

TBM 4: Stem the leak (Land +Sea)

Team name: BEBOT + TOM KYLE

Referee I (Land): WINFIELD, Referee II (Land): GUSTMANN

Referee I (Sea): KINGSTON, Referee II (Sea): SCHOPLEY

Date (DD/MM/YYYY): 19/9/17, Time (24:00): 13:15

Duration: _____ (Max. 45 min) ☐ Timeout

Achievements

Set A1: Outdoors

From the starting point of the building, a ground robot reaches WP5 L within a precision of 3m.	A1.1 <input type="checkbox"/>
A ground robot reaches WP6 L within a precision of 3m with autonomous navigation.	A1.2 <input type="checkbox"/>

	Outdoor damages (building)		
	D1 <input type="checkbox"/>	D2 <input type="checkbox"/>	D3 <input type="checkbox"/>
The ground robots recognise the damages on the wall of the building. (Each damage can only be scored once).	A1.3	A1.4	A1.5

The ground robot(s) build(s) an outdoor map of the land pipes area.	A1.6 <input type="checkbox"/>
A ground robot detects the leak marker on the pipe.	A1.7 <input checked="" type="checkbox"/>
A ground robot reports the pipe that is leaking on land.	A1.8 <input checked="" type="checkbox"/>
A ground robot recognises the number on the leaking pipe on land.	A1.9 <input checked="" type="checkbox"/>
A ground robot localises the unobstructed entrance in real-time in automatic way.	A1.10 <input type="checkbox"/>

Set A2: Indoors

A ground robot enters the building through the unblocked entrance.	A2.1 <input checked="" type="checkbox"/>
A ground robot finds a safe and unobstructed path to the machine room from the building entrance. (The path is shown on the map).	A2.2 <input checked="" type="checkbox"/>
From the building entrance, a ground robot follows a safe path (collision free from obstacles and structures) to the machine room.	A2.3 <input checked="" type="checkbox"/>
A ground robot recognises the machine room sign in real-time in automatic way.	A2.4 <input type="checkbox"/>
A ground robot enters the machine room.	A2.5 <input checked="" type="checkbox"/>

Indoor map		
The ground robot(s) builds a geometric indoor map of the building. (Use the best map or a combination of ground robots maps).	Area 1 <input type="checkbox"/>	Area 2 <input type="checkbox"/>
	A2.6	A2.7

A ground robot recognises the ID of the correct set of valves in the machine room.	A2.8 <input checked="" type="checkbox"/>
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Correct Valve		
A ground robot closes the correct valve. The robot must close one valve of the set autonomously and the other one manually. The process must be recorded by the on board camera of the robot. (Note: Each set of valves has two types: gate and lever)	Valve manual <input checked="" type="checkbox"/> A2.9	Valve autonomous <input type="checkbox"/> A2.10
	Specify type valve: <u>LEVER</u>	Specify type valve: _____

Set A3: Underwater

Type of images		
The underwater robot provides images of the gate.	Acoustic buoy-1 <input type="checkbox"/> A3.1	Optical buoy-1 <input type="checkbox"/> A3.3
	Acoustic buoy-2 <input type="checkbox"/> A3.2	Optical buoy-2 <input type="checkbox"/> A3.4

The underwater robot passes through the gate without touching it.	A3.5 <input type="checkbox"/>
The underwater robot passes through the gate within the first 30 minutes from the start of the run.	A3.6 <input type="checkbox"/>

The underwater robot detects the plume buoys in real time. Images are needed.	Buoys				
	B1 <input type="checkbox"/>	B2 <input type="checkbox"/>	B3 <input type="checkbox"/>	B4 <input type="checkbox"/>	B5 <input type="checkbox"/>
	A3.7	A3.8	A3.9	A3.10	A3.11
The underwater robot recognises the number on the plume buoys	Buoys numbers				
	B1 <input type="checkbox"/>	B2 <input type="checkbox"/>	B3 <input type="checkbox"/>	B4 <input type="checkbox"/>	B5 <input type="checkbox"/>
	A3.12	A3.13	A3.14	A3.15	A3.16

The underwater robot produces a geometric map of the plume (Area: B1+B2).	A3.17 <input type="checkbox"/>
The underwater robot produces a geometric map of the plume (Area: B3+B4+B5).	A3.18 <input type="checkbox"/>
The underwater robot detects the leak marker on the pipe in real time.	A3.19 <input type="checkbox"/>
The underwater robot recognises and provides images of the black number stamped on the leaking pipe.	A3.20 <input type="checkbox"/>
The underwater robot reports which is the number of the leaking pipe by its geometric position.	A3.21 <input type="checkbox"/>

The underwater robot inspects the four pipes underwater. Provide images.	Pipes underwater			
	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>
	A3.22	A3.23	A3.24	A3.25

Following the leaking pipe up to the assembly structure, the underwater robot provides an image mosaic of the <u>first half</u> of the leaking pipe.	A3.26 <input type="checkbox"/>
Following the leaking pipe up to the assembly structure, the underwater robot provides an image mosaic of the <u>second half</u> of the leaking pipe.	A3.27 <input type="checkbox"/>
The underwater robot provides a 3D reconstruction of the manipulation console where the correct underwater valve is.	A3.28 <input type="checkbox"/>
The underwater robot closes the correct valve with a rotation of the <u>first 45 degrees</u> . The process must be recorded by the on board camera of the robot.	A3.29 <input type="checkbox"/>
The underwater robot closes the correct valve with a rotation of the <u>last 45 degrees</u> . The process must be recorded by the on board camera of the robot.	A3.30 <input type="checkbox"/>

Set A4: Cooperation

The underwater robot communicates through a surface robot or directly to the ground robot the leaking pipe.	A4.1 <input type="checkbox"/>
The ground robot receives and decodes the message with the correct leaking pipe sent by directly by the underwater or through the surface robot.	A4.2 <input type="checkbox"/>
The ground robot communicates the correct land leaking pipe to the underwater robot (directly or through the surface robot).	A4.3 <input checked="" type="checkbox"/>
The underwater robot receives and decodes the message with the correct land leaking pipe sent by the aerial robot or the surface robot.	A4.4 <input type="checkbox"/>
The ground robot and the underwater robot close the correct valves in a synchronised process.	A4.5 <input type="checkbox"/>

Set A5: General

The ground robots return to the landing area once all the tasks have been done.	A5.1 <input type="checkbox"/>
The underwater robot surfaces in a controlled way once all the tasks have been done.	A5.2 <input type="checkbox"/>
The ground robot(s) transmits live position and images/video to the control station during the run.	A5.3 <input checked="" type="checkbox"/>
The marine robot(s) transmits live position and images/video to the control station during the run or the manipulation task.	A5.4 <input type="checkbox"/>

