

## Patents

**Method and system for assessing livestock welfare based on the analysis of animals vocalization audio signals** → the present invention relates to a novel method for assessing livestock welfare, especially poultry birds, based on the analysis of animals' vocalization audio signals. With a set of five acoustic features (the Mel-frequency cepstral coefficients MFCC3, MFCC4 and MFCC6, the number of livestock animal vocalizations per unit of time, and the pitch feature), the method of the invention provides with real-time or short time forecast of one or more livestock animal productive indicators. This allows them to monitor and control animal welfare in a non-invasive and continuous way at any given time, taking better and faster corrective actions to guarantee animal well-being and high-quality products while maximizing productivity and profit. In addition, the method of the invention allows farmers to guarantee the welfare state of the livestock animal/s sold to a customer both prior (main location) and during transportation (secondary location).  
<https://worldwide.espacenet.com/patent/search/family/083004477/publication/EP4321018A1?q=precision%20livestock%20farming>

**A method for customized monitoring of sounds caused by respiratory distress** → The invention relates to a method for customized monitoring of sounds caused by respiratory distress in a group of farm animals in a specific farm, stable, or section of a stable, a non-transitory processor readable medium having stored thereon processor executable instructions configured to cause a processor to perform the method according to the invention, a computing device to carry out the method according to the invention, and a kit of parts for carrying out each of the inventive method comprising such a computing device and at least one microphone.  
<https://worldwide.espacenet.com/patent/search/family/057345647/publication/CN110312421A?q=dries%20berckmans>

**Method for intelligent monitoring of one or more commercial sites for livestock animals** → The invention concerns a method for monitoring of one or more commercial sites for livestock animals, each comprising multiple buildings having one or more airspaces that comprise one or more monitoring devices equipped with one or more sensors to receive data. Data obtained by the monitoring devices is uploaded to the web server. User can access web server data related to one or more commercial sites for livestock animals using mobile terminal wherein this comprises display to indicate the broader level summary associate with one or more commercial sites and detailed status of one or more commercial sites wherein detailed status comprises

outside environmental conditions, temperature, relative humidity, status of each airspace of the building and livestock animal's health and/or welfare status. Further, it provides personalized notifications to users associated with one or more sites indicating site status and early warning of alarm conditions.

<https://worldwide.espacenet.com/patent/search/family/065951441/publication/WO2020127467A1?q=dries%20berckmans>

**Method for monitoring a livestock facility and/or livestock animals in a livestock facility using improved sound processing techniques** →

The invention concerns a method for monitoring a livestock facility and/or livestock animals in a livestock facility. It includes receiving audio signals comprising sounds generated in a livestock facility from two or more microphones. Sounds of interest in the audio signals are localized, the sounds of interest being both sounds generated by livestock animals and sounds generated by noise sources. The localization further comprises the steps of utilizing models of noise sources in an airspace based on localization in noise reduction algorithms to filter off noise sources from the audio signal, resulting in a filtered audio signal, and the step of analysing the filtered audio signal.

<https://worldwide.espacenet.com/patent/search/family/065951440/publication/US11716970B2?q=dries%20berckmans>

**Device for monitoring the status of a livestock facility** → A device for monitoring the status of a livestock facility is disclosed, wherein the status of the livestock facility includes health and/or welfare of livestock animals inside the livestock facility, and management status of various devices installed in the facility. The device includes a housing unit, one or more temperature sensors configured to measure the air temperature in the livestock facility, one or more relative humidity sensors configured to monitor the relative humidity of the air in the livestock facility, one or more light sensors configured to measure the color and/or the light intensity inside the livestock facility to distinguish the real or artificially imposed day and night regimes in the livestock facility, one or more light emitting means configured to indicate the status of the device and/or abnormalities related to livestock animals inside the livestock facility, one or more microphones, one or more loudspeakers, a communication module comprising one or more wireless communication means to interact with other devices.

<https://worldwide.espacenet.com/patent/search/family/065951439/publication/CN113056188A?q=dries%20berckmans>

**Apparatus for the abatement of pollutants in confined spaces using microorganisms and their abatement process** → The present invention concerns a pollutant abatement process characterised by the fact that it comprises the following steps: providing a confined environment containing the pollutants to be abated at least in volatile form conveying a plurality of microorganism into the confined environment using a dry mist produced by molecular fragmentation as a vector. The invention is particularly suited to abate manure gas at a livestock farm, but is also applicable to other environments. The invention also concerns a related abatement device and a related environment, such as a livestock site, containing such a device.

