	4.00	3	.856
such a fitness device would be useful in doing my job	184	3.54	3.50	3	.916
I have a generally favorable attitude toward using such a fitness device	185	3.40	3.00	3	.709
such a fitness device is attractive and pleasing	185	3.39	3.00	3	.814
such a fitness device offers tha sense of real-time connectedness	185	3.34	3.00	3	.719
I think that I can use such a fitness device anywhere	184	3.26	3.00	3	.983
these devices cost too much for their usefulness	184	3.22	3.00	3	.847
such a fitness device helps people who use it stand apart from the crowd	185	3.11	3.00	3	.938
I would be able to easily afford such a fitness device	185	2.59	3.00	3	.934
people who use such a fitness device would be considered leaders rather than followers	185	2.49	2.00	3	.984

The general attitude of respondents is relatively positive with a mean of 3.64, despite these devices are judged as expensive (3.69). These devices are perceived as useful and the respondents plan to acquire or use one of these. The social impact of using these device as a social differentiators does not get many support (mean=2.49).

Table 3 differentiates between respondents in terms of ownership of such devices. One out of four already own such a device and intend to continue to use it, while more than one third do not intend to buy one of these

TABLE III
OWNERSHIP ACTUAL AND PLANNED

Frequency	Percent	Valid Percent
i do not own & dont intend to buy	69	37.3
I intend to buy ASAP	63	34.1
I own and intend to continue to use	46	24.9

In order to determine the impact of this variable, an ANOVA test was computer with the Scheffe coefficients. As it appears in Table 4, owning a device generate a positive

attitude (mean = 3.59); the device does not appear beneficial enough to convince those who don't own and don't intend to own (4.49) The price seems to be the main factor as those who disagree with the affordability statement (mean=2.25) don't intend to buy.

V.CONCLUSION

The market of smartwatches and tracking devices may be growing but these devices are still expensive and their use still not totally integrated in life style according to our respondents. But our sample choice may explain some of these findings, namely in consideration of age of respondents and their economic relative incapacity. Clearly more research is needed.

TABLE 4: ANOVA TEST FOR OWNERSHIP OF DEVICE

perceptions / subsets (set 1 in bold)	i do not own & dont intend to buy	I intend to buy ASAP	I own and intend to continue to use	nbr groups
I have a generally favorable attitude toward using such a fitness device	3.13	3.59	3.59	2
Overall, using such a fitness device seems beneficial	4.49	3.48	3.72	1
I plan to use such a fitness device	3.15	3.82	3.76	2
I think that such a fitness device is easy to use	3.47	3.66	3.52	1
such a fitness device would be useful in doing my job	3.49	3.65	3.54	1
such a fitness device is attractive and pleasing	3.09	3.57	3.59	2
I think that I can use such a fitness device anywhere	3.00	3.57	3.24/3.24	2
such a fitness device offers the sense of real-time connectedness	3.28	3.41	3.35	1
such a fitness device helps people who use it stand apart from the crowd	2.94	3.17	3.11	1
people who use such a fitness device would be considered leaders rather than followers	2.14	2.57/2.57	2.8	2
such a fitness device is expensive	3.33	3.76	3.9	2
I would be able to easily afford such a fitness device	2.25	2.75	2.80	2
these devices cost too much for their usefulness	3.22	3.19	3.24	1
these devices would be helpful in my personal life (even if not in my work)	3.14	3.87	3.89	2

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