Penalised Behaviours

The robot needs manual intervention during a run (e.g. the robot is stuck):	
Marine robot	No permitted
Ground robot 1	PB1 <input checked="" type="checkbox"/> <input type="checkbox"/> (max. 2)
Ground robot 2	PB2 <input type="checkbox"/> <input type="checkbox"/> (max. 2)

The ground robot leaves the operating area.	PB3 <input type="checkbox"/> (max. 1)
The ground robot changes batteries or is refuelled.	PB4 <input type="checkbox"/> (max. 1)
The ground robot-1 hits the obstacles.	PB5 <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>

The ground robot-2 hits the obstacles.	PB6 <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
The underwater robot changes batteries.	PB7 <input type="checkbox"/> (max. 1)
The underwater robot surfaces at any point (GPS fix can be obtained) and re-submerges. (The surface for preparation of the manipulation task is not penalised)	PB8 <input type="checkbox"/> <input type="checkbox"/> (max. 2)

Disqualifying Behaviours

A robot damages competition arena (including the obstacles).	DB1 <input type="checkbox"/>
A robot does not conform to safety requirements for the competition.	DB2 <input type="checkbox"/>
A robot impacts the sensitive dune area.	DB3 <input type="checkbox"/>
A robot enters any of the upper floors of the building.	DB4 <input type="checkbox"/>
A marine robot is tele-operated (except for safety reasons agreed by the Technical Committee and the manipulation task).	DB5 <input type="checkbox"/>
The underwater robot closes the wrong valve underwater.	DB6 <input type="checkbox"/>
The ground robots close more than one wrong valve on land.	DB7 <input type="checkbox"/>

Comment: _____

WARNING: A disqualifying behaviour discards all other achievements in the current task. Use it only when it is really necessary (e.g. cheating).

Benchmarking data delivered appropriately: ☒ yes / ☐ no

(Time is 60 min after the end of the team's time-slot, formats as described in the TBM)

Team leader signature: _____

Referee signature: _____

TBM 4: Stem the leak (Land +Sea)

Team name: ENSTA BRETAGNE

Referee I (Land): MARSISKE, Referee II (Land): WINFIELD

Referee I (Sea): VLADI, Referee II (Sea): ANDREA

Date (DD/MM/YYYY): 19/09/17, Time (24:00): 11:15

Duration: _____ (Max. 45 min) ☐ Timeout

Achievements

Set A1: Outdoors

From the starting point of the building, a ground robot reaches WP5 L within a precision of 3m.	A1.1 <input checked="" type="checkbox"/>
A ground robot reaches WP6 L within a precision of 3m with autonomous navigation.	A1.2 <input type="checkbox"/>

	Outdoor damages (building)		
	D1 <input checked="" type="checkbox"/>	D2 <input type="checkbox"/>	D3 <input type="checkbox"/>
The ground robots recognise the damages on the wall of the building. (Each damage can only be scored once).	A1.3	A1.4	A1.5

The ground robot(s) build(s) an outdoor map of the land pipes area.	A1.6 <input type="checkbox"/>
A ground robot detects the leak marker on the pipe.	A1.7 <input type="checkbox"/>
A ground robot reports the pipe that is leaking on land.	A1.8 <input type="checkbox"/>
A ground robot recognises the number on the leaking pipe on land.	A1.9 <input type="checkbox"/>
A ground robot localises the unobstructed entrance in real-time in automatic way.	A1.10 <input type="checkbox"/>

Set A2: Indoors

A ground robot enters the building through the unblocked entrance.	A2.1 <input type="checkbox"/>
A ground robot finds a safe and unobstructed path to the machine room from the building entrance. (The path is shown on the map).	A2.2 <input type="checkbox"/>
From the building entrance, a ground robot follows a safe path (collision free from obstacles and structures) to the machine room.	A2.3 <input type="checkbox"/>
A ground robot recognises the machine room sign in real-time in automatic way.	A2.4 <input type="checkbox"/>
A ground robot enters the machine room.	A2.5 <input type="checkbox"/>

	Indoor map	
	Area 1 <input type="checkbox"/>	Area 2 <input type="checkbox"/>
The ground robot(s) builds a geometric indoor map of the building. (Use the best map or a combination of ground robots maps).	A2.6	A2.7

A ground robot recognises the ID of the correct set of valves in the machine room.	A2.8 <input type="checkbox"/>
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	Correct Valve	
	Valve manual <input type="checkbox"/> A2.9 Specify type valve: _____	Valve autonomous <input type="checkbox"/> A2.10 Specify type valve: _____
A ground robot closes the correct valve. The robot must close one valve of the set autonomously and the other one manually. The process must be recorded by the on board camera of the robot. (Note: Each set of valves has two types: gate and lever)		

Set A3: Underwater

	Type of images	
	Acoustic buoy-1 <input checked="" type="checkbox"/> A3.1	Optical buoy-1 <input type="checkbox"/> A3.3
The underwater robot provides images of the gate.	Acoustic buoy-2 <input checked="" type="checkbox"/> A3.2	Optical buoy-2 <input type="checkbox"/> A3.4

The underwater robot passes through the gate without touching it.	A3.5 <input type="checkbox"/>
The underwater robot passes through the gate within the first 30 minutes from the start of the run.	A3.6 <input type="checkbox"/>

The underwater robot detects the plume buoys in real time. Images are needed.	Buoys				
	B1 <input checked="" type="checkbox"/>	B2 <input type="checkbox"/>	B3 <input type="checkbox"/>	B4 <input type="checkbox"/>	B5 <input type="checkbox"/>
	A3.7	A3.8	A3.9	A3.10	A3.11
The underwater robot recognises the number on the plume buoys	Buoys numbers				
	B1 <input type="checkbox"/>	B2 <input type="checkbox"/>	B3 <input type="checkbox"/>	B4 <input type="checkbox"/>	B5 <input type="checkbox"/>
	A3.12	A3.13	A3.14	A3.15	A3.16

The underwater robot produces a geometric map of the plume (Area: B1+B2).	A3.17 <input type="checkbox"/>
The underwater robot produces a geometric map of the plume (Area: B3+B4+B5).	A3.18 <input type="checkbox"/>
The underwater robot detects the leak marker on the pipe in real time.	A3.19 <input type="checkbox"/>
The underwater robot recognises and provides images of the black number stamped on the leaking pipe.	A3.20 <input type="checkbox"/>
The underwater robot reports which is the number of the leaking pipe by its geometric position.	A3.21 <input type="checkbox"/>

