# Data Codebook of movement measures across activities of daily living (Walking (level, up or downstairs), sitting, standing, laying)

Legacy definition of the variable or measure

More descriptive name of variable or measure

Description of the variable or measurement

		Measur	rement	Movement to	Movement type		Data transformations	
					omnidirectional:			
					derived from		signal nitude	
			signal source:		linear		calculated	
			[g]yroscope or		acceleration &	raw[t*] or	using	
		form of movement:	[a]accelerometer*	directional: direction of	linear velocity	[f***]ourier	Euclidean	
original	modified	[b]ody or [g]ravity	*	movement (axis X, Y or Z)	[Jerk]	transformed signal	norm []	

Subject ID, values range from 1 to 30

Activity of Daily Living (ADL) (1 value recorded): 1=Walking, 2=Walking.Upstairs, 3=Walking.Downstairs, 4=Sitting, 5= Standing

### tBodyAcc-

XYZ		body	Accelerometer	directional	raw
BodyAcc- mean-X	Bodymotion.mean.al ong.Xaxis	mean of body moven	nent along the X axis for a	n ADL based on raw data	
BodyAcc- mean-Y	Bodymotion.mean.al ong.Yaxis	mean of body moven	nent along the Y axis for a	n ADL based on raw data	
BodyAcc- mean-Z	Bodymotion.mean.al ong.Zaxis	mean of body moven	nent along the Z axis for a	n ADL based on raw data	
BodyAcc- std-X	Bodymotion.sd.alon g.Xaxis	standard deviation o	f body movement along t	ne X axis for an ADL based on raw data	
BodyAcc- std-Y	Bodymotion.sd.alon g.Yaxis	standard deviation o	f body movement along t	ne Y axis for an ADL based on raw data	
BodyAcc- std-Z	Bodymotion.sd.alon g.Zaxis	standard deviation o	f body movement along t	ne Z axis for an ADL based on raw data	

## tGravityAcc

-XYZ		gravity	Accelerometer	directional		raw
GravityAcc- mean-X	UpDownmotion.mea n.along.Xaxis	mean of body (up/do	own) movement along the	X axis for an ADL based on ra	w data	
GravityAcc- mean-Y	UpDownmotion.mea n.along.Yaxis	mean of body (up/do	own) movement along the	Y axis for an ADL based on ra	w data	
GravityAcc- mean-Z	UpDownmotion.mea n.along.Zaxis	mean of body (up/do	own) movement along the	Z axis for an ADL based on ra	w data	
GravityAcc- std-X	UpDownmotion.sd.a long.Xaxis	standard deviation o	of body (up/down) moven	nent along the X axis for an AD	L based on raw data	
GravityAcc- std-Y	UpDownmotion.sd.a long.Yaxis	standard deviation o	of body (up/down) moven	nent along the Y axis for an AD	L based on raw data	
GravityAcc- std-Z	UpDownmotion.sd.a long.Zaxis	standard deviation o	of body (up/down) moven	nent along the Z axis for an AD	L based on raw data	
tBodyAccJe rk-XYZ		body	Accelerometer	directional	omnidirectional	raw
BodyAccJer k-mean-X	Bodymotion.multipl efoci.mean.along.Xa xis	mean of body (up/do on raw data	own) movement along the	X axis and omnidirectional ax	is for an ADL based	
BodyAccJer k-mean-Y	Bodymotion.multipl efoci.mean.along.Ya xis	mean of body (up/do on raw data	own) movement along the	Y axis and omnidirectional axi	is for an ADL based	
BodyAccJer k-mean-Z	Bodymotion.multipl efoci.mean.along.Za xis	mean of body (up/do on raw data	own) movement along the	Z axis and omnidirectional axi	is for an ADL based	
BodyAccJer k-std-X	Bodymotion.multipl efoci.sd.along.Xaxis	standard deviation o ADL based on raw da		nent along the X and omnidired	ctional axis for an	
BodyAccJer k-std-Y	Bodymotion.multipl efoci.sd.along.Yaxis	standard deviation o		nent along the Y and omnidired	ctional axis for an	

