



**CIP-297225**

**Deliverable D4.5**  
**Fine Tuning of the I-DONT-FALL Integrated Platform**

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## Change History

Version	Date	Status	Author (Partner)	Description
0.1.0	24/06/2015	Draft	K. Giokas (SILO)	ToC and draft released
0.2.0	13/10/2015	Draft	K. Giokas (SILO)	Contributions from SSSA and UPC
0.3.0	05/11/2015	Draft	K. Giokas (SILO)	Pre-final draft
0.4.0	06/11/2015	Final	K. Giokas (SILO)	

## **EXECUTIVE SUMMARY**

This deliverable accompanies the software prototype of the final version of the I-DONT-FALL platform deployed to the pilot sites in January 2014 and contains all changes to software and hardware to its subsystems since that particular release.

## Document Information

<b>CIP Project Number</b>	297225	<b>Acronym</b>	I-DONT-FALL
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<b>Work package</b>	<b>Number</b>	4	<b>Title</b>	Platform implementation, integration and test

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## GLOSSARY

IDF            I-DONT-FALL

## **1 INTRODUCTION**

In this deliverable the fine-tuning of the IDF platform will be depicted. This includes major updates for both software and hardware as well as bug fixing procedures and methods.

This deliverable follows up after Deliverable D4.3 and includes all relevant updates to IDF's subsystems since the submission of D4.3 in February 2014. It also contains release notes on software after this date.

## 2 IDF PLATFORM FINAL VERSION UPDATES

### 2.1 IDF Platform Pipeline Hardware Updates & Improvements

In this section we present the list of hardware and software component updates (if any) since the release of deliverable D4.3 I-DON'T-FALL Integrated Platform Final Version

#### 2.1.1 WIMU Release Notes

The SSSA fall detector was updated in order:

1. to make the system more/less sensitive in fall detection. The factory configuration of the fall detector can be tuned for a best performance respect to the user's characteristics (e.g. the sensitivity of the system can be increased/decreased taking in account the tendency to move more or less abruptly);
2. to extend the ability of the system to estimate the ADLs (Activities of daily living) of patients within a very extended mobility range: from very reduced to normal.

The above mentioned customization is executed is executed by changing the value of seven parameters (see appendix A) added to the file WIMUdevelop.txt stored on the smartphone.

#### 2.1.2 iWalker updates

There has been only one hardware modification. The design of the motor covers was modified (and substituted) to avoid the possibility to cut the can bus wires close to the motor axis.

For each i-Walker the modifications:

iw4.22 (MoSG)

XX/XX/XX Update to v2.4.

19/03/14 Update to v2.5 and hardware update

iw4.23 (SPC)

XX/XX/XX Update to v2.2i

23/01/14 Update to v2.4

XX/XX/14 Hardware update. (performed by themselves)

18/03/14 Update to v2.5

iw4.37 (SPC)

XX/XX/XX Update to v2.2i

23/01/14 Update to v2.4

XX/XX/14 Hardware update. (performed by themselves)

18/03/14 Update to v2.5



iw4.25 (FSL)

XX/XX/XX Update to v2.2. (performed on site)

XX/XX/XX Update to v2.2i

XX/XX/XX Update to v2.4. (performed on site)

19/02/14 Update to v2.5

21/03/14 Hardware update

iw4.35 (FSL)

XX/XX/XX Update to v2.2i.

XX/XX/XX Update to v2.4. (performed on site)

19/02/14 Update to v2.5

21/03/14 Hardware update

iw4.39 (FSL)

XX/XX/XX Update to v2.2i.

XX/XX/XX Update to v2.4. (performed on site)

19/02/14 Update to v2.5

21/03/14 Hardware update

iw4.26 (HGG)

XX/XX/XX Update to v2.2i. (performed on site)

04/02/14 Update to v2.5

11/03/14 Hardware update

iw4.31 (Frontida)

XX/XX/XX Update to v2.2i.