The underwater robot inspects the four pipes underwater. Provide images.	Pipes underwater			
	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>
	A3.22	A3.23	A3.24	A3.25

Following the leaking pipe up to the assembly structure, the underwater robot provides an image mosaic of the <u>first half</u> of the leaking pipe.	A3.26 <input type="checkbox"/>
Following the leaking pipe up to the assembly structure, the underwater robot provides an image mosaic of the <u>second half</u> of the leaking pipe.	A3.27 <input type="checkbox"/>
The underwater robot provides a 3D reconstruction of the manipulation console where the correct underwater valve is.	A3.28 <input type="checkbox"/>
The underwater robot closes the correct valve with a rotation of the <u>first 45 degrees</u> . The process must be recorded by the on board camera of the robot.	A3.29 <input type="checkbox"/>
The underwater robot closes the correct valve with a rotation of the <u>last 45 degrees</u> . The process must be recorded by the on board camera of the robot.	A3.30 <input type="checkbox"/>

Set A4: Cooperation

The underwater robot communicates through a surface robot or directly to the ground robot the leaking pipe.	A4.1 <input type="checkbox"/>
The ground robot receives and decodes the message with the correct leaking pipe sent by directly by the underwater or through the surface robot.	A4.2 <input type="checkbox"/>
The ground robot communicates the correct land leaking pipe to the underwater robot (directly or through the surface robot).	A4.3 <input type="checkbox"/>
The underwater robot receives and decodes the message with the correct land leaking pipe sent by the aerial robot or the surface robot.	A4.4 <input type="checkbox"/>
The ground robot and the underwater robot close the correct valves in a synchronised process.	A4.5 <input type="checkbox"/>

Set A5: General

The ground robots return to the landing area once all the tasks have been done.	A5.1 <input type="checkbox"/>
The underwater robot surfaces in a controlled way once all the tasks have been done.	A5.2 <input type="checkbox"/>
The ground robot(s) transmits live position and images/video to the control station during the run.	A5.3 <input checked="" type="checkbox"/>
The marine robot(s) transmits live position and images/video to the control station during the run or the manipulation task.	A5.4 <input type="checkbox"/>

Penalised Behaviours

The robot needs manual intervention during a run (e.g. the robot is stuck):	
Marine robot	No permitted
Ground robot 1	PB1 <input checked="" type="checkbox"/> <input type="checkbox"/> (max. 2)
Ground robot 2	PB2 <input type="checkbox"/> <input type="checkbox"/> (max. 2)
The ground robot leaves the operating area.	PB3 <input type="checkbox"/> (max. 1)
The ground robot changes batteries or is refuelled.	PB4 <input type="checkbox"/> (max. 1)
The ground robot-1 hits the obstacles.	PB5 <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>

The ground robot-2 hits the obstacles.	PB6 <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
The underwater robot changes batteries.	PB7 <input type="checkbox"/> (max. 1)
The underwater robot surfaces at any point (GPS fix can be obtained) and re-submerges. (The surface for preparation of the manipulation task is not penalised)	PB8 <input type="checkbox"/> <input type="checkbox"/> (max. 2)

Disqualifying Behaviours

A robot damages competition arena (including the obstacles).	DB1 <input type="checkbox"/>
A robot does not conform to safety requirements for the competition.	DB2 <input type="checkbox"/>
A robot impacts the sensitive dune area.	DB3 <input type="checkbox"/>
A robot enters any of the upper floors of the building.	DB4 <input type="checkbox"/>
A marine robot is tele-operated (except for safety reasons agreed by the Technical Committee and the manipulation task).	DB5 <input type="checkbox"/>
The underwater robot closes the wrong valve underwater.	DB6 <input type="checkbox"/>
The ground robots close more than one wrong valve on land.	DB7 <input type="checkbox"/>

Comment: _____

WARNING: A disqualifying behaviour discards all other achievements in the current task. Use it only when it is really necessary (e.g. cheating).

Benchmarking data delivered appropriately: ☒ yes / ☐ no

(Time is 60 min after the end of the team's time-slot, formats as described in the TBM)

Team leader signature: _____

Referee signature: _____

TBM 4: Stem the leak (Land +Sea)

Team name: ENSTA A TEAM

Referee I (Land): MICHAEL GUTMANN, Referee II (Land): BERND BRUEHMANN

Referee I (Sea): KINGSTON, Referee II (Sea): SCHOPLEY

Date (DD/MM/YYYY): 19/9/17, Time (24:00): 15:15

Duration: _____ (Max. 45 min) ☐ Timeout

Achievements

Set A1: Outdoors

From the starting point of the building, a ground robot reaches WP5 L within a precision of 3m.	A1.1 <input type="checkbox"/>
A ground robot reaches WP6 L within a precision of 3m with autonomous navigation.	A1.2 <input type="checkbox"/>

	Outdoor damages (building)		
	D1 <input checked="" type="checkbox"/>	D2 <input checked="" type="checkbox"/>	D3 <input type="checkbox"/>
The ground robots recognise the damages on the wall of the building. (Each damage can only be scored once).	A1.3	A1.4	A1.5

The ground robot(s) build(s) an outdoor map of the land pipes area.	A1.6 <input checked="" type="checkbox"/>
A ground robot detects the leak marker on the pipe.	A1.7 <input type="checkbox"/>
A ground robot reports the pipe that is leaking on land.	A1.8 <input type="checkbox"/>
A ground robot recognises the number on the leaking pipe on land.	A1.9 <input type="checkbox"/>
A ground robot localises the unobstructed entrance in real-time in automatic way.	A1.10 <input type="checkbox"/>

Set A2: Indoors

A ground robot enters the building through the unblocked entrance.	A2.1 <input type="checkbox"/>
A ground robot finds a safe and unobstructed path to the machine room from the building entrance. (The path is shown on the map).	A2.2 <input type="checkbox"/>
From the building entrance, a ground robot follows a safe path (collision free from obstacles and structures) to the machine room.	A2.3 <input type="checkbox"/>
A ground robot recognises the machine room sign in real-time in automatic way.	A2.4 <input type="checkbox"/>
A ground robot enters the machine room.	A2.5 <input type="checkbox"/>

Indoor map		
The ground robot(s) builds a geometric indoor map of the building. (Use the best map or a combination of ground robots maps).	Area 1 <input type="checkbox"/>	Area 2 <input type="checkbox"/>
	A2.6	A2.7