BodyAccJer k-std-Z	r Bodymotion.multipl efoci.sd.along.Zaxis	standard deviation o ADL based on raw da	ndard deviation of body (up/down) movement along the Z and omnidirectional axis for an . based on raw data				
tBodyGyro- XYZ		body	Gyroscope	directional		raw	
BodyGyro- mean-X	BodyShift.mean.alon g.Xaxis	mean of body positio data	nal change along the X ax	kis for an ADL based on raw			
BodyGyro- mean-Y	BodyShift.mean.alon g.Yaxis	mean of body positio data	nal change along the Ya	kis for an ADL based on raw			
BodyGyro- mean-Z							
BodyGyro- std-X	yro- BodyShift.sd.along.X axis standard deviation of body positional change along the X axis for an ADL based on raw data						
BodyGyro- std-Y	yro- BodyShift.sd.along.Y axis standard deviation of body positional change along the Y axis for an ADL based on raw data						
BodyGyro- std-Z	BodyShift.sd.along.Z axis	standard deviation o	f body positional change a	along the Zaxis for an ADL bas	ed on raw data		
Data (	Codebook of moven	nent measures acı	ross activities of da	ily living (Walking (level	, up or downstairs	), sitting, standing,	laying)
General defini	tion of the variable or me	asure					
More descr	riptive name of variable o	measure Desc	ription of the variable or I	measurement			
		Measur	rement	Movement t	-	Data transforr	nations
		form of movement: [b]ody or [g]ravity	signal source: [g]yroscope or [a]accelerometer* *	directional: direction of movement (axis X, Y or Z)	omnidirectional: derived from linear acceleration & linear velocity [Jerk]	raw[t*] or [f***]ourier transformed signal	signal nitude calculated using Euclidean norm []

#### tBodyGyroJ erk-XYZ

e	rk-XYZ		body	Gyroscope	directional	omnidirectional	raw
	BodyGyroJ erk-mean-X	BodyShift.multiplefo ci.mean.along.Xaxis	mean of body position raw data	nal change along the X axi	s and omnidirectional axis fo	r an ADL based on	
	BodyGyroJ erk-mean-Y	BodyShift.multiplefo ci.mean.along.Yaxis	mean of body position raw data	nal change along the Y axi	s and omnidirectional axis fo	r an ADL based on	
	BodyGyroJ erk-mean-Z	BodyShift.multiplefo ci.mean.along.Zaxis	mean of body position raw data	nal change along the Z axi	s and omnidirectional axis fo	r an ADL based on	
	BodyGyroJ erk-std-X	BodyShift.multiplefo ci.sd.along.Xaxis	standard deviation of ADL based on raw da	, ,	ong the X axis and omnidired	ctional axis for an	
	BodyGyroJ erk-std-Y	BodyShift.multiplefo ci.sd.along.Yaxis	standard deviation of ADL based on raw da	, ,	ong the Y axis and omnidired	ctional axis for an	
	BodyGyroJ erk-std-Z	BodyShift.multiplefo ci.sd.along.Zaxis	standard deviation of based on raw data	body positional change al	ong the Z axis and omnidired	ctional axis for an ADL	

Data Codebook of movement measures across activities of daily living (Walking (level, up or downstairs), sitting, standing, laying)

General definition of the variable or measure

Revisted descriptive name of measure

	Measurement		Movement to	уре	Data transformations	
				omnidirectional:		
				derived from		signal nitude
		signal source:		linear		calculated
		[g]yroscope or		acceleration &	raw[t*] or	using
f	orm of movement:	[a]accelerometer*	directional: direction of	linear velocity	[f***]ourier	Euclidean
	[b]ody or [g]ravity	*	movement (axis X, Y or Z)	[Jerk]	transformed signal	norm []

