Zephyr[™] Performance Systems

Zephyr[™] Performance Systems



OmniSense 4.X

New Features

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Version	Description
2014-DEC-10	Initial Release
2015-NOV-11	Updates for OmniSense 4.0
19-MAY-2016	Update for OmniSense 4.1

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Zephyr Part #	Description	
9600.0370	Zephyr BioModule BH3 BLE	
9600.0371	QSTARZ 1300ST GPS Receiver	
9600.0367	Pebble Watch w/ZephyrME application	
9600.0368	Motorola Barcode Scanner + BRAT Software utility	
9600.0369	Motorola DS3578 Wireless Bar Code Scanner	
9600.0372	Motorola DS4208 wired Bar Code Scanner	
9600.0366	GPS 5-Bay Charge Cradle + Power Supply	

1. Log Download Acceleration



- Log Download speeds have been increase by a factor of 8 10x when compared to OmniSense 3.9.7
- Some typical examples, per hour of data

Enhanced Summary Log Format	OmniSense 3.9.7	OmniSense 4.1
1 BioModule	1 min	12 sec
10 BioModules		50 sec
50 BioModules		6 minutes

Enhanced Summary &	OmniSense 3.9.7	OmniSense 4.1
Waveform Log Format		
1 BioModule	5.5 min	45 sec
10 BioModules		95 sec
50 BioModules		9 minutes

- The greater the number of BioModules, the greater the increase in download speed, as data is now cached on the host PC before processing into the OmniSense database
- Using the system case, BioModule logs are downloaded 10 devices at a time

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2. Readiness

A Readiness Metric, measured on a scale of 1 - 10, is now available. It is calculated based on a number of components:

- Analysis of an orthostatic hypotension test to provide resting heart rate and heart rate variability, and standing heart rate
- Completion of a survey by the subject, giving subjective 1 10 scores for: average 10-day training load & intensity, sleep quality, overall & current stress, eating habits, hydration & Injury.



- Individual weightings for the survey components can be customized in the Analysis Preferences settings
- Analysis can display all historical Readiness components (test + survey) as a line graph to plot subject progress
- Orthostatic Test results and Surveys completed offline can be imported from an external csv file. A future implementation will include an Android application capable of recording this data for remoting sending to the OmniSense operator.

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READINESS PHONE APPLICATION

SAMSUNG	SAMSUNG	SAMSUNG	SAMSUNG
OmniSense	Kerne Assessment	Back Assessment Survey	
READINESS	8	Unhealthy 7 Healthy	Your Readiness Score
Contraction of the second seco	HR	Hydration Level	9.9
Readiness Assessment	59	Dehydrated 9 Hydrated	And Address of the Address of the
a set a set	HRV	Injury	Send Results
Settings	69 Position -89*	No injury or pain 0 Can not perform	l'm Done ->
	Lay still and quiet on your back until we ask you to stand up.	Submit	
Medtronic Zephyr [®] Performance Systems	OmniSense Readiness Mectronic	OmniSense Readiness Mectronic	OmniSense Readiness Mectronic
¢ () •			

- A Readiness Application is now available for Android or iPhones
- Download the App from Google Play (Android) or Apple App Store
- Subject can now complete an orthostatic hypotension test and readiness survey at home or away from a training facility
- The app will calculate their Readiness score, and email results to a recipient, for entry into the OmniSense database
- Resting and Standing Heart Rate, and Resting Heart Rate are analyzed and recorded automatically
- The subject, wearing a BioModule, follows audio instructions to complete the test.

3. On-Board Accelerometry Analysis



Accelerometry data which was previously only available in a post-session report is now calculated in the BioModule and is available for display on the BioGauge, and included in log data.