A ground robot recognises the ID of the correct set of valves in the machine room.	A2.8 <input type="checkbox"/>
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Correct Valve		
A ground robot closes the correct valve. The robot must close one valve of the set autonomously and the other one manually. The process must be recorded by the on board camera of the robot. (Note: Each set of valves has two types: gate and lever)	Valve manual <input type="checkbox"/> A2.9	Valve autonomous <input type="checkbox"/> A2.10
	Specify type valve: _____	Specify type valve: _____

Set A3: Underwater

Type of images		
The underwater robot provides images of the gate.	Acoustic buoy-1 <input checked="" type="checkbox"/> A3.1	Optical buoy-1 <input type="checkbox"/> A3.3
	Acoustic buoy-2 <input checked="" type="checkbox"/> A3.2	Optical buoy-2 <input type="checkbox"/> A3.4

The underwater robot passes through the gate without touching it.	A3.5 <input checked="" type="checkbox"/>
The underwater robot passes through the gate within the first 30 minutes from the start of the run.	A3.6 <input type="checkbox"/>

The underwater robot detects the plume buoys in real time. Images are needed.	Buoys				
	B1 <input type="checkbox"/>	B2 <input type="checkbox"/>	B3 <input type="checkbox"/>	B4 <input type="checkbox"/>	B5 <input type="checkbox"/>
	A3.7	A3.8	A3.9	A3.10	A3.11
The underwater robot recognises the number on the plume buoys	Buoys numbers				
	B1 <input type="checkbox"/>	B2 <input type="checkbox"/>	B3 <input type="checkbox"/>	B4 <input type="checkbox"/>	B5 <input type="checkbox"/>
	A3.12	A3.13	A3.14	A3.15	A3.16

The underwater robot produces a geometric map of the plume (Area: B1+B2).	A3.17 <input type="checkbox"/>
The underwater robot produces a geometric map of the plume (Area: B3+B4+B5).	A3.18 <input type="checkbox"/>
The underwater robot detects the leak marker on the pipe in real time.	A3.19 <input type="checkbox"/>
The underwater robot recognises and provides images of the black number stamped on the leaking pipe.	A3.20 <input type="checkbox"/>
The underwater robot reports which is the number of the leaking pipe by its geometric position.	A3.21 <input type="checkbox"/>

The underwater robot inspects the four pipes underwater. Provide images.	Pipes underwater			
	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>
	A3.22	A3.23	A3.24	A3.25

Following the leaking pipe up to the assembly structure, the underwater robot provides an image mosaic of the <u>first half</u> of the leaking pipe.	A3.26 <input type="checkbox"/>
Following the leaking pipe up to the assembly structure, the underwater robot provides an image mosaic of the <u>second half</u> of the leaking pipe.	A3.27 <input type="checkbox"/>
The underwater robot provides a 3D reconstruction of the manipulation console where the correct underwater valve is.	A3.28 <input type="checkbox"/>
The underwater robot closes the correct valve with a rotation of the <u>first 45 degrees</u> . The process must be recorded by the on board camera of the robot.	A3.29 <input type="checkbox"/>
The underwater robot closes the correct valve with a rotation of the <u>last 45 degrees</u> . The process must be recorded by the on board camera of the robot.	A3.30 <input type="checkbox"/>

Set A4: Cooperation

The underwater robot communicates through a surface robot or directly to the ground robot the leaking pipe.	A4.1 <input type="checkbox"/>
The ground robot receives and decodes the message with the correct leaking pipe sent by directly by the underwater or through the surface robot.	A4.2 <input type="checkbox"/>
The ground robot communicates the correct land leaking pipe to the underwater robot (directly or through the surface robot).	A4.3 <input type="checkbox"/>
The underwater robot receives and decodes the message with the correct land leaking pipe sent by the aerial robot or the surface robot.	A4.4 <input type="checkbox"/>
The ground robot and the underwater robot close the correct valves in a synchronised process.	A4.5 <input type="checkbox"/>

Set A5: General

The ground robots return to the landing area once all the tasks have been done.	A5.1 <input type="checkbox"/>
The underwater robot surfaces in a controlled way once all the tasks have been done.	A5.2 <input type="checkbox"/>
The ground robot(s) transmits live position and images/video to the control station during the run.	A5.3 <input checked="" type="checkbox"/>
The marine robot(s) transmits live position and images/video to the control station during the run or the manipulation task.	A5.4 <input type="checkbox"/>

Penalised Behaviours

The robot needs manual intervention during a run (e.g. the robot is stuck):	
Marine robot	No permitted
Ground robot 1	PB1 <input checked="" type="checkbox"/> <input type="checkbox"/> (max. 2)
Ground robot 2	PB2 <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> (max. 2)

The ground robot leaves the operating area.	PB3 <input type="checkbox"/> (max. 1)
The ground robot changes batteries or is refuelled.	PB4 <input type="checkbox"/> (max. 1)
The ground robot-1 hits the obstacles.	PB5 <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>

The ground robot-2 hits the obstacles.	PB6 <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
The underwater robot changes batteries.	PB7 <input type="checkbox"/> (max. 1)
The underwater robot surfaces at any point (GPS fix can be obtained) and re-submerges. (The surface for preparation of the manipulation task is not penalised)	PB8 <input type="checkbox"/> <input type="checkbox"/> (max. 2)

Disqualifying Behaviours

A robot damages competition arena (including the obstacles).	DB1 <input type="checkbox"/>
A robot does not conform to safety requirements for the competition.	DB2 <input type="checkbox"/>
A robot impacts the sensitive dune area.	DB3 <input type="checkbox"/>
A robot enters any of the upper floors of the building.	DB4 <input type="checkbox"/>
A marine robot is tele-operated (except for safety reasons agreed by the Technical Committee and the manipulation task).	DB5 <input type="checkbox"/>
The underwater robot closes the wrong valve underwater.	DB6 <input type="checkbox"/>
The ground robots close more than one wrong valve on land.	DB7 <input type="checkbox"/>

Comment: _____

WARNING: A disqualifying behaviour discards all other achievements in the current task. Use it only when it is really necessary (e.g. cheating).

