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i-walk data security

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faster cleaner greener safer better

Preface

This document describes what data i-walk generates and saves. There will be an explanation and description of the following topics:

- Sensor data
- Server and peripheral connection
- User usage data
- Operational data
- Data being sent

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Context

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1. Sensor data

The i-walk has 7 sensors;

- 1x 2D lidar, for navigation purposes
- 3x 3D TOF sensor, for obstacle avoidance
- 3x ultrasonic sensor, for obstacle avoidance, mainly glass or mirror objects

The purpose of generating this data is to navigate around in the mapped area. There are no camera based sensors which are able to generate and collect photo or video. Also there are no microphones capable of generating and saving sound data. Furthermore, this data is also not accessible remotely and is not stored either locally or on a server.

Below there are three examples of data which are generated by the 2D lidar (fig. 1), the 3D TOF sensors (fig 2.), and an example of the 3D TOF sensors with an object in front.

1.1. 2D lidar data

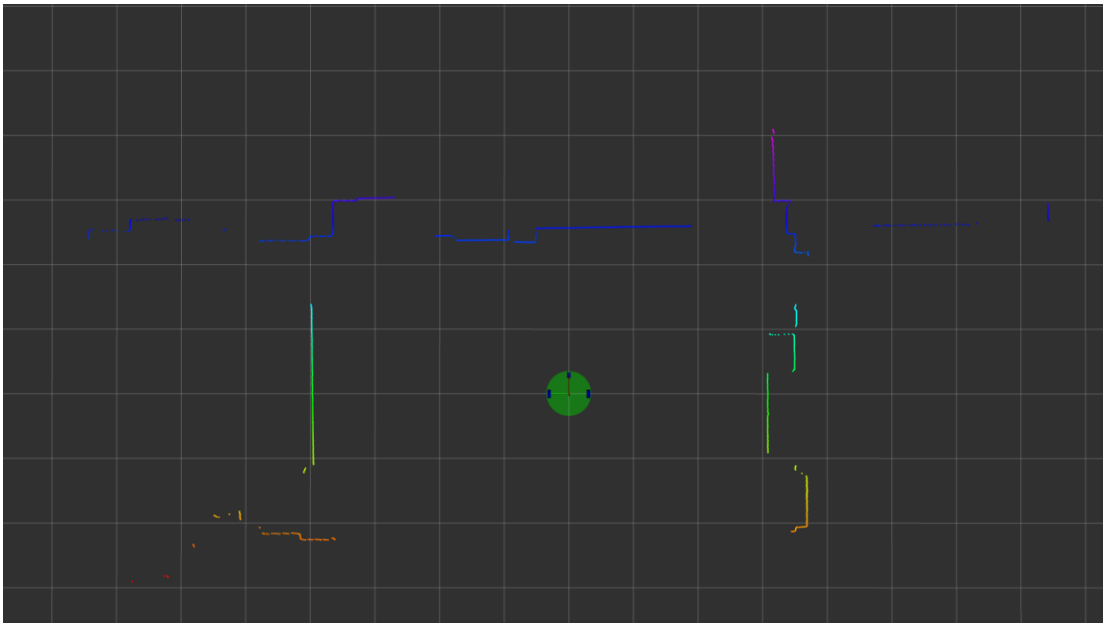

fig. 1 2D Lidar sensor data example

