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LEARNING

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EP3156873	AUTONOMOUS VEHICLE WITH IMPROVED SIMULTANEOUS LOCALIZATION AND MAPPING FUNCTION
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EP2689650	TRAINABLE AUTONOMOUS LAWN MOWER
EP2620050	SYSTEM, METHOD AND APPARATUS FOR UNSUPERVISED ADAPTION OF THE PERCEPTION OF AN AUTONOMOUS LAWN MOWER

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Navigation system based on slow feature gradients

EP3367061 B1

Current assignees

HONDA RESEARCH INSTITUTE EUROPE*

Inventors

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METKA BENJAMIN

BAUER-WERSING UTE

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IPC - International classification

G01C-021/20* G05D-001/02*

CPC - Cooperative classification

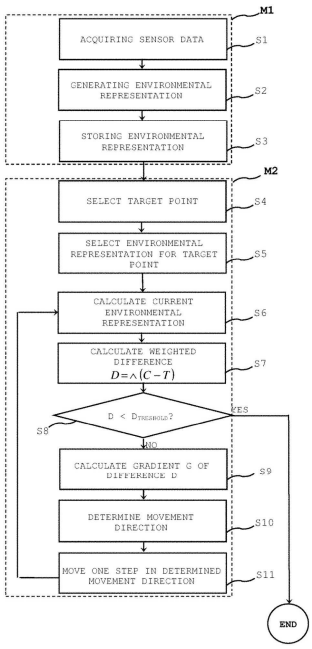
G01C-021/20 G05D-001/02/21*

Family

US10955852	B2	US20180246516	A1
EP3367061	B1	EP3367061	A1

(EP3367061)

The invention relates to the field of navigation for mobile systems. The invention proposes a method for navigating a mobile system and corresponding mobile system, in particular for autonomous mobile systems such as robots, for example lawn mowers or even smartphones. The mobile device comprises at least one sensor, an electronic control unit and an output unit. The method comprises a step of acquiring sensor data on an environment of the mobile device, a step of calculating a gradient of a difference of a target environmental representation and a current environmental representation, a step of determining a movement direction to reach a target position corresponding to the target environmental representation based on the estimated gradient. In an output step, the determined movement direction for navigating the mobile device is output, for example to a steering system of the mobile device or to a display. Advantageously, the method comprises a step of generating an environmental representation by performing unsupervised learning from the acquired sensor data.



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Robotic gardening device and method for controlling the same

EP3298874 B1

Current assignees

HONDA RESEARCH INSTITUTE EUROPE*

Inventors

FRANZIUS MATHIAS

EINECKE NILS

Filing date:
2016-09-22

Granting Date:
2020-07-01

IPC - International classification

A01D-034/00*	A01D-075/18	B60W-030/00
G05D-001/02	G06K-009/00	G06K-009/62
G06N-020/00	G06T-007/20	G06T-007/73

CPC - Cooperative classification

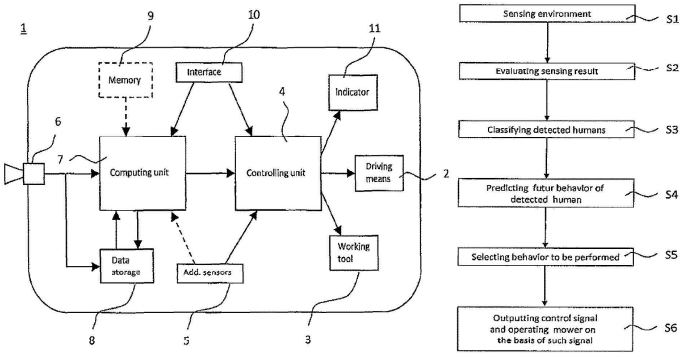
A01D-034/00/8*	A01D-075/18/5	B60W-030/00
G05D-001/02/46	G05D-2201/0208	G06K-009/00/362
G06K-009/00/664	G06K-009/62/12	G06N-020/00
G06N-099/00/5	G06T-007/20	G06T-007/75
G06T-2207/20081		

Family

US10912253	B2	EP3298874	A1
EP3298874	B1	US20180077860	A1

(EP3298874)

The invention regards a robotic gardening device comprising driving means (2) for propelling the robotic gardening device, a working tool (3) for performing dedicated gardening work and a controlling unit (4) for controlling said driving means (2) and the working tool (3) and a method for controlling the same. The robotic gardening device further comprises at least one environment sensor (6) generating a signal indicative of objects in the environment of the robotic gardening device, a computing unit (7) for classifying these objects, wherein the classes comprise at least two different classes for objects being determined to be humans. The computing unit (7) is configured to control the driving means (2) and/or the working device (3) according to a predetermined behavior associated with the respective objects class.