**tBodyAcc** body Accelerometer raw yes

	BodyAccMa g-mean	Bodymotion.mean	mean of body movem nitude	ent along the Z axis for an ADL with Euclidean norm trar	nsformation of		
	BodyAccMa g-std	Bodymotion.sd	standard deviation of transformation of nitu	body movement along the Z axis for an ADL with Euclide de	ean norm		
tG	ravityAcc		gravity	Accelerometer		raw	yes
	GravityAcc Mag-mean	UpDownmotion.mea n	mean of up/down mo	vement for an ADLwith Euclidean norm transformation o	f nitude		
	GravityAcc Mag-std	UpDownmotion.sd	standard deviation of nitude	up/down movement for an ADL with Euclidean norm tra	nsformation of		
tB rk	odyAccJe		body	Accelerometer	omnidirectional	raw	yes
	BodyAccJer kMag- mean	Bodymotion.multipl efoci.mean		nent for an ADL of omnidirectional change wit Euclidean			,
	BodyAccJer kMag-std	Bodymotion.multipl efoci.sd	standard deviation of transformation of nitu	bodily movement for an ADL of omnidirectional change v de	vit Euclidean norm		
tB	odyGyro		body	Gyroscope		raw	
	BodyGyro Mag-mean	BodyShift.mean	mean of body position	nal movement for an ADL based upon raw data			
	BodyGyro Mag-std	BodyShift.sd	standard deviation of	body positional movement for an ADL based upon raw d	ata		
tB er	odyGyroJ k		body	Gyroscope		raw	
	BodyGyroJ erkMag- mean	BodyShift.multiplefo ci.mean	mean of bodily omnid data	irectional body shift movement movement for an ADL b	pased upon raw		
	BodyGyroJ erkMag-std	BodyShift.multiplefo ci.sd	standard deviation of data	bodily omnidirectional body shift movement for an ADI	based upon raw		

## Data Codebook of movement measures across activities of daily living (Walking (level, up or downstairs), sitting, standing, laying)

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Description of the variable or measurement

		Measu	rement	Movement t	ype	Data transform	mations
		form of movement: [b]ody or [g]ravity	signal source: [g]yroscope or [a]accelerometer* *	directional: direction of movement (axis X, Y or Z)	omnidirectional: derived from linear acceleration & linear velocity [Jerk]	raw[t*] or [f***]ourier transformed signal	signal nitude calculated using Euclidean norm []
BodyAcc- XYZ		body	Accelerometer	directional		fourier	
BodyAcc- mean-X	Bodymotion.mean.al ong.Xaxis	mean of bodily move	ment along the X axis f	or an ADL based upon fourier tra	ansformed signal		
BodyAcc- mean-Y	Bodymotion.mean.al ong.Yaxis	mean of bodily move	nean of bodily movement along the Y axis for an ADL based upon fourier transformed signal				
BodyAcc- mean-Z	Bodymotion.mean.al ong.Zaxis	mean of bodily move	ment along the Z axis f	or an ADL based upon Fourier tr	ansformed signal		
BodyAcc- std-X	Bodymotion.sd.alon g.Xaxis	standard deviation of transformed signal	bodily movement along	g the X axis for an ADL based up	oon Fourier		
BodyAcc- std-Y	Bodymotion.sd.alon g.Yaxis	standard deviation of transformed signal	bodily movement along	g the Y axis for an ADL based up	on Fourier		
BodyAcc- std-Z	Bodymotion.sd.alon g.Zaxis	standard deviation of transformed signal	bodily movement alon	g the Z axis for an ADL based up	on Fourier		
BodyAccJer k-XYZ		body	Accelerometer	directional		Fourier	

BodyAccJer k-mean-X	Bodymotion.multipl efoci.mean.along.Xa xis	mean of omnidirectional bodily movement along the X axis for an ADL based upon Fourier transformed signal
BodyAccJer k-mean-Y	Bodymotion.multipl efoci.mean.along.Ya xis	mean of omnidirectional bodily movement along the Y axis for an ADL based upon Fourier transformed signal
BodyAccJer k-mean-Z	Bodymotion.multipl efoci.mean.along.Za xis	mean of omnidirectional bodily movement along the Z axis for an ADL based upon Fourier transformed signal
BodyAccJer k-std-X	Bodymotion.multipl efoci.sd.along.Xaxis	standard deviation of omnidirectional bodily movement along the X axis for an ADL based upon Fourier transformed signal
BodyAccJer k-std-Y	Bodymotion.multipl efoci.sd.along.Yaxis	standard deviation of omnidirectional bodily movement along the Y axis for an ADL based upon Fourier transformed signal
BodyAccJer k-std-Z	Bodymotion.multipl efoci.sd.along.Zaxis	standard deviation of omnidirectional bodily movement along the Z axis for an ADL based upon Fourier transformed signal nitude

Data Codebook of movement measures across activities of daily living (Walking (level, up or downstairs), sitting, standing, laying)