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1.2. 3D TOF sensor data

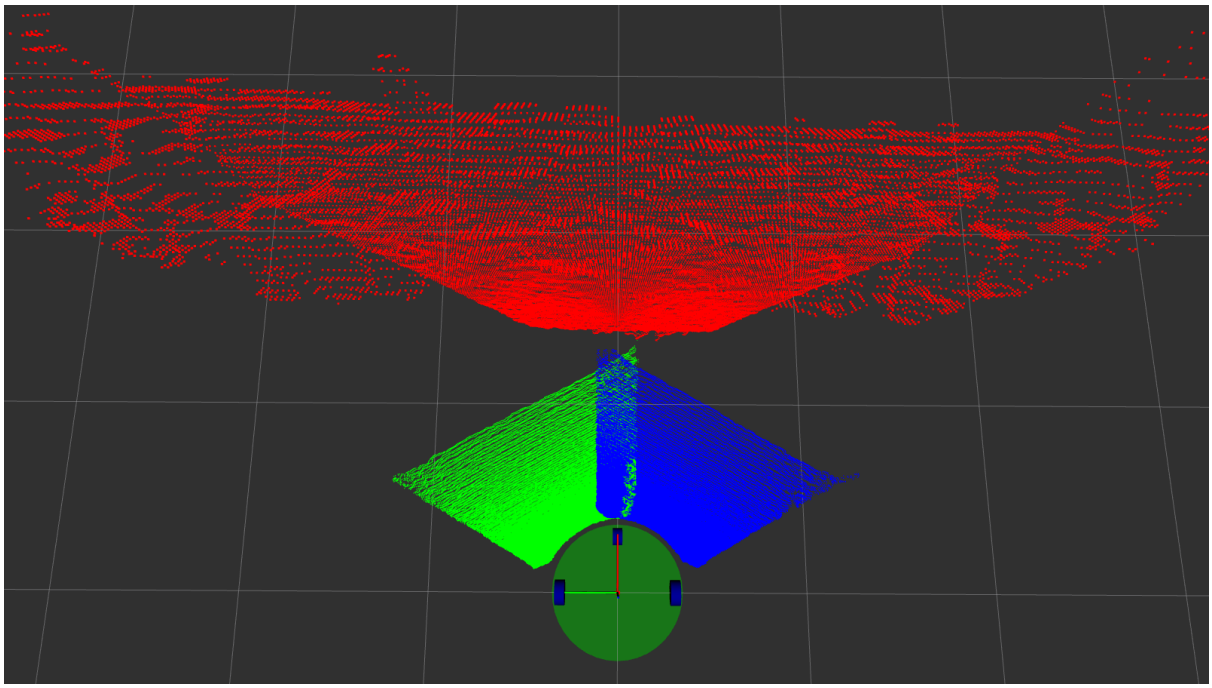

fig. 2 3D TOF sensor data example

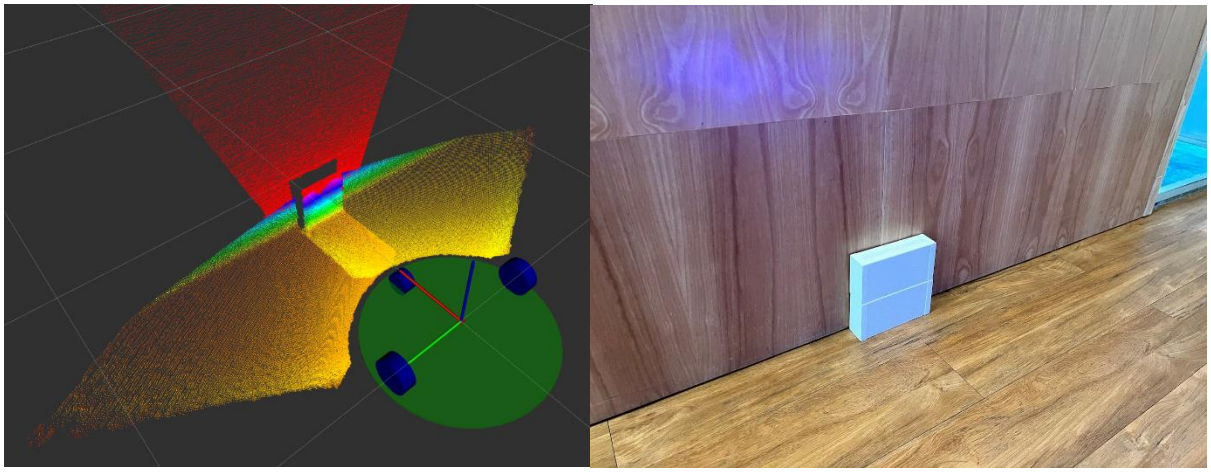

fig. 3 3D TOF sensor data example with object

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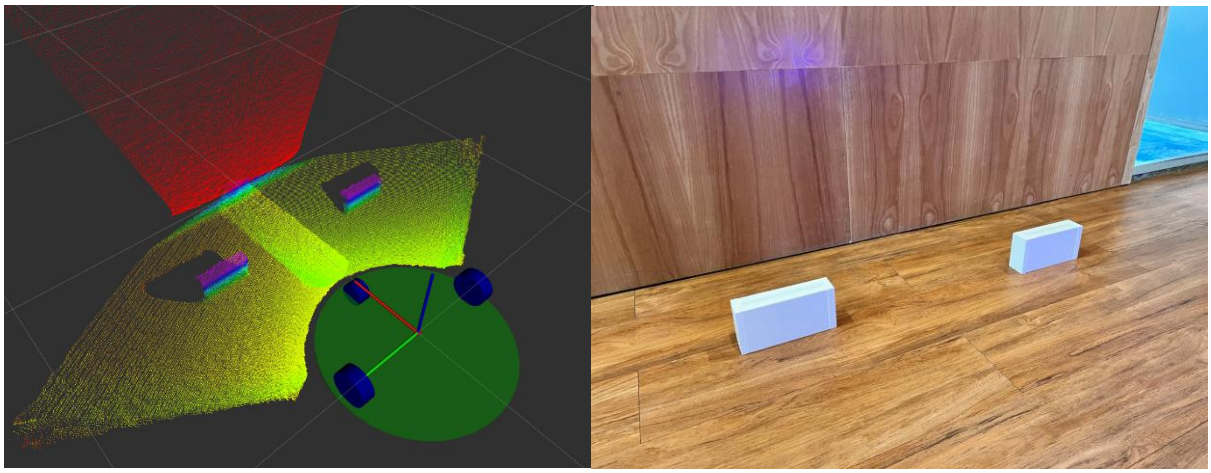

fig. 4 3D TOF sensor data example with objects

1.3. QR code reading sensor data

To detect the QR code used by the i-walk the bottom 3D sensor is used. This sensor also has camera possibilities because this is required to detect such a QR code. The sensor and camera placements on the i-walk are tuned specifically to each form factor with the intent of supporting autonomous navigation and are not positioned to collect information of a natural person, environment or building.

In case where the sensors and cameras of the robots would incidentally collect information of a natural person or environment while supporting autonomous navigation, such image data resides only on board of the i-walk. There is no sharing of this collected information over the air of any kind. Furthermore the image data onboard the i-walk is purged quickly enough such that no identification is possible in case of misuse.

1.4. Server

For normal operation on the there is a connection from the i-walk to a server. This server is from AWS (Amazon Web Services) and is located in Frankfurt, Germany. Currently there is no second server and also no server where data is stored outside of Europe. This might be subject to change if there are large amounts in other continents to improve data transmission speed, or required location safety. For more information about AWS data security, documentation, GDPR and how this is handled please see the links below:

- https://aws.amazon.com/compliance/gdpr-center/
- https://aws.amazon.com/compliance/data-privacy-faq/

1.5. Peripheral

For map commissioning, cleaning records and notifications there is a network connection required from both the i-walk and the operator phone. The operator phone comes with a pre-installed roaming data sim card from Vodafone. The sim card or network connection for the i-walk needs to be arranged locally. Please be aware that the i-walk does not require a sim card to function, only for map commissioning, cleaning reports and receiving notifications. If there is no network connection there will be no notifications to the phone, cleaning records cannot be seen from the phone and no real-time data can be seen from the unit. There is also no direct network link between the operator phone and the i-walk. Also note that the phone and also the server currently used for the i-walk is the same as the co-botic™ 45. Find in fig. 5 what the architecture is for sending data.