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Autonomous working machine such as autonomous lawn mower

EP3187953 B1

Current assignees

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Inventors

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Filing date: 2015-12-30

Granting Date: 2020-03-18

IPC - International classification

A01D-034/00*	A01D-101/00	B60R-011/04
G05B-015/00	G05B-019/00	G05D-001/02
G06K-009/00	G06T-007/70	H04N-007/18
H04N-013/204		

CPC - Cooperative classification

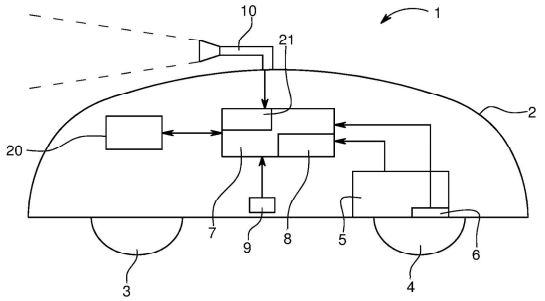
A01D-034/00/8*	A01D-2101/00	B60R-011/04
G05D-001/02/51	G05D-001/02/53	G05D-001/02/7
G05D-001/02/72	G05D-2201/0208	G06K-009/00/791
G06T-007/70	G06T-2207/10012	G06T-2207/30252
H04N-007/18/3	H04N-013/02/03	H04N-013/204

Family

EP3187953	B1	US20170188510	A1
US10321625	B2	EP3187953	A1

(EP3187953)

The invention regards an autonomous working machine comprising drive means, current position estimation means, control means including a driving control unit and a camera. With aid of the current position estimation means the current position of the autonomous working machine is estimated. Furthermore, the driving control unit generates driving commands for the driving means on the basis of an intended movement of the autonomous working machine and the estimated current position. The camera is configured to capture images of the environment of the working machine. For estimating the current position, the current position estimation means is formed by the control means, which is configured to apply visual odometry on the captured images for estimating the current position of the working machine.



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Autonomous vehicle with improved simultaneous localization and mapping function

EP3156873 B1

Current assignees

HONDA RESEARCH INSTITUTE EUROPE*

Inventors

FRANZIUS MATHIAS

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Filing date: 2015-10-15

Granting Date: 2019-12-04

IPC - International classification

A01D-034/00 G05D-001/00 G05D-001/02*

CPC - Cooperative classification

G05D-001/00/88* G05D-001/02/19 G05D-001/02/51

G05D-001/02/65 G05D-001/02/7 G05D-001/02/74

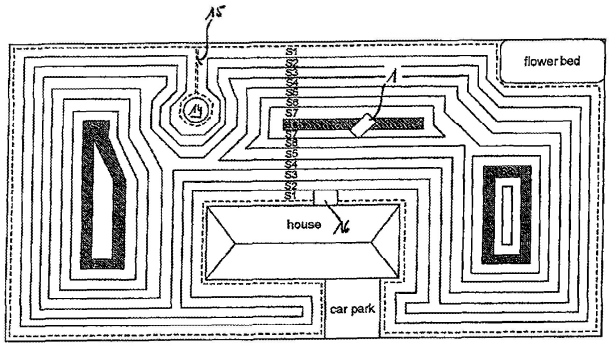
G05D-2201/0208

Family

EP3156873	B1	US20170108867	A1
US10191488	B2	EP3156873	A1

(EP3156873)

The invention relates to an autonomous vehicle comprising a driving means and a system including such autonomous vehicle. The autonomous vehicle furthermore comprises at least one environment sensing means (10, 11) for sensing an environment of the autonomous vehicle (1). It furthermore comprises a computing unit (7) configured to perform a mapping function and a localization function. The mapping function is performed on the basis of respective signals supplied from the at least one environment sensing means (10, 11) to build up a map. The localization function localizes the autonomous vehicle (1) within the map and generates respective localization information, The autonomous vehicle (1) further comprises a boundary distance sensing means (12, 13) configured to generate a distance signal correlated to a distance between the autonomous vehicle and a boundary indication means (15). The computing unit (7) is configured to receive the distance signal and to perform at least one of the mapping function and the localization function on the basis of a signal from the at least one environment sensing means (10, 11) and the distance signal from the boundary distance sensing means (12, 13). The system comprises in addition to the autonomous vehicle a boundary wire indicating a border of an entire area in which autonomous driving of the autonomous vehicle (1) shall be performed.