Impulse Load	A cumulative measurement of mechanical load – the sum of the areas under the accelerometer magnitude curve for all impulses, measured in Newtons
No. Walk Stope	Count of wolking stopp
No. Walk Steps	
No. Run Steps	Count of running steps
No. Bounds	Count of bounds
No. Jumps	Count of jumps
No. Minor Impacts	Count of minor impacts
No. Major Impacts	Count of major impacts
Average Rate Force	A measure of explosive power, averaged over the previous 10
Development	steps, measured in Newton/s
Average Step Impulse	A measure of the efficiency of steps, i.e. how much energy is
	expended during a step. Shorter (in duration) steps expend
	less energy. Measured in Newton seconds.
Average Step Period	S – time duration of step
Jump Flight Time	Milliseconds – time in air for detected jump events
	(crouch/pause/jump)
Peak Acceleration Phi	Degrees from vertical of force or impact during an epoch*
angle	
Peak Acceleration	Degrees from horizontal of force or impact during an epoch*
Theta angle	

*Epoch is 1 / 2.5 / 5 seconds, dependent on ECHO network setting

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4. Support for up to 100 BioModules

Considense	opped	e •		5						Dash Finish	?
001 SUBJECT 46 WHR MAX 782 1.4 Activity Calorias	002 SUBJECT 42 16HR MAX 862 1.6 Calories	003 SUBJECT 43 56HR MAX 550 1.5 Activity Calories	004 SUBJECT 53 16HR MAX 0.9 Activity Calories	005 SUBJECT 48 50HR MAX 0.9 Activity Calories	0 06 SUBJECT 53 NHR MAX 682 1.4 Activity Calories	007 SUBJECT 43 %HR MAX 689 1.8 Activity Calories	008 SUBJECT 52 WHR MAX 0.9 Activity Calories	009 SUBJECT 47 MHR MAX 843 0.8 Activity Calories	010 SUBJECT 43 %HR MAX 951 0.8 Activity Calories	Heart Rate : 42 BPM Breathing Rate : 18 BPM Signal Strength: (<>>206) Heart Rate Confidence: 100	Details
011 SUBJECT 51 91HR MAX 953 1.2 Activity Calories	002 SUBJECT 43 NHR MAX 845 1.3 Activity Calories	013 SUBJECT 39 94HR MAX 942 0.8 Activity Calories	014 SUBJECT 42 SCHR MAX 537 0.7 Activity Calories	015 SUBJECT 49 56HR MAX 978 0.6 Activity Calories	016 SUBJECT 47 %HR MAX 789 0.8 Activity Calories	017 SUBJECT 52 %HR MAX 951 0.6 Activity Calories	018 SUBJECT 52 SHR MAX 864 1.4 Activity Calories	019 SUBJECT 48 %HR MAX 852 1.2 Activity Calories	020 SUBJECT 41 %HR MAX 852 1.1 Activity Calories	Temperature : 97 °F Activity : 0.0 g (Stat) Posture : -3 Degrees Battery: 89%	Acc
021 SUBJECT 42 WHR MAX 845 1.2 Activity Calories	022 SUBJECT 41 SHR MAX 549 0.8 Activity Calories	023 SUBJECT 39 %HR MAX 752 0.7 Activity Calories	024 SUBJECT 43 SHR MAX 842 1.5 Activity Calories	025 SUBJECT 45 16HR MAX 587 1.2 Activity Calories	026 SUBJECT 44 %HR MAX 471 0.5 Activity Calories	027 SUBJECT 45 SHR MAX 579 0.8 Activity Calories	028 SUBJECT 52 SCHR MAX 852 0.7 Activity Calories	029 SUBJECT 53 %HR MAX 578 1.4 Activity Calories	030 SUBJECT 48 %HR MAX 885 0.5 Activity Calories	G Green	ol Col
031 SUBJECT 46 SHR MAX 574 0.8 Activity Calories	032 SUBJECT 39 %HR MAX 588 0.2 Activity Calories	033 SUBJECT 40 SHR MAX 765 1.2 Activity Calories	034 SUBJECT 37 SHR MAX 599 0.8 Activity Calories	035 SUBJECT 44 SHR MAX 1201 0.8 Activity Calories	036 SUBJECT 52 %HR MAX 956 0.7 Activity Calories	037 SUBJECT 42 %HR MAX 684 0.2 Activity Calories	038 SUBJECT 39 %HR MAX 842 0.8 Activity Calories	039 SUBJECT 40 %HR MAX 895 1.1 Activity Calories	040 SUBJECT 43 %HR MAX 1008 1.4 Activity Calories	100% 62 B PM	suu
