

- **actuation method, hardware control labels**

label	contents
a_1	pneumatic
a_2	hydraulic
a_3	motor
a_4	electro and hydraulic
a_5	pneumatic and motor
a_6	cable-driven

- **hardware control labels**

label	contents
hc_1	remote operator control
hc_2	automatic control
hc_3	human-robot collaboration
hc_4	manual control

- **application labels**

label	contents	label	contents	label	contents
A_1	road construction	A_{22}	masonry construction	A_{43}	joint filling
A_2	titling placing	A_{23}	on-site rescue	A_{44}	panel installation
A_3	building service	A_{24}	machinery path management	A_{45}	cleaning
A_4	ferromagnetic surface construction	A_{26}	grasp soft objects	A_{46}	machinery mapping
A_5	earthmoving construction	A_{26}	remote operating machines	A_{47}	mining
A_6	building inspection	A_{27}	airforce construction	A_{48}	logistics
A_7	excavation	A_{28}	ceiling construction	A_{49}	transmission tower construction
A_8	steel construction	A_{29}	material, sorting, delivery, distribution	A_{50}	operation simulation
A_9	tunnel construction	A_{30}	Mars/Lunar construction	A_{51}	pose estimation
A_{10}	glass installation	A_{31}	slab finishing	A_{52}	measurement
A_{11}	wall construction	A_{32}	machinery navigation	A_{53}	highway construction
A_{12}	bridge construction	A_{33}	reduce lifting workload	A_{54}	arc welding
A_{13}	construction monitoring	A_{34}	components assemble	A_{55}	underwater work
A_{14}	equipment positioning	A_{35}	construction activity evaluation	A_{56}	remote construction
A_{15}	building quality assessment	A_{36}	diagnosis detection	A_{57}	improve home living environment
A_{16}	concrete printing	A_{37}	timer construction	A_{58}	finishing
A_{17}	high rise building construction	A_{38}	marking	A_{59}	object recognition
A_{18}	large-scale building construction	A_{39}	hazard detection	A_{60}	drilling
A_{19}	building maintenance	A_{40}	harbour construction	A_{61}	scaffolding work
A_{20}	spraying	A_{41}	waste collection	A_{62}	fire curtain testing
A_{21}	pipe construction	A_{42}	disaster restoration	A_{63}	contour crafting