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System and method for assisting reductive shaping of plants into a desired 3d-shape by removing material

EP3085223 B1

Current assignees

HONDA RESEARCH INSTITUTE EUROPE*

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Filing date: 2015-04-20

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B27G-019/06 G05B-019/18

CPC - Cooperative classification

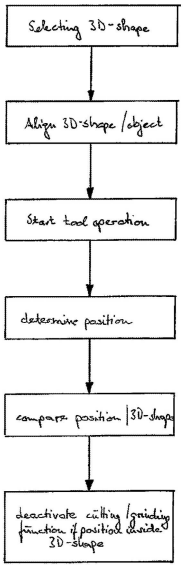
A01G-003/04/35 A01G-003/047 B26B-029/06*
G05B-019/18/2 G05B-2219/35318 G05B-2219/37095

Family

JP6747853	B2	JP2016202171	A
US10131065	B2	US20160311124	A1
EP3085223	B1	EP3085223	A1

(EP3085223)

The invention regards a system and method for assisting reductive shaping of an object into a desired 3D-shape by removing material. The system comprises a tool and a localization means. The tool is configured to remove material from an object by means of a cutting function or a grinding function performed by a working head of the tool. The localization means determines a position of the working head relative to the desired 3D-shape. Each time the grinding function or cutting function would remove material from an inside of the desired 3D-shape the cutting or grinding function is deactivated.



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Trainable autonomous lawn mower

EP2689650 B1

Current assignees

HONDA RESEARCH INSTITUTE EUROPE*

Inventors

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WERSING DR HEIKO

Filing date: 2012-07-27

Granting Date: 2014-09-10

IPC - International classification

A01D-034/00* G05D-001/00*

CPC - Cooperative classification

A01D-034/00/8* A01D-075/18/5 G05D-001/02/46

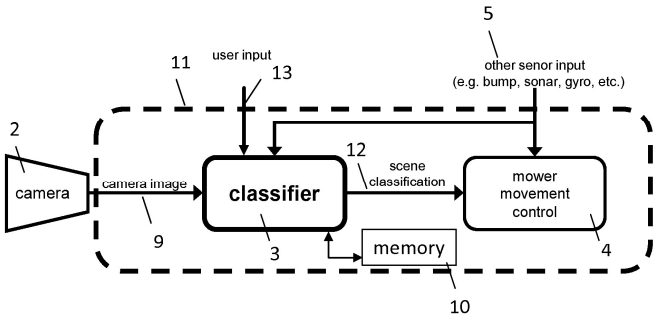
G05D-2201/0208 G06K-009/00/664 G06K-009/00/993

Family

US9137943	B2	US20140032033	A1
EP2689650	B1	EP2689650	A1

(EP2689650)

The present invention proposes a profound user-mower interaction, which enables the user to teach a robotic lawn mower (1) for improving its visual obstacle detection. The main idea of the invention is that the user can show some typical obstacles (6) from his garden to the mower (1). This will increases the performance of the visual obstacle detection. In the simplest scenario the user just places the mower (1) in front of an obstacle 6, and activates the learning mechanism of the classification means (module) (3) of the mower (1). The increasing use of smart devices (8) such as smart phones or tablets enables also more elaborated learning. For example, the mower can send the input image (9) to the smart device (8), and the user can provide a detailed annotation of the image. This will drastically improve the learning, because the mower (1) is provided with ground truth information.



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HONDA

System, method and apparatus for unsupervised adaptation of the perception of an autonomous mower

EP2620050 B1

Current assignees

HONDA RESEARCH INSTITUTE EUROPE*

Inventors

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Granting Date: 2016-07-27

IPC - International classification

A01B-069/00*	A01D-034/00	A01D-034/04
A01D-034/64	G01C-022/00	G03B-007/093
G03B-007/095	G03B-007/16	G03B-015/02
G03B-017/00	G03B-017/02	G05D-001/02
H04N-005/238	H04N-005/243	

CPC - Cooperative classification

A01B-069/00/1	A01D-034/00	A01D-034/00/8*
A01D-034/04	G05D-001/02/21	G05D-001/02/46
G05D-001/02/74	G05D-2201/0208	G06K-009/00/664

PCL - US patent classification

PCLO: 701028000*

PCLX: 037243000 700245000

Family

EP2620050	B1	JP2013153413	A
US8958939	B2	EP2620050	A1
JP5529947	B2	US20130190965	A1

(EP2620050)

The present invention presents a method and system for an autonomous mower attached with a camera, wherein the control of the parameters of the camera and the control of the mower movement and grass detection are optimized holistically during operation. The present invention mitigates the camera sensing limits by adapting the movement speed of the mower. Furthermore, the camera control optimizes the visibility of grass by using the grass mask of a grass segmentation to calculate updated exposure, gain and aperture values only from grass pixels. The grass segmentation tracks changes in the grass color that are caused by illumination differences. Optionally, the system is equipped with a head light used to further improve the camera signal quality in conjunction with the control of the camera parameters and the movement speed of the mower.