041 SUBJECT 35 SHR MAX 819 1.2 Activity Calories	002 SUBJECT 47 WHR MAX 951 1.0 Activity Calories	043 SUBJECT 52 %HR MAX 1027 0.5 Activity Calories	044 SUBJECT 49 KHR MAX 1200 0.4 Activity Calories	045 SUBJECT 42 WHR MAX 1021 1.4 Activity Calories	046 SUBJECT 52 %HR MAX 967 1.1 Activity Calories	047 SUBJECT 53 %HR MAX 942 0.7 Activity Calories	048 SUBJECT 42 %HR MAX 987 0.5 Calories	049 SUBJECT 32 %HR MAX 1187 0.4 Activity Calories	050 SUBJECT 49 %HR MAX 1111 1.2 Calories	0% Heart Rate	Man
38 SHR MAX 912 1.4 Activity Calories	45 711 SHR MAX 711 1.4 Calories 062 SUBJECT	0.3 SUBJECT SHR MAX 890 0.3 Activity Calories	46 SHR MAX 943 0.1 Activity Calories	53 SHR MAX 864 0.5 Activity Calories	39 %HR MAX 898 0.6 Activity Calories	43 SHR MAX 1208 0.8 Activity Calories	45 Schr Max 1005 0.4 Activity Calories	37 %HR MAX 874 0.7 Activity Calories	52 %HR MAX 985 0.9 Activity Calories 470 SUBJECT	OB PM	Workout
49 %HR MAX 862 0.8 Activity Calories 071 SUBJECT	41 SHR MAX 942 1.2 Activity Calories 072 SUBJECT	43 965 %HR MAX 965 0.5 Calories 073 SUBJECT	52 SHR MAX 852 0.8 Activity Calories 074 SUBJECT	53 SHR MAX 852 0.9 Activity Calories 075 SUBJECT	52 %HR MAX 848 1.2 Activity Calories 076 SUBJECT	48 SHR MAX 1247 1.6 Activity Calories 077 SUBJECT	41 %HR MAX 1212 0.9 Activity Calories 078 SUBJECT	42 SHR MAX 1124 0.8 Activity Calories 079 SUBJECT	38 SHR MAX 852 1.4 Activity Calories 080 SUBJECT	Run walk stat	
60 Si HR MAX 1257 1.2 Activity Calories 081 SUBJECT	45 16 HR MAX 964 0.5 Calories 082 SUBJECT	52 SHR MAX 1023 0.8 Activity Calories 083 SUBJECT	54 SHR MAX 1204 1.5 Activity Catories 084 SUBJECT	43 SHR MAX 914 1.7 Activity Calories 085 SUBJECT	43 %HR MAX 962 0.5 Activity Calories 086 SUBJECT	52 SHR MAX 999 0.8 Activity Calories 087 SUBJECT	50 KHR MAX 1254 0.7 Activity Calories 088 SUBJECT	57 WHR MAX 1158 0.8 Activity Calories 089 SUBJECT	53 %HR MAX 1247 1.2 Activity Calories 090 SUBJECT		
48 SHR MAX 1120 0.5 Activity Calories 091 SUBJECT 38	42 Schr Max 681 0.8 Activity Calories 092 SUBJECT 38	42 SHR MAX 1294 0.8 Activity Calories 093 SUBJECT 61	52 SCHR MAX 1276 1.4 Activity Calories 094 SUBJECT 47	38 16HR MAX 954 1.7 Activity Calories 095 SUBJECT 44	42 %HR MAX 1574 0.8 Activity Calories 096 SUBJECT 42	42 %HR MAX 1463 0.7 Activity Calories 097 SUBJECT 46	48 WHR MAX 1542 0.5 Activity Calories 098 SUBJECT 51	42 %HR MAX 1548 1.8 Activity Calories 099 SUBJECT 49	52 0.8 Activity Calories 100 SUBJECT	97 Estimated Core Temperature	
Si HR MAX 1568 1.5 Activity Calories Zephyr	SHR MAX 541 0.4 Calories Activity Calories	SHR MAX 1566 1.3 Activity Calories	WHR MAX 1247 0.5 Activity Calories	MHR MAX 684 1.4 Activity Calories	KHR MAX 1598 1.1 Activity Calories	KHR MAX 1578 0.8 Activity Calories	%HR MAX 865 0.5 Activity Calories	%HR MAX 854 0.7 Activity Calories	Mille Max 1528 1.0 Activity Calories	050 Subject	
Responses received : 78, N	fissed : 22 (017 Subject, 018 S	Subject, 019 Subject, 020 Su	ubject, 027 Subject, 031 Subj	ject, 035 Subject, 037 Subje	ct, 039 Subject, 052 Subject	t, 053 Subject, 054 Subject,	056 Subject, 058 Subject, 06	4 Subject, 079 Subject, 081	Subject, 091 Subject, 092 Sul	bject, 093 Subject, 094 Subject, 095 Subject) 16:25:50 PM	