Benchmarking data delivered appropriately: ☐ yes / ☐ no

(Time is 60 min after the end of the team's time-slot, formats as described in the TBM)

Team leader signature: _____

Referee signature: _____

TBM 4: Stem the leak (Land +Sea)

Team name: ROBPOS IMM

Referee I (Land): ALAN WINFIELD, Referee II (Land): BERND

Referee I (Sea): ANDREA, Referee II (Sea): VLADE

Date (DD/MM/YYYY): 19/9/17, Time (24:00): 12:15

Duration: _____ (Max. 45 min) ☐ Timeout

Achievements

Set A1: Outdoors

From the starting point of the building, a ground robot reaches WP5 L within a precision of 3m.	A1.1 <input checked="" type="checkbox"/>
A ground robot reaches WP6 L within a precision of 3m with autonomous navigation.	A1.2 <input checked="" type="checkbox"/>

	Outdoor damages (building)		
	D1 <input type="checkbox"/>	D2 <input type="checkbox"/>	D3 <input type="checkbox"/>
The ground robots recognise the damages on the wall of the building. (Each damage can only be scored once).	A1.3	A1.4	A1.5

The ground robot(s) build(s) an outdoor map of the land pipes area.	A1.6 <input checked="" type="checkbox"/>
A ground robot detects the leak marker on the pipe.	A1.7 <input checked="" type="checkbox"/>
A ground robot reports the pipe that is leaking on land.	A1.8 <input checked="" type="checkbox"/>
A ground robot recognises the number on the leaking pipe on land.	A1.9 <input checked="" type="checkbox"/>
A ground robot localises the unobstructed entrance in real-time in automatic way.	A1.10 <input checked="" type="checkbox"/>

Set A2: Indoors

A ground robot enters the building through the unblocked entrance.	A2.1 <input checked="" type="checkbox"/>
A ground robot finds a safe and unobstructed path to the machine room from the building entrance. (The path is shown on the map).	A2.2 <input type="checkbox"/>
From the building entrance, a ground robot follows a safe path (collision free from obstacles and structures) to the machine room.	A2.3 <input type="checkbox"/>
A ground robot recognises the machine room sign in real-time in automatic way.	A2.4 <input type="checkbox"/>
A ground robot enters the machine room.	A2.5 <input type="checkbox"/>

	Indoor map	
	Area 1 <input type="checkbox"/>	Area 2 <input type="checkbox"/>
The ground robot(s) builds a geometric indoor map of the building. (Use the best map or a combination of ground robots maps).	A2.6	A2.7

A ground robot recognises the ID of the correct set of valves in the machine room.	A2.8 <input type="checkbox"/>
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	Correct Valve	
	Valve manual <input type="checkbox"/> A2.9 Specify type valve: _____	Valve autonomous <input type="checkbox"/> A2.10 Specify type valve: _____
A ground robot closes the correct valve. The robot must close one valve of the set autonomously and the other one manually. The process must be recorded by the on board camera of the robot. (Note: Each set of valves has two types: gate and lever)		

Set A3: Underwater

	Type of images	
	Acoustic buoy-1 <input type="checkbox"/> A3.1	Optical buoy-1 <input type="checkbox"/> A3.3
The underwater robot provides images of the gate.	Acoustic buoy-2 <input type="checkbox"/> A3.2	Optical buoy-2 <input type="checkbox"/> A3.4

The underwater robot passes through the gate without touching it.	A3.5 <input type="checkbox"/>
The underwater robot passes through the gate within the first 30 minutes from the start of the run.	A3.6 <input type="checkbox"/>

The underwater robot detects the plume buoys in real time. Images are needed.	Buoys				
	B1 <input type="checkbox"/>	B2 <input type="checkbox"/>	B3 <input type="checkbox"/>	B4 <input type="checkbox"/>	B5 <input type="checkbox"/>
	A3.7	A3.8	A3.9	A3.10	A3.11
The underwater robot recognises the number on the plume buoys	Buoys numbers				
	B1 <input type="checkbox"/>	B2 <input type="checkbox"/>	B3 <input type="checkbox"/>	B4 <input type="checkbox"/>	B5 <input type="checkbox"/>
	A3.12	A3.13	A3.14	A3.15	A3.16

The underwater robot produces a geometric map of the plume (Area: B1+B2).	A3.17 <input type="checkbox"/>
The underwater robot produces a geometric map of the plume (Area: B3+B4+B5).	A3.18 <input type="checkbox"/>
The underwater robot detects the leak marker on the pipe in real time.	A3.19 <input type="checkbox"/>
The underwater robot recognises and provides images of the black number stamped on the leaking pipe.	A3.20 <input type="checkbox"/>
The underwater robot reports which is the number of the leaking pipe by its geometric position.	A3.21 <input type="checkbox"/>

The underwater robot inspects the four pipes underwater. Provide images.	Pipes underwater			
	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>
	A3.22	A3.23	A3.24	A3.25

Following the leaking pipe up to the assembly structure, the underwater robot provides an image mosaic of the <u>first half</u> of the leaking pipe.	A3.26 <input type="checkbox"/>
Following the leaking pipe up to the assembly structure, the underwater robot provides an image mosaic of the <u>second half</u> of the leaking pipe.	A3.27 <input type="checkbox"/>
The underwater robot provides a 3D reconstruction of the manipulation console where the correct underwater valve is.	A3.28 <input type="checkbox"/>
The underwater robot closes the correct valve with a rotation of the <u>first 45 degrees</u> . The process must be recorded by the on board camera of the robot.	A3.29 <input type="checkbox"/>
The underwater robot closes the correct valve with a rotation of the <u>last 45 degrees</u> . The process must be recorded by the on board camera of the robot.	A3.30 <input type="checkbox"/>

Set A4: Cooperation

The underwater robot communicates through a surface robot or directly to the ground robot the leaking pipe.	A4.1 <input type="checkbox"/>
The ground robot receives and decodes the message with the correct leaking pipe sent by directly by the underwater or through the surface robot.	A4.2 <input type="checkbox"/>
The ground robot communicates the correct land leaking pipe to the underwater robot (directly or through the surface robot).	A4.3 <input checked="" type="checkbox"/>
The underwater robot receives and decodes the message with the correct land leaking pipe sent by the aerial robot or the surface robot.	A4.4 <input type="checkbox"/>
The ground robot and the underwater robot close the correct valves in a synchronised process.	A4.5 <input type="checkbox"/>

Set A5: General

The ground robots return to the landing area once all the tasks have been done.	A5.1 <input type="checkbox"/>
The underwater robot surfaces in a controlled way once all the tasks have been done.	A5.2 <input type="checkbox"/>
The ground robot(s) transmits live position and images/video to the control station during the run.	A5.3 <input checked="" type="checkbox"/>
The marine robot(s) transmits live position and images/video to the control station during the run or the manipulation task.	A5.4 <input type="checkbox"/>

Penalised Behaviours

The robot needs manual intervention during a run (e.g. the robot is stuck):	
Marine robot	No permitted
Ground robot 1	PB1 <input type="checkbox"/> <input type="checkbox"/> (max. 2)
Ground robot 2	PB2 <input type="checkbox"/> <input type="checkbox"/> (max. 2)