● control algorithm labels

label	contents	label	contents
<i>ca</i> ₁	SFT algorithm, NNG algorithm	<i>ca</i> ₆₁	pixels regression
<i>ca</i> ₂	kinematic	<i>ca</i> ₆₂	image processing
<i>ca</i> ₃	analytical model	<i>ca</i> ₆₃	Actuator-level languages
<i>ca</i> ₄	estimate ego-position	<i>ca</i> ₆₄	iterative algorithms + regression model
<i>ca</i> ₅	PI controller, active control algorithm	<i>ca</i> ₆₅	path-planning
<i>ca</i> ₆	pure-pursuit method	<i>ca</i> ₆₆	geodetical method
<i>ca</i> ₇	Dijkstra's algorithm	<i>ca</i> ₆₇	Kalman Filter Algorithm
<i>ca</i> ₈	tractive thrust, numerical simulation	<i>ca</i> ₆₈	Msc. Adams and Matlab/Simulink programs
<i>ca</i> ₉	performance test, evaluation	<i>ca</i> ₆₉	dynamic model
<i>ca</i> ₁₀	heuristic algorithm, heuristics	<i>ca</i> ₇₀	PTP control
<i>ca</i> ₁₁	Mesh Mould	<i>ca</i> ₇₁	TCP control
<i>ca</i> ₁₂	path planning-linear interpolation algorithm-TP language	<i>ca</i> ₇₂	Particle Swarm Optimization (PSO) algorithms
<i>ca</i> ₁₃	NDT-method	<i>ca</i> ₇₄	RFID
<i>ca</i> ₁₄	control travel speed	<i>ca</i> ₇₅	IFC + BIM
<i>ca</i> ₁₅	automated off-line teaching system	<i>ca</i> ₇₆	LPA* algorithm
<i>ca</i> ₁₆	user datagram protocol (UDP)	<i>ca</i> ₇₇	digital signal processing (DSP) controller
<i>ca</i> ₁₇	admittance control	<i>ca</i> ₇₈	torque measure methods
<i>ca</i> ₁₈	CAN-communication	<i>ca</i> ₇₉	RBF-PID Control, PID
<i>ca</i> ₁₉	simplified error analysis model	<i>ca</i> ₈₀	augmented reality techniques (AR)
<i>ca</i> ₂₀	vision based gesture estimation, CARLoS Scenario	<i>ca</i> ₈₁	predictive force method
<i>ca</i> ₂₁	optimizing welding sequence	<i>ca</i> ₈₂	Generalized Resolution Correlative Scan Matching (GRCSM)
<i>ca</i> ₂₂	BIM+ Augmented Reality+Human-Machine Interfaces (IMUs)	<i>ca</i> ₈₃	finite element method
<i>ca</i> ₂₃	power line communication net	<i>ca</i> ₈₄	Force feedback control
<i>ca</i> ₂₄	beacon-based localization method	<i>ca</i> ₈₅	iterative learning control, fuzzy logic controller
<i>ca</i> ₂₅	a search algorithm.	<i>ca</i> ₈₆	master-slave system
<i>ca</i> ₂₆	fusion fuzzy, fuzzy logic, fuzzy set theory	<i>ca</i> ₈₇	improved Bug-based path planning algorithm
<i>ca</i> ₂₇	distributed feedback mechanism	<i>ca</i> ₈₈	“point-to-angle” algorithms
<i>ca</i> ₂₈	motion simulation	<i>ca</i> ₈₉	trajectory generation algorithm
<i>ca</i> ₂₉	planning and stigmergy, Linux-based computer	<i>ca</i> ₉₀	C++, Java, C# script, C program
<i>ca</i> ₃₀	encoder failure detection algorithm	<i>ca</i> ₉₁	pre-acting control algorithm
<i>ca</i> ₃₁	wireless communication, wireless Lan	<i>ca</i> ₉₂	Virtual Reality
<i>ca</i> ₃₂	parametric-integrated algorithm, parametric synthesis	<i>ca</i> ₉₃	bar penetration technique, in-process reinforcing technique
<i>ca</i> ₃₃	Brooks' algorithm	<i>ca</i> ₉₄	Raspberry Pi
<i>ca</i> ₃₄	Anderson Passive control theory	<i>ca</i> ₉₅	PLC
<i>ca</i> ₃₅	BIM, prepare the trajectories	<i>ca</i> ₉₆	real time navigation
<i>ca</i> ₃₆	PID position control	<i>ca</i> ₉₇	cost optimization
<i>ca</i> ₃₇	intelligent beacon	<i>ca</i> ₉₈	tree-Based algorithm
<i>ca</i> ₃₈	least squares algorithm	<i>ca</i> ₉₉	dedicated smart sensors
<i>ca</i> ₃₉	voltage response	<i>ca</i> ₁₀₀	markov chains

<i>ca</i> ₄₀	collision avoidance algorithms, feed forward control algorithms	<i>ca</i> ₁₀₁	robust algorithm
<i>ca</i> ₄₁	timing algorithm	<i>ca</i> ₁₀₂	MPEG algorithm, the pair-wise alignment algorithm, Minimum V variance Matching (MVM) Algorithm
<i>ca</i> ₄₂	HyperCard program	<i>ca</i> ₁₀₃	motion planning
<i>ca</i> ₄₃	inverse kinematic and dynamic models	<i>ca</i> ₁₀₄	integral monitoring system
<i>ca</i> ₄₄	3D printer/printing	<i>ca</i> ₁₀₅	A* algorithm, A-star
<i>ca</i> ₄₅	discrete event simulation model	<i>ca</i> ₁₀₆	point cloud data control
<i>ca</i> ₄₆	embedded, embedding, controller	<i>ca</i> ₁₀₇	random walk algorithm
<i>ca</i> ₄₇	UML state charts and capsules	<i>ca</i> ₁₀₈	positioning system
<i>ca</i> ₄₈	Hierarchical planning	<i>ca</i> ₁₀₉	stereovision method
<i>ca</i> ₄₉	genetic algorithms (GA)	<i>ca</i> ₁₁₀	Iterative Closest Point (ICP) algorithm
<i>ca</i> ₅₀	simple kinematic connection	<i>ca</i> ₁₁₁	measures vector value of vertical lifting
<i>ca</i> ₅₁	Iterative Inverse Perspective Matching algorithm	<i>ca</i> ₁₁₂	Ubiquitous Sensor Network
<i>ca</i> ₅₂	longest common subsequence (LCS)	<i>ca</i> ₁₁₃	velocity control
<i>ca</i> ₅₃	forward and inverse geometric model	<i>ca</i> ₁₁₄	behaviour-based system
<i>ca</i> ₅₄	inverse position equation	<i>ca</i> ₁₁₅	self-positioning algorithm
<i>ca</i> ₅₅	teaching robots' specific skills	<i>ca</i> ₁₁₆	segmentation approach
<i>ca</i> ₅₆	best-fit algorithms	<i>ca</i> ₁₁₇	automatic battery replacement
<i>ca</i> ₅₇	C-K Theory	<i>ca</i> ₁₁₈	SLAM
<i>ca</i> ₅₈	soft additive fabrication	<i>ca</i> ₁₁₉	error modification
<i>ca</i> ₅₉	primitive static states	<i>ca</i> ₁₂₀	estimate the distance between robot to wall
<i>ca</i> ₆₀	workflow method		
<i>ca</i> ₇₃	Machine Learning: neural, deep learning, CNN, Computer vision, Deep Reinforcement learning, FCN, neural network, deep convolutional neural networks, RRT algorithm, LNSNet network, Network, Fast R-CNN, BP network, Stacked Hourglass Networks, CV algorithm. open CV.		