07/02/14 Update to v2.5

07/02/14 Hardware update. (performed by themselves)

iW4.36 (Sermas)

23/01/14 Update to v2.4

20/02/14 Update to v2.5 and Hardware update

## 2.2 IDF Platform Pipeline Software Updates & Improvements

### 2.2.1 iWalker Software Updates

v2.1 – The first version sent originally to the pilot sites

v2.2 – Fine tuning in the low level reactive control to allow accelerometer parameterization. The slippery ground of FSL premises motivated this change.

v2.2i – Specific wifi settings configuration based on the pilot.

v2.3 – Internal version

v2.4 – Improvement in signal filtering on handlebar measurements.

v2.5 – Change in speed units, from RPM to RPH. Detection of gyroscope blocking and sensor reset to avoid central box hanging. This version includes VPN configuration to facilitate remote support. It takes the initial timestamp of the files from the communication with Careportal.

### **2.2.2 AREAS Software Updates**

V6 – First Version originally released

V7 – Final version with following updates:

- Static Language Translation
- Falls Message Notification
- Static translation completion
- Bugs Fixing

Further information on release notes can be read on Annex I of Deliverable D4.3 I-DONT-FALL Integrated Platform Final Version.

### 3 CONCLUSIONS

In this deliverable we have provided a list of updates in hardware and software of the components of the platform that had new releases since February 2014.

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**Related documentation:**

- [1] D2.2 Fall Detection and Prevention Functionalities and Operative Protocols.
- [2] D3.1 Detailed Technical Specifications of Detection and Prevention Services.
- [3] D3.2 Integrated Platform and Technical Specifications.
- [4] D4.1 Customized Fall Detection and Fall Prevention Solutions Customized Fall Detection and Fall Prevention Solutions.
- [5] D4.2 I DONT FALL Integrated Platform Interim Version.
- [6] D5.3 Training Seminars, Materials and Documentation.

## Annex I

### WIMU Release Notes

WIMUdevelop.txt file content description

The WIMUdevelop.txt file is a text file whose structure is described in table 1.

Line number	Value	Description
1	32.0	Do not change
2	false	Do not change
3	60000	Do not change
4	12000	Do not change
5	10000	Do not change
6	false	Do not change
7	1.15	Treshold 1 gain
8	1.15	Treshold 2 gain
9	1.15	Treshold 3 gain
10	1.0	ADL gain
11	0.42	Acceleration threshold
12	3.5	Angular rate treshold
13	0.007	Angular rate gain

Table 1: WIMUdevelop.txt content example.

The description and the line numbers have been included for the sake of clarity; however they are not part of the file content.

In order to adapt the Fall Detector to the characteristics of the user the parameters to be used are those between the lines 7 and 13.

Using the values reported in table 2 the system works in factory mode.

7	1.0	Treshold 1 gain
8	1.0	Treshold 2 gain
9	1.0	Treshold 3 gain
10	1.0	ADL gain
11	0.0	Acceleration threshold
12	0.0	Angular rate treshold
13	0.0	Angular rate gain

Table 2: WIMUdevelop.txt factory mode content.

## FALL DETECTION

The fall detection is based on the combined usage of three threshold values applied to three parameters obtained from acceleration data.

Values in 7,8,9 represent the gains to be applied to the three thresholds in order to modulate their value with respect to that of factory. Gains over/below 1.0 make the system less/more sensitive in detecting a fall.

## ADL MONITORING

The ADL estimation is based on the combined use of information coming from the accelerometer (acceleration estimation) and the gyroscope (angular rate estimation).

To make the device more/less sensitive in the evaluation of the user movement the two gains on line 10 and 13 can be adjusted. Gains over/below 1.0 make the system more/less sensitive to estimate the user's movement.

The threshold values on line 11,12 are used to reject noise components in acceleration and angular rate. Acquired values below these thresholds are zeroed.