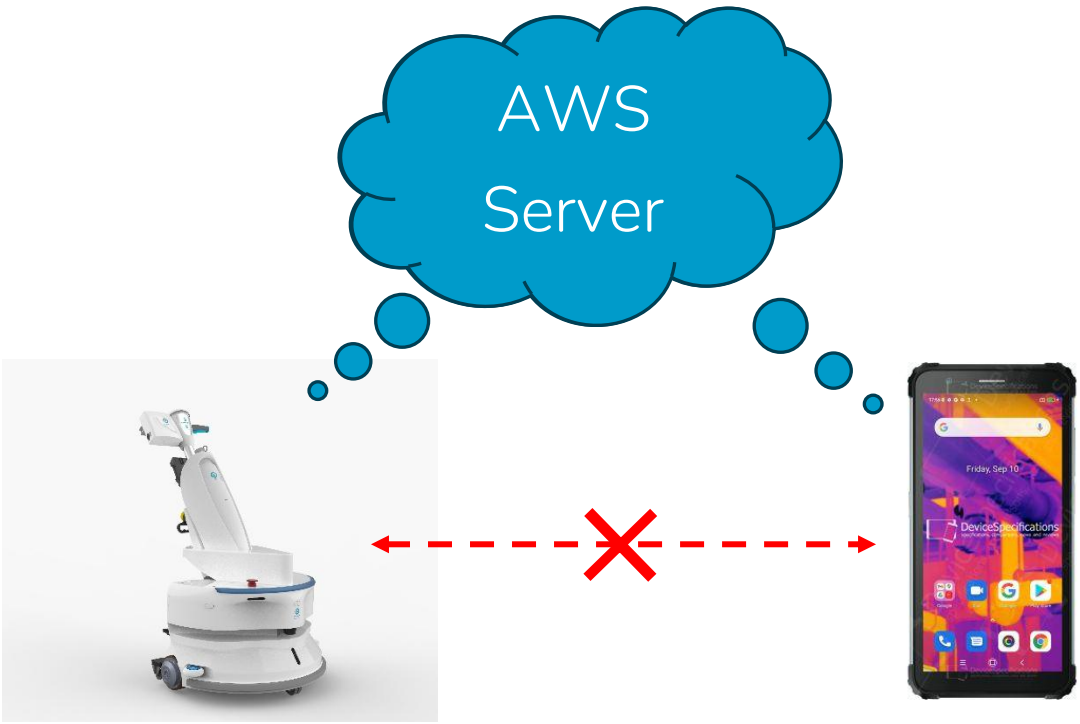

fig. 5 Data sending architecture

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1.6. Supplied operator phone

The supplied operator phone is the Blackview BV6600. This phone is locked to specific apps by i-team via a phone locking software called Esper. For data security questions related to the Esper software, please check out the following link: https://www.esper.io/security

Furthermore Esper also allows i-team to look remotely on the screen of the operator phone. i-team can only access the phone remotely if the operator, who has the phone accepts this request on the screen. The only time this is used, is for remote assistance, if this is required. There is no way to access the cameras to make photos or videos remotely via the Esper software.

Furthermore the operator phone uses a Vodafone sim card supplied by i-team. This sim card is whitelisted to specific ip-addresses for our i-walk, co-botic™ 45 and i-link servers. This sim card cannot be used to reach other websites or ip-addresses.

2. User usage data

There is data stored from the device where the apk (Android Package Kit) file is installed on. This will include, cookies, tokens, robot data such as; serial number, cleaning mode setting, map planning, editing, task information, cleaning record data, etc. This data is generated on all devices the apk is installed on.