● sensory system labels

label	contents	label	contents
<i>s</i> ₁	laser + ultrasonic + CCD camera	<i>s</i> ₈₀	infrared + camera
<i>s</i> ₂	camera + pressure sensor + force sensor + magnetostriction sensor + tactile sensor, gyro	<i>s</i> ₈₁	angle sensor
<i>s</i> ₃	position sensor + camera	<i>s</i> ₈₂	laser + lidar
<i>s</i> ₄	image sonars + camera + LBL, gyro	<i>s</i> ₈₃	IMU + laser
<i>s</i> ₅	pressure sensor + tactile sensor	<i>s</i> ₈₄	GPS + lidar + camera + angle sensors + distance sensors + force sensor + depth sensor + radar, ultrasonic sensors + IMU
<i>s</i> ₆	torque/force sensor + force sensor	<i>s</i> ₈₅	pressure sensor + speed sensor + proximity sensors
<i>s</i> ₇	camera	<i>s</i> ₈₆	range sensor + displacement sensor + GPS
<i>s</i> ₈	pressure sensor	<i>s</i> ₈₇	range sensors + distance sensor
<i>s</i> ₉	visual sensor	<i>s</i> ₈₈	pressure sensors + laser sensor
<i>s</i> ₁₀	ultrasonic	<i>s</i> ₈₉	liquid based sensor
<i>s</i> ₁₁	visual sensor + touch sensor + optical detector + arc weaving sensor	<i>s</i> ₉₀	IR sensor + F/T sensor + acceleration sensor
<i>s</i> ₁₂	tactile sensing system + welding sensor	<i>s</i> ₉₁	elasto-magnetic (E/M) sensor
<i>s</i> ₁₃	arc sensor + laser	<i>s</i> ₉₂	robust sensor + pressure sensors + force sensors
<i>s</i> ₁₄	laser	<i>s</i> ₉₃	LPG sensor + a smoke sensor