 Two new ECHO modes are now available, selected from OmniSense LIVE > Preferences

Name	Devices Supported	Data Update Rate
ECHO_20	Up to 20	1 second (new)
ECHO_50	Up to 50	2.5 seconds
ECHO_100	Up to 100	5.0 seconds (new)

- For display of larger numbers of BioGauges, a larger monitor is recommended
- Using ECHO-20 with a 1 second data rate, live data calculations on intensity & load calculations will now match those obtained from log data.

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5. Lightweight GPS1300ST



- A smaller, lighter GPS unit is now available
- Battery capacity up to 4 hours
- High accuracy DGPS supported

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6. OmniSense Live GPS Map Window



- For subjects using supported GPS modules
 - Map toolbar button will display a map with a Live 'snail trail' for selected BioGauge
- Snail Trail options:
 - Colored trail selection for
 - Heart Rate
 - %HR max
 - %HR @ AT
 - Physiological or Mechanical Intensity
 - Speed or Altitude Zones
 - ROG Safety Status
 - Slide buttons to set colored value ranges
 - Set trail width & opacity
 - Set duration of trail (minutes and seconds prior to current location)
 - o Add distance markers at configurable intervals
 - o Set marker size & opacity
 - o Display full path prior to snail trail
 - An internet connection is required for Map or Satellite view display

HEAT MAP



- Heat Map highlighting relates to location only.
- Heat Map shows in addition to vital signs snail trail.
- Heat track graduates from green through amber to red, according to how frequently. a location is logged (a stationary subject will show red).
- Heat track indication responds to map zoom will trend to red as view zoomed out.
- An internet connection is required for Map or Satellite view display

7. Heart Rate Variability Improvement



• The algorithm for detecting and calculating HRV has been improved to provide continuous data in the presence of motion artefacts.

8. Workout Notes Audio



• Workout Notes are now available as audio

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9. Updated Pebble Application

- Three fields can be customized through eight optional parameters
- Heart Rate
- Respiration Rate
- Training Zones
- Estimated Core Body Temperature
- Posture
- Activity Level
- Heart Rate Variability
- Stress

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10. Analysis Main Screen with Google Maps

The main screen has been reorganized

- Sessions incorporating GPS data now display on a map panel, which can be viewed as an embedded panel or pop-up window, or hidden
- Internet connection needed

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11. Analysis Preferences

M Preferences
General Application Settings Intensity & Load Training Zones Speed Zones Altude Zones Summary Graph Data Filters Readiness Weights
Save Cancel

General Settings	Switch between Metric & Imperial Units, Set default session display
Intensity & Load	Configure Intensity 1 – 10 scale thresholds (shared with OmniSense Live)
Training Zones	Configure Training Zone thresholds (shared with OmniSense Live)
Speed Zones	Configure speed zone thresholds for background color setting on time graphs
Altitude Zones	Configure Altitude Zones
Summary Graph	Set Summary bar graph axis limits manually or leave on autoscale
Data Filters	Filter a parameter according to itself or another
Readiness Weights	Set weightings of factors in Readiness calculation