When using the supplied operator phone there is no end user data that needs to be put in. To use the units there have been created general user accounts. Therefore there is no data from the end user that can be taken from the i-walk. The only data that is sent, is general data which does not bind the end user to a specific machine or peripheral, because this is a general user account and phone and provided by i-team. Email and telephone number are not required from the end user for operation of the i-walk.

3. Third party SDK data collection and communication

When using the supplied operator phone and not using the apk on a private device, the following is not of interest.

1. Crash data

The operator phone and installed apk collects crash data for statistical analysis of abnormal and error data during app operation.

2. Cellphone information

The operator phone and installed apk will collect cellphone information such as android ID, IMSI, SD, IMEI, ICCID, SIM, IP address. This is not of interest if the apk is installed on the supplied operator phone only.

3.1. HTTP data

HTTP data is being communicated between the i-walk and the server. Furthermore this info is used by the phone to display information. This is more general information which is only updated periodically.

Table	Field	Type	Description
MapV2	robotPk	String	Map ID
	mapName	String	Map name
	robotSn	String	Machine SN
	mapScene	String	Map Usage Scenarios
	updateTimestamp	String	Map update timestamp
	legendOfFigure	String	Map resolution scale
	file	FILE	Map file
TaskReportAndZipFile	taskId	String	Task ID
	robotSn	String	Machine SN
	taskName	String	The name of the task
	taskType	String	Cleaning Scene Type
	reportNo	String	Task report number
	startTime	String	Task start time
	endTime	String	Task end time
	mapName	String	Map name
	mapType	Int	Map type
	opType	String	Task initiation method
	opUser	String	Mission Sponsor
	generatorTime	String	Report generation time
	taskProgress	String	Task progress
	targetArea	String	Target clean area
	actualArea	String	Actual clean area
	effectArea	String	Effective cleaning area
	startElectric	String	Battery level at the start of the task
	endElectric	String	Battery at the end of the task
	supplyTimes	String	Number of resupply
	speedBumpsTimes	String	Number of speed bumps
	breakTime	String	Number of task interruptions
	carTime	String	Number of times to give way
	cleanEfficiency	String	Mission efficiency
	cleanSpentTime	String	Task duration
	cleanCoverage	String	Clean coverage
	spentElectric	String	Power consumption
	spentWater	String	Water consumption
	taskSpentTime	String	Task time consumption
	averageSpeed	String	Average speed
	robotPk	String	Associated map id
	file	FILE	Map and trajectory files

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Table	Field	Type	Description
RobotLog	file	FILE	Log file
	fileName	String	File name
	robotSn	String	Machine SN
CleanData	taskNo	String	Task number (task number in the associated report)
	cleanType	String	Cleaning type
	taskNode	String	Cleaning Mission Key Event Nodes
	taskProgress	String	Task progress
	taskTime	Long	Key event time points for cleaning tasks
	taskName	String	Task name
	targetCleanArea	Double	Target clean area
	actualCleanArea	Double	Actual clean area
	effectiveCleanArea	Double	Effective cleaning area
	runningTime	Int	Task run time
	cleanTime	Int	Task cleaning time
	mapName	String	Map name
Message	msgType	String	Message type
	noticeTime	Long	Notification generation time
	taskIncident	String	Mission events
	taskName	String	Task name
	mapName	String	Map name
	suspendReason	String	Reason for suspension
LoginPad	ctrlSn	String	Control box SN
	ctrlSnPwd	String	Control box password
	sign	String	Signature (signature encrypted with CDKEY md5)
	timeStamp	Long	Current timestamp
	version	String	Current version number
FactoryStatus	code	Int	Postback code
	id	Long	The task ID is sent by the server and will be postback.
	robotSn	String	Machine SN
Version	series	String	Series
	version	String	Current version number
Info	robot_sn	String	Machine SN
	robot_model	String	Machine model
	app_version	String	Application version number
	algorithm_version	String	Algorithm version number
	fireware_version	String	Firmware version number

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3.2. MQTT data

MQTT data is being communicated between the i-walk and the server. Furthermore this info is used by the phone to display information. This data is real-time information about the unit required to show current status, notifications and location of the unit in the map.