<https://worldwide.espacenet.com/patent/search/family/084829765/publication/WO2024074992A1?f=lang%3Ain%3Den%7Cpd%3Ain%3D20240301-20241231&q=precision%20livestock%20farming&queryLang=en>

**CN117760530A** → The invention relates to the technical field of dynamic weighing, and in particular to a wireless dynamic adaptive weighing verification method suitable for poultry breeding. The method comprises the following steps: S1, construction of a wireless dynamic adaptive weighing system; S2, proposal of an automatic peeling algorithm for weight data; S3, preparation before operation of a poultry dynamic weighing algorithm; S4, adaptive weighing of a poultry dynamic weighing algorithm. The present invention conducts reasonable scheme design and verification, compares with traditional EMD decomposition, truncated mean method and wavelet transform algorithm, and conducts actual application monitoring in breeding farms, and obtains a method that satisfies the requirements for weight detection in the poultry breeding process while having both speed and accuracy, and has high practicality; data collected in broiler breeding farms show that when the growth conditions of broilers in cages are relatively uniform, the minimum weight error is kept within 1%, which is 1/3 of the error of manual weighing.

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**CN117727068A** → The invention discloses a method and system for constructing a cattle identification image feature extraction model, which relates to the technical field of image processing. The invention reduces the clustering difficulty and improves the reliability of pseudo labels by learning multiple local centers within a class through feature clustering. On this basis, the local centers within a class are used to represent the class proxy centers, and an independent domain contrast learning framework is constructed based on the class proxy. In combination with the approximate average precision loss, the sorting information within the retrieval sequence is used to improve the purity of feature clustering by removing negative example samples in the retrieval sequence. With the help of these two, the learning ability on the source domain dataset with known identities is transferred to the unlabeled target domain dataset, and high-performance clustering is learned in the target feature space, which helps to solve the problem of model training's dependence on data

calibration, thereby improving the accuracy of target domain identity recognition under unsupervised learning.

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**CN117718244A** → The present application provides a grouping weighing system for cattle, comprising: a grouping weighing platform, an RFID identifier, a visual sensor, a weighing device, an induction gate, and a target grouping channel; the RFID identifier identifies the ear tag of the target cattle, obtains the individual information of the target cattle, and sends the individual information to the grouping weighing platform; the visual sensor obtains the image data of the target cattle in response to the target cattle entering a preset area, and sends the image data to the grouping weighing platform; the weighing device weighs the target cattle in response to the target cattle entering the preset area, obtains the weight data of the target cattle, and sends the weight data to the grouping weighing platform; the grouping weighing platform determines the grouping conditions of the target cattle according to the individual information, image data and weight data, and controls the induction gate and the target grouping channel according to the grouping conditions, so that the target cattle enter the corresponding population from the target grouping channel.

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**CN117697791A** → The invention discloses a livestock and poultry house cleaning robot and a cleaning effect identification method. The robot comprises a forearm swinging part, an arm connecting part, an arm rotating part, a height adjustment frame, a camera part, a fluid system, a carriage, a mobile unit and an electronic control component; an external pressure water source is connected through a hose reel of the fluid system and sprayed out from a nozzle of the forearm swinging part; the forearm swinging part has a simple, compact and ingenious structure, which realizes flexible up and down swinging of the nozzle; the arm rotating part realizes high-precision large-torque horizontal rotation of the forearm swinging part, and can provide accurate nozzle angle adjustment even under the working condition of strong external pressure water source pressure, and can realize structural self-locking to prevent inversion, and has good safety and reliability; a light and simple solution in which the forearm swinging part and the arm rotating part cooperate with each other realizes flexible cleaning at multiple angles; the cleaning effect identification function can realize high-efficiency operation of washing and checking at the same time, and avoid incomplete cleaning or missed cleaning.

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**Liquid monitoring system and method** → A liquid monitoring system may include a monitoring device configured to be positioned at a surface of a confined liquid body. The monitoring device may include a housing including walls defining a cavity. The monitoring device may include an internal sensing sub-system enclosed within the cavity. The internal sensing sub-system may include one or more liquid monitoring sensors configured to monitor a level, temperature, or quality of the confined liquid body. The liquid monitoring system may be configured to receive a set of liquid monitoring data from the one or more liquid monitoring sensors. The liquid monitoring system may be further configured to determine one or more liquid measurement values based on set of liquid monitoring data. The one or more liquid measurement values may include a liquid level measurement value, a temperature measurement value, or a liquid quality measurement value for the confined liquid body.

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**CN117671586A** → The present invention discloses an integrated device for detecting dead chickens in caged laying hens, which comprises a data acquisition part, an edge computing part, a network transmission part, a data processing part, a motion platform part, and a visualization part, wherein: the edge computing part deploys a dead chicken target detection model, and performs dead chicken target detection based on multi-source data fusion. This patent proposes a method for judging weak chickens by fusion of multi-source data based on machine vision, thereby improving the accuracy of weak chicken detection. At the same time, it is proposed to reduce the false detection rate of dead chickens by adding dead chicken features and comprehensively judging the dead chickens.

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