Table S1: Summary findings from the reviewed studies.

Studies	Assessment methods	Sensors	Work Activities	Participants	Measured variables	Key findings	Sensor attachment
Marras WS, et al. Farrag A, et al. Granata KP, et al. Marras W (1992), et al. Marras W (2000), et al. [16,18,19,21,22]	OLBD Risk Model	LMM	MMH activities		· Spinal acceleration · Angular velocity · Magnetic field strength · Orientation in the three planes of motion	The system is effective in quantifying trunk kinematic data and identifying the risk level associated with the job	Back
Cassisi JE, et al. Elfving B, et al. Peach JP, et al. Ng JK-F, et al. Lloyd DG, et al. [28-31,67]	EMG Assisted Models	sEMG	Various movements including MMH activities		· Muscle forces	EMG signals can be used as objective indicators of low back pain cases. Body parts moments can be quantified using EMG-assisted models	Various body parts
Cabeças JM. [33]	Strain Index	sEMG	40 different cleaning activities	20 cleaning operators	· Exertion level · Exertion frequency · Exertion duration	The EMG data could be used as alternative to observational methods to assess the exertion	Right and left wrist flexor and extensor muscles

						intensity, frequency, and duration	
Giannini P, et al. [36]	NIOSH Lifting Equation	• 17 IMUs (Xsens)• 17 IMUs (Noitom)• A custom 11-IMU system	Lifting activities		· Horizontal distance, vertical location, vertical displacement, asymmetry angle, frequency	The system could be used to obtain kinematic and muscles activities data to use in the assessment of MMH activities using the various the listed ergonomic assessment methods.	Head, sternum, shoulder blades, upper arms, lower arms, hands, pelvis, upper legs, lower legs, and foots
	Snook & Ciriello		Pushing/Pulling		· Handle height, covered distance, pushing or pulling frequency		
	REBA		Repetitive high frequency actions		· Head flexion/extension · Lateral bending and right/left rotation · Trunk flexion and extension · Knee flexion/extension · Shoulder flexion/raising · Upper arm abduction · Elbow		Upper arms, lower arms, upper legs, lower legs, pelvis, head and T1 vertebra

					flexion · Wrist flexion/ bending/twisting · Activity frequency		
	Strain Index	Custom EMG system	MMH activities		· Intensity of exertion · Duration of exertion · frequency of exertion · Wrist posture		Right/left wrists
	Strain Index	Shimmer3 EMG					
Mudiyanselage SE, et al. [37]	NIOSH Lifting Equation	2 sEMG (Noraxon)	Lifting activities	1 male	· Thoracic muscles electrical impulses	The developed system could be used to provide insights regarding the ergonomic hazards according to NIOSH Lifting Equation	Upper back muscles (i.e., Thoracic)
Peppoloni L, et al. [41]	RULA	3 IMUs	Grocery cashier	10 (7 males and 3 females)	· Upper arm flexion · Forearm flexion and pronation/supination · Wrist flexion and abduction · Task frequency · Wrist flexion · Work speed	The system performs an online score computation according to RULA and SI scoring methods	Upper arm, forearm and back of the hand

	Strain Index	8-channel sEMG			· # of exertion/min · Duration of exertions · Force exertion		Forearm
Battini D, et al. [42]	RULA, OCRA, OWAS, NIOSH LI	17 IGS-180i IMUs	MMH tasks at two warehouses		· Upper extremity inclination angles · Task duration · Task frequency · Right and left hands positions (vertically and horizontally)	The developed system enables for the postural assessment using the various ergonomic assessment tools. Some errors were observed such as the evaluation of the head, neck and trunk position	Full body motion capture system
Schall MC, et al. [43]	OLBD Risk Model*	2 series SXT IMUs vs. LMM	Material handling task	36 males	· Spinal acceleration · Angular velocity · Magnetic field strength · Orientation in the three planes of motion	Outcomes obtained from methods used IMUs worn at the sternum and L5/S1 body segments were more equivalent to the LMM data than methods	The sternum and L5/S1 body segment

						that computed torso motion only from the IMU worn at the sternum	
Schall Jr MC, et al. [44]	(NIOSH, WA L&I, ACGIH, Ohio BWC, Snook, and LiFFT)*	One wGT3X-BT PA accelerometer compared to 3 IMUs ArduIMU v3	Registered nurse activities	36 females	· Activity frequency and duration	Limited agreement between the IMUs PA measurements and the wGT3X-BT waist-worn PA measurements. Sensor locations significantly influence the PA measurements	IMUs: upper arms and trunk; PA: waist
Valero E, et al. [45]	ATBAN	7 IMUs	Construction activities		· Torso bending angles · Leg flexion angles · Right and left hands positions (vertically and horizontally)	The proposed system could be used to detect unsafe body postures based on measurements of motion data from the IMUs	Upper arms, forearms, shins, and lower back