s_{15}	laser + torch sensor	s_{94}	LTK + GPS + pseudofiles + laser + NLS
s_{16}	CCD camera + stereo sensor	s_{95}	sonar system
s_{17}	LIDAR sensors + IMU + Kinetic	s_{96}	camera + accelerometers
s_{18}	various sensors + sensor system	s_{97}	front rear sensors + wireless camera
s_{19}	3D laser + camera + torch sensor + galvanometer scanner	s_{98}	analogy voltage sensor + laser profile probe
s_{20}	vacuum sensor + air pressure sensor + position sensor + camera	s_{99}	orientation and proximity sensors + CCD camera + thermographic sensors
s_{21}	distance sensor + tilt sensor	s_{100}	ultrasonic sensor + Infrared sensor + dangerous gas sensor + noise sensor + light sensor
s_{22}	position sensor	s_{101}	lidar + IMU
s_{23}	rotation angles sensors + vacuum sensors + accelerometers + pressure sensor	s_{102}	ultrasonic + Infrared + laser
s_{24}	light sensor + infrared proximity sensors	s_{103}	camera + laser scanners + inclinometer
s_{25}	infrared distance sensors + camera	s_{104}	gyro sensor + laser sensor + CCD camera
s_{26}	shock sensor + infrared ray sensor + laser sensor, magnetic sensor	s_{105}	DSLR camera + rotating sensor
s_{27}	laser radar + GPS + RFID	s_{106}	camera + force + laser
s_{28}	alignment sensor + brake check sensor + obstacle detecting sensors + laser sensors + ultrasonic sensor + HMR sensor	s_{107}	radar + acoustic sensors + electrical resistivity sensors + impact-echo + ultrasonic + cameras
s_{29}	camera + laser + lidar	s_{108}	camera + LED + light
s_{30}	GPS + generic pose sensor	s_{109}	GPS + camera
s_{31}	tactile senses + force sensor	s_{110}	pressure sensor + Rotary encoder + potentiometer
s_{32}	camera + GPS + dust meter	s_{111}	camera + force + laser + pressure
s_{33}	force sensor + ultrasonic sensor	s_{112}	vision sensor + proximity sensor + peripheral sensors
s_{34}	force sensor + sonar sensor	s_{113}	rotation angle + encoder sensor + laser, accelerometer
s_{35}	vision sensor	s_{114}	ultrasonic sensors + encoders + IMU + yaw angle sensor + sonar sensors
s_{36}	optical sensors + touch sensor	s_{115}	proximity sensor
s_{37}	ultrasonic sensor + 2D LIDAR	s_{116}	IMU + force sensor
s_{38}	cameras + pressure force sensor	s_{117}	camera + encoder + proximity
s_{39}	camera + image + CCD + Kinect	s_{118}	camera + sonar sensor + temperature sensor + airflow sensors + laser
s_{40}	position sensor + velocity sensor	s_{119}	optical (IR) sensor
s_{41}	position sensor + load sensor	s_{120}	pressure sensor + tensioner sensor + magnetostrictive sensor
s_{42}	rotation sensor + force sensor	s_{121}	meteor-sensors + proximity sensor + navigation sensor
s_{43}	joint sensor	s_{122}	power/torque sensor
s_{44}	force sensor + pressure transducers	s_{123}	force/ touch sensor
s_{45}	force and position sensors + ground penetrating radar (GPR) + laser	s_{124}	photoelectric sensor
s_{46}	force + pressure + laser	s_{125}	ultra-sonic sensor + magnetic sensor + camera
s_{47}	force sensors + Laser + GPS + INS	s_{126}	laser + camera + tempo sonics
s_{48}	work environment sensors + GPS + IMU + lidar	s_{127}	3D sensor
s_{49}	infrared sensor	s_{128}	force sensor + pressure sensor + provision sensor + vision sensors
s_{50}	position sensor + force sensor	s_{129}	optical + ultrasonic + laser
s_{51}	bump sensor	s_{130}	camera + pressure sensor + displacement sensor
s_{52}	on-board camera + live video + inductive sensors	s_{131}	gyroscopes, force/torque sensor, video cameras