12. Analysis Accelerometer Data

Filter Cossien List	Include the environment of			
Filter Session List	Isolate the session you want	Hide Legend	Show Data 📈 🏬 📈 💖	
Show leams:	Show People:	Graph Training Reports Fitness Repo	orts	
All	All		Background Shading	
All	All 👻	HH:mm:ss Avg Rate Force Dev (N/s) Acc. 00:05:14 4.86 0.66		
From:	To:	20:29:13	Boal Time Elansod Time	Filter Export
01 Nov 2015, 00:00	08 Nov 2015, 11:18		Clapsed Time	
Select Session	Drag Up to 16 onto Legend	9	A-0/h	16 -
Orthostatic Test / [02 Nov 2015 /	14:04:19] / [00:12:05]	₹ 12		- 14 🖉
Accelerometry Test/ (03 Nov 201	57202359 7 00 10 28	§ 10		12 2
Orthostatic Test / 105 Nov 2015 /	13-36-371/101-00-031	8		-8 8
	•	÷ , • 1		-6 2
- Accelerometry	*	S S S S S S S S S S S S S S S S S S S		
C Activity			Start which we are a set of the s	0 8
Posture		00. 00.	00.00	00
Peak Acceleration		20:271	20:29:0	20:31
Accelerometry		Nov. 02,	Nov-03, Nov-03, Nov-	201
Avg Rate Force Development				
Average Step Period				
Elight Time	E		Time (HH:mm:ss)	
Peak Magnitude Phi			(1000)	
Peak Magnitude Theta		Dennis Phillins Accelerometry Test /	(03 Nov 2015 /	
Impulse Load		20:23:59]/[00:10:28]		
Walk Step Count				
Run Step Count				
Bound Count				
Jump Count				-
Minor impacts				
Major Impacts				
Physiological Load				
Physiological Intensity				
Mechanical Load				

- Accelerometer data, previously only available in an external Impact Report, is now integrated into the Analysis module
- Time and Summary graphs can be displayed for:
 - Peak Acceleration
 - Avg Rate Force Development
 - Avg Step Impulse
 - Avg Step Period
 - Jump Flight Time
 - Peak Magnitude Phi
 - Peak Magnitude Theta

- Impulse Load
- Walk Step Count
- Run Step Count
- Bound Count
- Jump Count
- Minor Impact Count
- Major Impact Count

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13. Analysis Parameter List Re-organisation

- The parameter list has been reordered and divided into sections which can be maximized or minimized for ease of use.
- Accelerometer data now includes parameters previously only available by using the Impact Analysis tool and generating a report

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14. Analysis Data Filtering

)ata Filters		1.1137.11	_	14.0			A .::	_	0.40%	
 Filter Vanable	In	reshold Vanable		When		Value	Action		Un/Off	
HR HR	▼ Hea	art Rate Confidence	-	Less Than	-	50	Interpolate	-	V	
Speed (mph)	▼ Spe	ed (mph)	-	Greater Than	-	18	Null	-		
*	-		•		-			-		
										4

Filter HR, BR, Posture, Activity, Peak Accel, HRV or Speed data by setting thresholds on its own or other parameter values.

Examples:

- Use Heart Rate confidence to remove unrealistic HR values (interpolate between valid values before and after invalid section). This will allow better calculation of Average HR, time in training zones and calories burned.
- Remove unrealistic high or low speed values caused by interruptions in satellite reception. This improves estimates of average speed, maximum speed, distance and time in speed zones.

15. Analysis Markers

• Custom Markers can now be added to a session in OmniSense Analysis, as well as OmniSense Live

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16. Analysis Change Session Date / Time

Select Session	Drag Up to 16 onto Leg	gend:
📄 📄 Zephyr		
📄 📄 Dennis Phill	ips	
Circuit 1	GPS1300 MTB / [30 Oct 2015 / 17:40:41] / [00:37:49] (Gi	SPS)
Circuit 1	GPS1300 MTB / [01 Nov 2015 / 10:35:36] / [00:40:15] (G	GPS)
Circuit 1	GPS1300 MTB / [06 Nov 2015 / 11:11:07] / [00:37:59] (G	GPS)
1	Change Start Time	
	Saturday Nevember 07, 2015 11:20:16 p.m	
	Saturday , November 07, 2015 11:26:16 p.m ◆	
- Raw Phy	Offset Time By:	<u> </u>
Mean Rai	(+) ss mm bh ddd vv	
Breathing		
Skin Tem		=
Heart Rat		
- Depende	Selected Session(s) 🔘 Filtered Sessions	
Estimate		
Heart Rat	OK Cancel	
Heart Rat		
Heart Rat		

• Change session date and/or time for one or all sessions displayed.

17. Analysis Session Merge

- Merge one or more sessions together
- Use to turn sequential sessions into ne contiguous session
- Combine Live and Log data from a session to fill any gaps in Live data

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