The ground robot leaves the operating area.	PB3 <input type="checkbox"/> (max. 1)
The ground robot changes batteries or is refuelled.	PB4 <input type="checkbox"/> (max. 1)
The ground robot-1 hits the obstacles.	PB5 <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>

The ground robot-2 hits the obstacles.	PB6 <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
The underwater robot changes batteries.	PB7 <input type="checkbox"/> (max. 1)
The underwater robot surfaces at any point (GPS fix can be obtained) and re-submerges. (The surface for preparation of the manipulation task is not penalised)	PB8 <input type="checkbox"/> <input type="checkbox"/> (max. 2)

Disqualifying Behaviours

A robot damages competition arena (including the obstacles).	DB1 <input type="checkbox"/>
A robot does not conform to safety requirements for the competition.	DB2 <input type="checkbox"/>
A robot impacts the sensitive dune area.	DB3 <input type="checkbox"/>
A robot enters any of the upper floors of the building.	DB4 <input type="checkbox"/>
A marine robot is tele-operated (except for safety reasons agreed by the Technical Committee and the manipulation task).	DB5 <input type="checkbox"/>
The underwater robot closes the wrong valve underwater.	DB6 <input type="checkbox"/>
The ground robots close more than one wrong valve on land.	DB7 <input type="checkbox"/>

Comment: _____

WARNING: A disqualifying behaviour discards all other achievements in the current task. Use it only when it is really necessary (e.g. cheating).

Benchmarking data delivered appropriately: ☒ yes / ☐ no

(Time is 60 min after the end of the team's time-slot, formats as described in the TBM)

Team leader signature: _____

 (sea)  (land)

Referee signature: _____



TBM 4: Stem the leak (Land +Sea)

Team name: RAPTORs + OUBOT

Referee I (Land): GOITMANN, Referee II (Land): BERND BRUGEMANN

Referee I (Sea): _____, Referee II (Sea): _____

Date (DD/MM/YYYY): 19/9/17, Time (24:00): 16:15

Duration: _____ (Max. 45 min) ☐ Timeout

Achievements

Set A1: Outdoors

From the starting point of the building, a ground robot reaches WP5 L within a precision of 3m.	A1.1 <input type="checkbox"/>
A ground robot reaches WP6 L within a precision of 3m with autonomous navigation.	A1.2 <input type="checkbox"/>

Outdoor damages (building)			
The ground robots recognise the damages on the wall of the building. (Each damage can only be scored once).	D1 <input checked="" type="checkbox"/>	D2 <input checked="" type="checkbox"/>	D3 <input checked="" type="checkbox"/>
	A1.3	A1.4	A1.5

The ground robot(s) build(s) an outdoor map of the land pipes area.	A1.6 <input checked="" type="checkbox"/>
A ground robot detects the leak marker on the pipe.	A1.7 <input checked="" type="checkbox"/>
A ground robot reports the pipe that is leaking on land.	A1.8 <input checked="" type="checkbox"/>
A ground robot recognises the number on the leaking pipe on land.	A1.9 <input checked="" type="checkbox"/>
A ground robot localises the unobstructed entrance in real-time in automatic way.	A1.10 <input checked="" type="checkbox"/>

Set A2: Indoors

A ground robot enters the building through the unblocked entrance.	A2.1 <input checked="" type="checkbox"/>
A ground robot finds a safe and unobstructed path to the machine room from the building entrance. (The path is shown on the map).	A2.2 <input checked="" type="checkbox"/>
From the building entrance, a ground robot follows a safe path (collision free from obstacles and structures) to the machine room.	A2.3 <input checked="" type="checkbox"/>
A ground robot recognises the machine room sign in real-time in automatic way.	A2.4 <input checked="" type="checkbox"/>
A ground robot enters the machine room.	A2.5 <input checked="" type="checkbox"/>

	Indoor map	
	Area 1 <input type="checkbox"/>	Area 2 <input type="checkbox"/>
The ground robot(s) builds a geometric indoor map of the building. <i>(Use the best map or a combination of ground robots maps).</i> <i>manual map built</i>	A2.6	A2.7
A ground robot recognises the ID of the correct set of valves in the machine room.	A2.8 <input checked="" type="checkbox"/>	

	Correct Valve	
	Valve manual <input checked="" type="checkbox"/> A2.9	Valve autonomous <input type="checkbox"/> A2.10
A ground robot closes the correct valve. The robot must close one valve of the set autonomously and the other one manually. The process must be recorded by the on board camera of the robot. (Note: Each set of valves has two types: gate and lever)	Specify type valve: <i>LEVER</i>	Specify type valve: _____

Set A3: Underwater

	Type of images	
	Acoustic buoy-1 <input type="checkbox"/> A3.1	Optical buoy-1 <input type="checkbox"/> A3.3
The underwater robot provides images of the gate.	Acoustic buoy-2 <input type="checkbox"/> A3.2	Optical buoy-2 <input type="checkbox"/> A3.4
The underwater robot passes through the gate without touching it.	A3.5 <input type="checkbox"/>	
The underwater robot passes through the gate within the first 30 minutes from the start of the run.	A3.6 <input type="checkbox"/>	

The underwater robot detects the plume buoys in real time. Images are needed.	Buoys				
	B1 <input type="checkbox"/> A3.7	B2 <input type="checkbox"/> A3.8	B3 <input type="checkbox"/> A3.9	B4 <input type="checkbox"/> A3.10	B5 <input type="checkbox"/> A3.11
The underwater robot recognises the number on the plume buoys	Buoys numbers				
	B1 <input type="checkbox"/> A3.12	B2 <input type="checkbox"/> A3.13	B3 <input type="checkbox"/> A3.14	B4 <input type="checkbox"/> A3.15	B5 <input type="checkbox"/> A3.16

The underwater robot produces a geometric map of the plume (Area: B1+B2).	A3.17 <input type="checkbox"/>
The underwater robot produces a geometric map of the plume (Area: B3+B4+B5).	A3.18 <input type="checkbox"/>
The underwater robot detects the leak marker on the pipe in real time.	A3.19 <input type="checkbox"/>
The underwater robot recognises and provides images of the black number stamped on the leaking pipe.	A3.20 <input type="checkbox"/>
The underwater robot reports which is the number of the leaking pipe by its geometric position.	A3.21 <input type="checkbox"/>