Command	Field	Type	Description
CMD 20006 Upload machine location and real-time tracks	robotSn	String	Machine SN
	axis_x	Float	Machine location map x-axis coordinates
	axis_y	Float	Machine location map y-axis coordinates
	angle	Int	Orientation angle of machine location map
	map_id	Long	Map ID
	map_name	String	Map name
	timestamp	Long	Current timestamp
	taskId	String	Current task Id
	areaIndex	Int	Clean area index
	cleanStatusCode	Int	Current clean state
CMD 10030 Upload real-time paths in batches	id	String	Current task Id
	timestamp	Long	Current timestamp
	robotSn	String	Machine SN
	data	String	Real-time trajectory
CMD 20007 Upload real-time task information	robotSn	String	Machine SN
	name	String	Task name
	progress	Int	Task progress
	action	String	Current execution action
	status	String	Status of the task
	startTime	Long	Task start time
	runningTotal	Int	Task run time
	cleaningRate	Int	Mission efficiency
	mapId	Int	Current map id
	mapName	String	Map name
	targetCleanArea	Int	Target clean area
	actualCleanArea	Int	Actual clean area
	coverageRate	Int	Clean coverage
	remainTime	Long	Cleaning remaining time
	remainArea	Int	Remaining area
	taskId	String	Current task id
CMD 20005 Upload the machine status	status	String	Current state of the machine
	statusStr	String	Description of the current state
	subStatus	String	Current operating status of the machine
	subStatusStr	String	Description of the current operating status of the machine
	currLocation	String	Map name where the machine is currently located
	mode	String	Current machine mode
	timestamp	Long	Timestamp Current time
	cleanWater	Int	Clean water tank status
	dirtyWater	Int	Wastewater tank condition
	battery	Int	Electricity
	exception	String	Abnormal message
	cellular	Int	4G signal information
	latLng	Double	Machine latitude and longitude (geographical location)
	robotSn	String	Machine SN
	speed	Double	Real-time speed

Command	Field	Type	Description
CMD 10046 Upload real-time maps and hand-pushed perimeter tracks	cpp	String	Real-time hand push peripheral trajectory
	robotSn	String	Machine SN
	speed	Double	Real-time speed
	timestamp	Long	Current timestamp
	map	String	Map data
	cppJsonStr	String	Planning path
	createMapState	Int	Mapping state
CMD 20020 Upload real-time exceptions	robotSn	String	Machine SN
	error	String	Real-time exception information
CMD 10050 The result of the uplink request to occupy the map	eleJson	String	Elements on the current map
	resultCode	Int	Result code for applying to occupy the map
	robotSn	String	Machine SN
	mapName	String	Map name
	callbackUser	String	Callback user name
CMD 10054 Uplink edit map heartbeat command feedback	robotSn	String	Machine SN
	resultCode	Int	Edit map heartbeat command feedback code
	mapName	String	Map name
	callbackUser	String	Callback user name
CMD 10057 Add no-go zone feedback	robotSn	String	Machine SN
	resultCode	Int	Code to add forbidden area to save feedback
	mapName	String	Map name
	callbackUser	String	Callback user name
CMD 10063 The current map element	eleJson	String	Elements on the current map
	resultCode	Int	Result code for applying to occupy the map
	robotSn	String	Machine SN
	mapName	String	Map name
	callbackUser	String	Callback user name
CMD 10067 Self-check items and results	robotSn	String	Machine SN
	callbackUser	String	Callback user name
	modelCode	String	Detection item
	modelResult	String	Results corresponding to detection items
	modelName	String	Detection name
	failCode	Int	Self-test failed code