<i>s</i> ₅₃	lidar + distance sensor + IMU + inductive sensor + contact sensors	<i>s</i> ₁₃₂	CCD cameras + acceleration sensors + position sensors + magnetic stroke sensors
<i>s</i> ₅₄	laser + cameras + Kinect	<i>s</i> ₁₃₃	a stereo camera + acceleration sensors
<i>s</i> ₅₅	load cell sensor	<i>s</i> ₁₃₄	magnetic stroke sensors + pressure sensors + stereo camera
<i>s</i> ₅₆	ultrasonic + position camera	<i>s</i> ₁₃₅	force sensor + tracker sensor + stereo camera
<i>s</i> ₅₇	environmental sensor	<i>s</i> ₁₃₆	camera + position + pressure
<i>s</i> ₅₈	F/T sensors force/torque + environmental sensor	<i>s</i> ₁₃₇	position sensors + magnetic stroke sensors + pressure sensors
<i>s</i> ₅₉	position and forces sensor	<i>s</i> ₁₃₈	axis sensors
<i>s</i> ₆₀	infrared sensor + force sensor + camera	<i>s</i> ₁₃₉	stereo camera + acceleration sensors + a gyro sensor
<i>s</i> ₆₁	optical sensor + camera	<i>s</i> ₁₄₀	pressure sensor + electronic compass + displacement transducers
<i>s</i> ₆₂	IMU	<i>s</i> ₁₄₁	angle sensor + ultrasonic sensors
<i>s</i> ₆₃	proximity sensor + multiple sensors + camera	<i>s</i> ₁₄₂	light sensors + humidity/temperature sensors + sonar sensors + ultrasonic range sensor + infrared distance measuring sensors + CMOS image sensor
<i>s</i> ₆₄	force + laser	<i>s</i> ₁₄₃	GPS + IMU
<i>s</i> ₆₅	camera + tactile	<i>s</i> ₁₄₄	camera + angle + lidar + GPS
<i>s</i> ₆₆	GPS, position sensor, reference sensor	<i>s</i> ₁₄₅	attitude sensor + acceleration sensor + camera, displacement sensor
<i>s</i> ₆₇	GPS	<i>s</i> ₁₄₆	Kinect + accelerometers + IMUs
<i>s</i> ₆₈	GPS + inclinometer	<i>s</i> ₁₄₇	webcam
<i>s</i> ₆₉	GPS + laser	<i>s</i> ₁₄₈	IMU + camera
<i>s</i> ₇₀	laser + position	<i>s</i> ₁₄₉	force-torque sensor + camera/vision
<i>s</i> ₇₁	force-torque + photoelectric sensor	<i>s</i> ₁₅₀	RGB LED
<i>s</i> ₇₂	camera + proximity sensor + F/T sensor	<i>s</i> ₁₅₁	height sensor
<i>s</i> ₇₃	tilt sensor + distance sensor + camera + laser scanner, gyroscope	<i>s</i> ₁₅₂	stroke sensor + temperature sensor + hydraulic sensor + potentiometer
<i>s</i> ₇₄	ultrasonic sensor + displacement transducers + ranging transducer + laser scanner	<i>s</i> ₁₅₃	RFID + humidity sensor + temperature sensor + Kinect Sensor
<i>s</i> ₇₅	laser distance + stereo infrared sensor	<i>s</i> ₁₅₄	equivalent sensor
<i>s</i> ₇₆	distance sensor	<i>s</i> ₁₅₅	presence sensor + IR interrupt sensor + LVDT inductive sensors
<i>s</i> ₇₇	force sensor + pose sensor	<i>s</i> ₁₅₆	RGB camera + IMU
<i>s</i> ₇₈	actuators and electronic sensors + stop sensor	<i>s</i> ₁₅₇	Zigbee sensors + laser finder
<i>s</i> ₇₉	lidar + camera	<i>s</i> ₁₅₈	depth sensor + colour sensors + camera

● hardware design labels

lahdel	contents	lahdel	contents
<i>bd</i> ₁	humanoid	<i>bd</i> ₄₂	mobile vehicle, aerial lift, manipulator, vacuum suction device
<i>bd</i> ₂	arm, manipulator, mounted on vehicle, track, excavator, caterpillar, lorry, rail, crawler, crane, car	<i>bd</i> ₄₄	manipulator, vacuum suction, wheel mobility
<i>bd</i> ₃	crawler	<i>bd</i> ₄₅	wearable
<i>bd</i> ₄	arm, slider pulley	<i>bd</i> ₄₆	wheel mobile, magnetic gripper
<i>bd</i> ₅	multi-fingered robot hand, gear, belt	<i>bd</i> ₄₇	mobile formwork
<i>bd</i> ₆	tank	<i>bd</i> ₄₈	reconfigurable, vacuum grippers, arm, two robots
<i>bd</i> ₇	gantry robot, arm	<i>bd</i> ₄₉	crane, robotized crane
<i>bd</i> ₈	mobile robotic platform/robot	<i>bd</i> ₅₀	vacuum cups, overhead gantry crane