The underwater robot inspects the four pipes underwater. Provide images.	Pipes underwater			
	1 <input type="checkbox"/> A3.22	2 <input type="checkbox"/> A3.23	3 <input type="checkbox"/> A3.24	4 <input type="checkbox"/> A3.25

Following the leaking pipe up to the assembly structure, the underwater robot provides an image mosaic of the <u>first half</u> of the leaking pipe.	A3.26 <input type="checkbox"/>
Following the leaking pipe up to the assembly structure, the underwater robot provides an image mosaic of the <u>second half</u> of the leaking pipe.	A3.27 <input type="checkbox"/>
The underwater robot provides a 3D reconstruction of the manipulation console where the correct underwater valve is.	A3.28 <input type="checkbox"/>
The underwater robot closes the correct valve with a rotation of the <u>first 45 degrees</u> . The process must be recorded by the on board camera of the robot.	A3.29 <input type="checkbox"/>
The underwater robot closes the correct valve with a rotation of the <u>last 45 degrees</u> . The process must be recorded by the on board camera of the robot.	A3.30 <input type="checkbox"/>

Set A4: Cooperation

The underwater robot communicates through a surface robot or directly to the ground robot the leaking pipe.	A4.1 <input type="checkbox"/>
The ground robot receives and decodes the message with the correct leaking pipe sent by directly by the underwater or through the surface robot.	A4.2 <input type="checkbox"/>
The ground robot communicates the correct land leaking pipe to the underwater robot (directly or through the surface robot).	A4.3 <input type="checkbox"/>
The underwater robot receives and decodes the message with the correct land leaking pipe sent by the aerial robot or the surface robot.	A4.4 <input type="checkbox"/>
The ground robot and the underwater robot close the correct valves in a synchronised process.	A4.5 <input type="checkbox"/>

Set A5: General

The ground robots return to the landing area once all the tasks have been done.	A5.1 <input checked="" type="checkbox"/>
The underwater robot surfaces in a controlled way once all the tasks have been done.	A5.2 <input type="checkbox"/>
The ground robot(s) transmits live position and images/video to the control station during the run.	A5.3 <input checked="" type="checkbox"/>
The marine robot(s) transmits live position and images/video to the control station during the run or the manipulation task.	A5.4 <input type="checkbox"/>

Penalised Behaviours

The robot needs manual intervention during a run (e.g. the robot is stuck):	
Marine robot	No permitted
Ground robot 1	PB1 <input type="checkbox"/> <input type="checkbox"/> (max. 2)
Ground robot 2	PB2 <input type="checkbox"/> <input type="checkbox"/> (max. 2)
The ground robot leaves the operating area.	PB3 <input type="checkbox"/> (max. 1)
The ground robot changes batteries or is refuelled.	PB4 <input type="checkbox"/> (max. 1)
The ground robot-1 hits the obstacles.	PB5 <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>

The ground robot-2 hits the obstacles.	PB6 <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
The underwater robot changes batteries.	PB7 <input type="checkbox"/> (max. 1)
The underwater robot surfaces at any point (GPS fix can be obtained) and re-submerges. (The surface for preparation of the manipulation task is not penalised)	PB8 <input type="checkbox"/> <input type="checkbox"/> (max. 2)

Disqualifying Behaviours

A robot damages competition arena (including the obstacles).	DB1 <input type="checkbox"/>
A robot does not conform to safety requirements for the competition.	DB2 <input type="checkbox"/>
A robot impacts the sensitive dune area.	DB3 <input type="checkbox"/>
A robot enters any of the upper floors of the building.	DB4 <input type="checkbox"/>
A marine robot is tele-operated (except for safety reasons agreed by the Technical Committee and the manipulation task).	DB5 <input type="checkbox"/>
The underwater robot closes the wrong valve underwater.	DB6 <input type="checkbox"/>
The ground robots close more than one wrong valve on land.	DB7 <input type="checkbox"/>

Comment: _____

WARNING: A disqualifying behaviour discards all other achievements in the current task. Use it only when it is really necessary (e.g. cheating).

Benchmarking data delivered appropriately: ☐ yes / ☐ no

(Time is 60 min after the end of the team's time-slot, formats as described in the TBM)

Team leader signature: Amir Ali (SEA) Mohamed Lutfy (GARD)

Referee signature: 

TBM 4: Stem the leak (Land +Sea)

Team name: TELEROB + GIRONA

Referee I (Land): HANS ARTHUR M., Referee II (Land): BERND B.

Referee I (Sea): K. COOPER, Referee II (Sea): MITESH

Date (DD/MM/YYYY): 19/9/17, Time (24:00): 17:15

Duration: _____ (Max. 45 min) ☐ Timeout

Achievements

Set A1: Outdoors

From the starting point of the building, a ground robot reaches WP5 L within a precision of 3m.	A1.1 <input checked="" type="checkbox"/>
A ground robot reaches WP6 L within a precision of 3m with autonomous navigation.	A1.2 <input type="checkbox"/>

	Outdoor damages (building)		
	D1 <input checked="" type="checkbox"/>	D2 <input type="checkbox"/>	D3 <input type="checkbox"/>
The ground robots recognise the damages on the wall of the building. (Each damage can only be scored once).	A1.3	A1.4	A1.5

The ground robot(s) build(s) an outdoor map of the land pipes area.	A1.6 <input checked="" type="checkbox"/>
A ground robot detects the leak marker on the pipe.	A1.7 <input checked="" type="checkbox"/>
A ground robot reports the pipe that is leaking on land.	A1.8 <input checked="" type="checkbox"/>
A ground robot recognises the number on the leaking pipe on land.	A1.9 <input checked="" type="checkbox"/>
A ground robot localises the unobstructed entrance in real-time in automatic way.	A1.10 <input type="checkbox"/>

Set A2: Indoors

A ground robot enters the building through the unblocked entrance.	A2.1 <input checked="" type="checkbox"/>
A ground robot finds a safe and unobstructed path to the machine room from the building entrance. (The path is shown on the map).	A2.2 <input checked="" type="checkbox"/>
From the building entrance, a ground robot follows a safe path (collision free from obstacles and structures) to the machine room.	A2.3 <input checked="" type="checkbox"/>
A ground robot recognises the machine room sign in real-time in automatic way.	A2.4 <input type="checkbox"/>
A ground robot enters the machine room.	A2.5 <input checked="" type="checkbox"/>

Indoor map		
The ground robot(s) builds a geometric indoor map of the building. (Use the best map or a combination of ground robots maps).	Area 1 <input type="checkbox"/>	Area 2 <input type="checkbox"/>
	A2.6	A2.7
A ground robot recognises the ID of the correct set of valves in the machine room.	A2.8 <input checked="" type="checkbox"/>	