Valero E, et al. [46]	ISO 11226	8 IMUs	Construction MMH tasks	6 male students	· Torso inclination · Knee flexion · Kneeling · Arm elevation	The system correctly discriminates between various body postures and classify those at increased risk of OLBD based on ISO 11226	Upper/lower back, arms and upper/lower legs
Yan X, et al. [48]	ISO 11226	2 IMUs	Construction activities		· Head, neck, and back inclination angles	The system could be used to provide real-time feedback and warning about the awkward neck and trunk postures	Head and lower back
Chen J, et al. [49]	(NIOSH, WA L&I, ACGIH, Ohio BWC, Snook, LiFFT, RULA)*	17 IMU (Noitom)	Construction MMH tasks	4 graduate students	· Overhead and forward hand reaching · Torso forward bending · Kneeling and squatting · Neck bending · Task duration	The system can accurately identify awkward body postures in construction operation	Pelvis, head, both scapula, upper arms, forearms, sternum, hands, thighs, shanks, and feet

Hischke M, et al. [50]	(RULA, OCRA, OWAS)*	17 IMUs (Xsens)	MMH activities	30 males	· Torso flexion and extension · Time spent in each posture	Three configurations of IMU sensors were used to determine the trunk inclination angles. Trunk measurements obtained from the IMU attached to the sternum were the most comparable to those obtained from the IMU on the sternum relative to the IMU on the sacrum	Pelvis, head, both scapula, upper arms, forearms, sternum, hands, thighs, shanks, and feet
Brents C, et al. [51]	(RULA, OCRA, OWAS)*	17 IMUs (Xsens)	MMH activities	5 males	· Torso flexion and extension · Time spent in each posture	The system could be used to characterize low back angular displacement during keg lifting from different vertical heights	Pelvis, head, both scapula, upper arms, forearms, sternum, hands, thighs, shanks, and feet

Barim MS, et al. [52]	ACGIH TLV for Lifting	5 IMUs (Kinetic)	MMH activities	10 (5 males, 5 females)	· Hand location in the 12 ACGIH TLV lifting zones · Trunk inclination angle · Task duration	Accurate measurements of the trunk inclination angle and task duration. The mean measurement errors for the horizontal and vertical hand location were 6.5 and 33 cm, respectively	Upper back, left upper arm, right and left wrist, and left thigh
Barim MS, et al. 53]	ACGIH TLV for Lifting	5 IMUs (Kinetic)	MMH activities	10 (5 males, 5 females)	· Hand location in the 12 ACGIH TLV lifting zones · Trunk inclination angle · Task duration	The mean measurement errors for the horizontal and vertical hand location reduced to 2.2 and 14 cm, respectively	Upper back, left upper arm, right and left wrist, and left thigh
Beravs T, et al. [54]	RULA, REBA, and OWAS*	4 IMUs	Lower limb exoskeletons or general human movement	1	· Angles of hip, knee, and ankle	Measured body joint angles with a median absolute error of up to 5 degrees	Trunk, thigh, shank, and foot

Conforti I, et al. [55]	RULA, REBA, and OWAS*	8 IMUs (Xsens)	Lifting/releasing load tasks	26	· RoM of the lumbosacral, left and right knee, and left and right ankle joint angles	THE IMU system could be used to distinguish between the correct and incorrect lifting/releasing loads	Sternum body, pelvis, mid-thighs, mid-shanks, and instep of the feet
Porta M, et al. [57]	(NIOSH, WA L&I, ACGIH, Ohio BWC, Snook, and LiFFT)*	Up to 17 IMUs (Xsens)	MMH activities	10 (5 males and 5 females)	· Activity type · Duration · Frequency	A single IMU can be used to successfully classify the activity type, duration, and frequency	Head, sternum, pelvis, scapulae, the upper and lower arms, hands, thighs, shanks, and feet
Faber G, et al. [61]	A top-down inverse dynamics model*	17 IMUs (Xsens) + force shoes	Lifting/carrying tasks	16 (8 males, 8 females)	· Hand forces during lifting	The proposed system measured the hand forces with RMSD of 10-27N. Lower errors were found during lifting as compared to walking and carrying	Pelvis, head, both scapula, upper arms, forearms, sternum, hands, thighs, shanks, and feet

						activities	
Donisi L, et al. [56]	NIOSH Lifting Equation	A single IMU (Opal System)	Lifting activities	7	· Pelvis acceleration and angular velocity signals from the IMU were used in machine learning algorithm	The developed system could be used to classify biomechanical risk according to the revised NIOSH lifting equation	Pelvis
Faber G, et al. [58]	3D L5/S1 moments	17 IMUs (Xsens) + force shoes	Lifting activities	16 (8 males, 8 females)	· 3D L5/S1 moments estimated using top-down and bottom-up models	The top-down model resulted in smaller errors compared to the bottom-up model	Pelvis, head, both scapula, upper arms, forearms, sternum, hands, thighs, shanks, and feet
Matijevich ES, et al. [62]	Biomechanical model	8 IMUs (Xsens) and pressure insoles (Pedar-x)	MMH activities	10 (7 males and 3 females)	· Lumbar moment	A minimum of one IMU sensor attached on the trunk and pressure insoles can predict the lumbar	Feet, shanks, thighs, pelvis, trunk) and pressure insoles placed inside the shoes

						moment with acceptable accuracy	