<i>bd₉</i>	AGV, track lifting arm	<i>bd₅₁</i>	omnidirectional wheel, mobile platform, vacuum generator, robotic arm
<i>bd₁₀</i>	traveling crane	<i>bd₅₂</i>	mobile vehicle, carriage, truck, excavator, tank, trolley, dozer, Caterpillar, Forklift, machine
<i>bd₁₁</i>	lifting rail, and arm moved by carriage	<i>bd₅₃</i>	wireless gripper, winch
<i>bd₁₂</i>	fixed arm (depicted, mounted, hang on, manipulator, attach)	<i>bd₅₄</i>	vacuum gripper and robot arm
<i>bd₁₃</i>	mobile platform arm, manipulator	<i>bd₅₅</i>	vertically mobile arm
<i>bd₁₄</i>	changeable cell	<i>bd₅₆</i>	rail moving arm,
<i>bd₁₅</i>	wheel mobile lifting single arm	<i>bd₅₇</i>	wire robot, cable climb
<i>bd₁₆</i>	climbing platform, pediculate, gripper	<i>bd₅₈</i>	UAV
<i>bd₁₇</i>	lift fixed manipulator	<i>bd₅₉</i>	a scissor lift, aerial bucket, and a manipulator arm
<i>bd₁₈</i>	the legged mobile platform with rods climbs	<i>bd₆₀</i>	truss-type robot
<i>bd₁₉</i>	climbing platforms, with vacuum grippers and suction	<i>bd₆₁</i>	double arm excavator arm, double front, dual arm
<i>bd₂₀</i>	climbing two platforms and a light skeleton, vacuum grippers	<i>bd₆₂</i>	caterpillar and, 6-DOF manipulator with vacuum pad
<i>bd₂₁</i>	mobile arm	<i>bd₆₃</i>	scissor-jack type manipulator
<i>bd₂₂</i>	mobility platform and magnetic gripper	<i>bd₆₄</i>	ground-based, aerial robotic platform
<i>bd₂₃</i>	mobile robot, a light automatic manipulator moves by rail	<i>bd₆₅</i>	mobile square
<i>bd₂₄</i>	climbing system	<i>bd₆₆</i>	mobile tracked locomotion
<i>bd₂₅</i>	parallel robots	<i>bd₆₇</i>	frame system
<i>bd₂₆</i>	rail, vertical-moving robot	<i>bd₆₈</i>	mobile platform Husky
<i>bd₂₇</i>	AGV, unmanned ground vehicle	<i>bd₆₉</i>	platform clamp
<i>bd₂₈</i>	Hexapod-Shaped	<i>bd₇₀</i>	mobility feet, leg, limbed
<i>bd₂₉</i>	a mobile platform, a manipulator mounted on a lifting column	<i>bd₇₁</i>	wheel mobile platform, caterpillar
<i>bd₃₀</i>	ABB arm, arm, KUKA arm, Mitsubishi Robot RV-2AJ, manipulator, UR5	<i>bd₇₂</i>	Hammering Robot
<i>bd₃₁</i>	UGV and UAV	<i>bd₇₃</i>	magnetic wheel
<i>bd₃₂</i>	wheel mobile robot	<i>bd₇₄</i>	worm-like, snake-like robot
<i>bd₃₃</i>	bucket, arm	<i>bd₇₅</i>	mobility, clamping manipulator
<i>bd₃₄</i>	vertical mobile, a cleaning head, a pressure pump, a suction device, a filter and a tank.	<i>bd₇₆</i>	scissor lifter and omnidirectional wheels
<i>bd₃₅</i>	magnetic clamp and mobile platform	<i>bd₇₇</i>	bolting robot
<i>bd₃₆</i>	mobile arm, manipulator with wheels	<i>bd₇₈</i>	collaborative robots, multi robot, team of robots, multiple
<i>bd₃₇</i>	mobile reconfigurable, platform	<i>bd₇₉</i>	omnidirectional wheel
<i>bd₃₈</i>	reconfigurable vertical climbing	<i>bd₈₀</i>	3d printer, lifting
<i>bd₃₉</i>	reconfigurable with locomotive wheels	<i>bd₈₁</i>	motion base, manipulator
<i>bd₄₀</i>	caterpillar wheels, commercial impeller, vacuum suction	<i>bd₈₂</i>	artificial Nbber/ Rubber muscle (PARM)
<i>bd₄₁</i>	parallel manipulator, frame	<i>bd₈₃</i>	a novel furniture system, terminal wall system

● benchmarking technique labels

label	contents
bm_1	the environmental impact, life cycle Assessment (LCA)
bm_2	technical, economic, efficiency
bm_3	efficiency
bm_4	motion/force transmissibility
bm_5	safety, posture load, working environment, risk exposure time, safety improvement ratio
bm_6	cost optimization, quality control functions
bm_7	productivity, economic feasibility, sensitivity, safety improvement, quality improvement
bm_8	life cycle cost, productivity, sensitivity analysis
bm_9	material management
bm_{10}	position error, internal error, force
bm_{11}	tele grasping force perception
bm_{12}	sustainability performance, environment
bm_{13}	error, cost, power consumption, controllability, complexity continuous time
bm_{14}	cost, productivity, efficiency
bm_{15}	mental workload