Correct Valve		
A ground robot closes the correct valve. The robot must close one valve of the set autonomously and the other one manually. The process must be recorded by the on board camera of the robot. (Note: Each set of valves has two types: gate and lever)	Valve manual <input checked="" type="checkbox"/> A2.9	Valve autonomous <input checked="" type="checkbox"/> A2.10
	Specify type valve: _____	Specify type valve: _____

Set A3: Underwater

Type of images		
The underwater robot provides images of the gate.	Acoustic buoy-1 <input checked="" type="checkbox"/> A3.1	Optical buoy-1 <input type="checkbox"/> A3.3
	Acoustic buoy-2 <input checked="" type="checkbox"/> A3.2	Optical buoy-2 <input type="checkbox"/> A3.4
The underwater robot passes through the gate without touching it.	A3.5 <input checked="" type="checkbox"/>	
The underwater robot passes through the gate within the first 30 minutes from the start of the run.	A3.6 <input checked="" type="checkbox"/>	

The underwater robot detects the plume buoys in real time. Images are needed.	Buoys				
	B1 <input type="checkbox"/> A3.7	B2 <input type="checkbox"/> A3.8	B3 <input type="checkbox"/> A3.9	B4 <input type="checkbox"/> A3.10	B5 <input type="checkbox"/> A3.11
The underwater robot recognises the number on the plume buoys	Buoys numbers				
	B1 <input type="checkbox"/> A3.12	B2 <input type="checkbox"/> A3.13	B3 <input type="checkbox"/> A3.14	B4 <input type="checkbox"/> A3.15	B5 <input type="checkbox"/> A3.16

The underwater robot produces a geometric map of the plume (Area: B1+B2).	A3.17 <input type="checkbox"/>
The underwater robot produces a geometric map of the plume (Area: B3+B4+B5).	A3.18 <input type="checkbox"/>
The underwater robot detects the leak marker on the pipe in real time.	A3.19 <input type="checkbox"/>
The underwater robot recognises and provides images of the black number stamped on the leaking pipe.	A3.20 <input type="checkbox"/>
The underwater robot reports which is the number of the leaking pipe by its geometric position.	A3.21 <input type="checkbox"/>

The underwater robot inspects the four pipes underwater. Provide images.	Pipes underwater			
	1 <input type="checkbox"/> A3.22	2 <input type="checkbox"/> A3.23	3 <input type="checkbox"/> A3.24	4 <input type="checkbox"/> A3.25

Following the leaking pipe up to the assembly structure, the underwater robot provides an image mosaic of the <u>first half</u> of the leaking pipe.	A3.26 <input type="checkbox"/>
Following the leaking pipe up to the assembly structure, the underwater robot provides an image mosaic of the <u>second half</u> of the leaking pipe.	A3.27 <input type="checkbox"/>
The underwater robot provides a 3D reconstruction of the manipulation console where the correct underwater valve is.	A3.28 <input type="checkbox"/>
The underwater robot closes the correct valve with a rotation of the <u>first 45 degrees</u> . The process must be recorded by the on board camera of the robot.	A3.29 <input type="checkbox"/>
The underwater robot closes the correct valve with a rotation of the <u>last 45 degrees</u> . The process must be recorded by the on board camera of the robot.	A3.30 <input type="checkbox"/>

Set A4: Cooperation

The underwater robot communicates through a surface robot or directly to the ground robot the leaking pipe.	A4.1 <input checked="" type="checkbox"/>
The ground robot receives and decodes the message with the correct leaking pipe sent by directly by the underwater or through the surface robot.	A4.2 <input checked="" type="checkbox"/>
The ground robot communicates the correct land leaking pipe to the underwater robot (directly or through the surface robot).	A4.3 <input checked="" type="checkbox"/>
The underwater robot receives and decodes the message with the correct land leaking pipe sent by the aerial robot or the surface robot.	A4.4 <input checked="" type="checkbox"/>
The ground robot and the underwater robot close the correct valves in a synchronised process.	A4.5 <input type="checkbox"/>

Set A5: General

The ground robots return to the landing area once all the tasks have been done.	A5.1 <input checked="" type="checkbox"/>
The underwater robot surfaces in a controlled way once all the tasks have been done.	A5.2 <input type="checkbox"/>
The ground robot(s) transmits live position and images/video to the control station during the run.	A5.3 <input checked="" type="checkbox"/>
The marine robot(s) transmits live position and images/video to the control station during the run or the manipulation task.	A5.4 <input checked="" type="checkbox"/>

Penalised Behaviours

The robot needs manual intervention during a run (e.g. the robot is stuck):	
Marine robot	No permitted
Ground robot 1	PB1 <input type="checkbox"/> <input type="checkbox"/> (max. 2)
Ground robot 2	PB2 <input type="checkbox"/> <input type="checkbox"/> (max. 2)

The ground robot leaves the operating area.	PB3 <input type="checkbox"/> (max. 1)
The ground robot changes batteries or is refuelled.	PB4 <input type="checkbox"/> (max. 1)
The ground robot-1 hits the obstacles.	PB5 <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>

The ground robot-2 hits the obstacles.	PB6 <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
The underwater robot changes batteries.	PB7 <input type="checkbox"/> (max. 1)
The underwater robot surfaces at any point (GPS fix can be obtained) and re-submerges. (The surface for preparation of the manipulation task is not penalised)	PB8 <input type="checkbox"/> <input type="checkbox"/> (max. 2)

Disqualifying Behaviours

A robot damages competition arena (including the obstacles).	DB1 <input type="checkbox"/>
A robot does not conform to safety requirements for the competition.	DB2 <input type="checkbox"/>
A robot impacts the sensitive dune area.	DB3 <input type="checkbox"/>
A robot enters any of the upper floors of the building.	DB4 <input type="checkbox"/>
A marine robot is tele-operated (except for safety reasons agreed by the Technical Committee and the manipulation task).	DB5 <input type="checkbox"/>
The underwater robot closes the wrong valve underwater.	DB6 <input type="checkbox"/>
The ground robots close more than one wrong valve on land.	DB7 <input type="checkbox"/>

Comment: _____

WARNING: A disqualifying behaviour discards all other achievements in the current task. Use it only when it is really necessary (e.g. cheating).

Benchmarking data delivered appropriately: ☒ yes / ☐ no

(Time is 60 min after the end of the team's time-slot, formats as described in the TBM)

Team leader signature: _____

Chris Smith (land) *Eric (sea)*

Referee signature: _____

[Signature]