General definition of the variable or measure		

More descriptive name of variable or measure

Description of the variable or measurement

Measurement		Movement ty	t type Data transformatio		nations
			omnidirectional:		
			derived from		signal nitude
	signal source:		linear		calculated
	[g]yroscope or		acceleration &	raw[t*] or	using
form of movement:	[a]accelerometer*	directional: direction of	linear velocity	[f***]ourier	Euclidean
[b]ody or [g]ravity	*	movement (axis X, Y or Z)	[Jerk]	transformed signal	norm []

BodyGyro-XYZ

body

Gyroscope

directional

Fourier

BodyGyro- mean-X	BodyShift.mean.alon g.Xaxis	mean of body shift ch data	nange along the X axis for an ADL based upon raw			
BodyGyro- mean-Y	BodyShift.mean.alon g.Yaxis	mean of body shift ch data	nange along the Y axis for an ADL based upon raw			
BodyGyro- mean-Z	BodyShift.mean.alon g.Zaxis	mean of body shift ch data	nange along the Z axis for an ADL based upon raw			
BodyGyro- std-X	BodyShift.sd.along.X axis	standard deviation of	body shift change along the X axis for an ADL based up	on raw data		
BodyGyro- std-Y	BodyShift.sd.along.Y axis	standard deviation of	body shift change along the Y axis for an ADL based up	on raw data		
BodyGyro- std-Z	BodyShift.sd.along.Z axis	standard deviation of	body shift change along the Z axis for an ADL based up	on raw data		
BodyAcc		body	Accelerometer		Fourier	
BodyAccMa g-mean	Bodymotion.mean	mean of unspecified b	podily movement movement for an ADL based upon raw	data		
BodyAccMa g-std	Bodymotion.sd	standard deviation of	unspecified bodily movement movement for an ADL bas	sed upon raw data		
BodyAccJer k		body	Accelerometer	omnidirectional	Fourier	yes
BodyBodyA ccJerkMag- mean	BodyBodymotion.m ultiplefoci.mean	mean of bodily omnid	directional bodily movement movement for an ADL based grals	d upon Fourier		
BodyBodyA ccJerkMag- std	BodyBodymotion.m ultiplefoci.sd	standard deviation of upon Fourier transfor	bodily omnidirectional bodily movement movement for med nitude signals	an ADL based		
BodyGyro		body	Gyroscope		Fourier	yes
BodyBodyG yroMag- meanFreq	BodyBodyShift.mean Freq	mean frequency of re	ported frequencies of body shift change movement for	an ADL based upon Fou	rier transformed nitude	

B r	odyGyroJe k		body	Gyroscope	omnidirectional	Fourier	yes
	BodyBodyG yroJerkMag -mean BodyBodyShift.multi plefoci.mean		mean of omnidirectional body shift change movement for an ADL based upon Fourier transformed nitude signals				
	BodyBodyG yroJerkMag -std	BodyBodyShift.multi plefoci.sd	standard deviation of Fourier transformed n	omnidirectional body shift change movement f itude signals	or an ADL based upon		
	angle.BodyAccMean,gravity.  angle.BodyAccJerkMean.,gravityMe an.						
	angle.BodyGyroMean,gravityMean.						
	angle.BodyGyroJerkMean,gravityMean.		Component variables modifying other variables used in the signal averaging process				
	angle.X,gra vityMean. angle.Y,gra vityMean.						
angle.Z,gra vityMean.							
mean()		mean or average measurement movement for an ADL used to estimate from each signal					

std()

standard deviation movement for an ADL or square root of sum of squared differences from the mean from each signal

<sup>\*</sup> t stands for time domain signals captured at a constant rate of 50 Hz and filtered using a median filter and a 3rd order low pass Butterworth filter with a corner frequency of 20 Hz to remove noise

<sup>\*\*</sup> the acceleration signal was then separated into body and gravity acceleration signals (tBodyAcc-XYZ and tGravityAcc-XYZ) using another low pass Butterworth filter with a corner frequency of 0.3 Hz.

***a Fast Fourier Transform (FFT) was applied to some of these signals producing BodyAcc-XYZ, BodyAccJerk-XYZ, BodyGyro-XYZ, BodyAccJerk, BodyGyro, BodyGyroJerk. (Note the 'f' to indicate frequency domain signals).