

A SYSTEM FOR WEIGHING AND CLASSIFYING A FOOD ITEM IN A KITCHEN

Field of the Invention

- 5 The present invention relates to a system for weighing and classifying a food item in a kitchen.

Background of the Invention

- 10 According to World Bank, by 2100, "they estimate that the growing global urban population will be producing three times as much waste as it does today." The amount of waste we currently generate today carries serious consequences, both to public health, to the environment and the financial resources of governments. "The global cost of dealing with all the trash is rising too: from \$205 billion a year in 2010
15 to \$375 billion by 2025" (World Bank, 2013). Therefore, waste is a global problem which is already an issue today which will continue to increase in severity based on current trends. In countries such as Singapore where land is scarce, the waste problem is even more pronounced. The last remaining landfill in Singapore will be completely filled by 2035.

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- Waste associated with food is of particular concern. Food is a limited resource which can be scarce and as such, it is preferable that steps be taken to limit the amount of unnecessary wastage. Food waste generated by commercial kitchens, for example in a restaurant or hotel, constitutes a significant portion of food waste generated
25 worldwide. In addition to the environmental problems associated with excess food waste, food waste results in a significant financial loss to businesses in the food and beverage industry.

- Commercial kitchens are usually very busy during service and staff are not typically
30 tasked with monitoring or recording the amount of food waste generated during service. Therefore, in most conventional kitchens, it is difficult to keep track of the amount of food waste generated. It is difficult to reduce generated food waste without information on actual food waste. For example, a restaurant will not know to

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reduce their order of a certain type of food based without the knowledge that they have been ordering too much of that certain type of food.

It is generally desirable to overcome or ameliorate one or more of the above described
5 difficulties, or to at least provide a useful alternative.

Summary of the Invention

In accordance with the present invention, there is provided a system for weighing and
10 classifying a food item in a kitchen, the system including:

- (a) one or more processors in communication with a non-transitory data storage media having instructions stored thereon;
- (b) a weighing system for generating data representing a weight of a food
15 item placed thereon; and
- (c) a recognition system for generating classification data representing a classification of the item placed on the weighing system;

wherein the instructions are executed by the one or more processors to
20 perform the steps of:

- (a) receiving, from the weighing system, weight data representing the weight of the item placed thereon;
- (b) receiving, from the recognition system, classification data representing
25 the classification of the item placed on the weighing system; and
- (c) storing the weight data and the classification data to the storage media.

Brief Description of the Drawings

30 Preferred embodiments of the invention are hereafter described, by way of non-limiting example only, with reference to the accompanying drawings, in which:

Figure 1 is a schematic diagram of a system for a monitoring food waste in a kitchen;

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Figure 2 is a flowchart diagram showing a process for weighing and classifying a food item in a kitchen;

Figures 3ai, 3aii and 3aiii show an exemplary classifying system for weighing and classifying a food item in a kitchen;

5 Figure 3b shows a circuit diagram for an exemplary system;

Figure 3c shows another circuit diagram for an exemplary system

Figures 4ai, 4aii and 4aiii show another exemplary classifying system for weighing and classifying a food item in a kitchen;

Figure 4b shows a circuit diagram for another exemplary classifying system; and

10 Figure 5 is a schematic diagram showing components of an exemplary computing device.

Detailed Description of Embodiments of the Invention

15 **Monitoring System 10**

The monitoring system 10 shown in Figure 1 allows monitoring of waste. The monitoring system 10 includes one or more of the following:

- 20 (a) a system for weighing and classifying a food item in a kitchen 12;
(b) a computing system 14; and
(c) a display 16.

The components of monitoring system 10 are in communication via the network 20.

25 The communication network 20 may include the Internet, telecommunications networks and/or local area networks.

The monitoring system 10 makes monitoring waste simpler, faster and more convenient. Embodiments of the invention allow waste to be measured, tracked and
30 monitored. In particular, waste generated in a commercial environment, for example a kitchen of a restaurant or factory, can be more easily and conveniently monitored. This will allow food waste to be managed more effectively resulting in potential cost savings. Preferably, embodiments of the invention automatically identifies, weighs and records details about the item being thrown away which allows information to be

seamlessly recorded, such as location, appearance and nature of the item without requiring physical user input, for example.

5 Preferably, embodiments of the invention are part of the Internet of Things (IoT), such as waste disposal or collection sites (such as bins), product management systems or inventory management systems. This will allow data to be collected for preparing reports which may be automatically furnished for the user to understand the amount of waste generated, type of waste and develop strategies to reduce unnecessary waste.

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In particular, embodiments of the invention may be used to monitor waste associated with food generated in a commercial setting. For example in a restaurant setting, food is often discarded due to overly large portions or lost due to damage or spoilage. In the food and beverage industry, it is important to minimise cost and maximise profit – minimizing food waste and loss may result in increased profitability. In addition, stress on the environment may be reduced by reducing waste.

20 Embodiments of the invention allow waste to be measured and recorded whilst requiring minimal interaction with the user. The waste item is identified by embodiments of the invention without requiring the user to physically input the type of category the item falls into. This allows users to monitor the amount and type of generated waste in an efficient manner which encourages users to adopt the system. Preferably, the invention is embodied as an apparatus that fits a standard dustbin, for example, which would not disrupt the usual workflow of users.

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Preferably, embodiments of the invention are portable. This allows users to conveniently and more easily reposition the system 10 in areas where it is needed. Additionally, the invention may be embodied into components of an existing system. For example, in a food waste use case, the invention may be embodied in a lid of a bin or waste disposal device. This allows users to make a small modification to existing systems to be able to implement the monitoring system 10. This may result in a better uptake of the system 10.

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System For Weighing And Classifying A Food Item In A Kitchen 12

Preferably, the system 12 includes:

- 5 (a) one or more processors 12c in communication with a non-transitory data storage media having instructions stored thereon;
- (b) a weighing system 12a for generating data representing a weight of a food item 12d placed thereon; and
- (c) a recognition system 12b for generating classification data representing
- 10 a classification of the item 12d placed on the weighing system;
- wherein the instructions are executed by the one or more processors 12c to perform the steps in process 200, which include:

- (a) receiving, from the weighing system 12a, weight data representing the
- 15 weight of the item 12d placed thereon;
- (b) receiving, from the recognition system 12b, classification data representing the classification of the item 12d placed on the weighing system; and
- (c) storing the weight data and the classification data to the storage media.

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Data storage may be located physically on classifying system 12. In another embodiment, classifying system 12 is in communication with data storage on server 14 via communication network 20, for example in a cloud-based storage system.

- 25 Preferably, the weighing system 12a includes a receptacle 12e for receiving the item 12d to be weighed. The weighing system 12a further includes a load sensor or strain gauge for obtaining the weight of the item 12d placed thereon. The receptacle 12e, or weighing platform, may be embodied in the form of a plate or bowl like structure covering the top of a dust bin such as a lid, for example.

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The classifying system 12 further includes a container 12g inferiorly coupled to the weighing system 12a such that an item 12d placed on the receptacle 12e can fall therefrom into the container 12g.

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The classifying system 12 further includes a mechanism 12f for displacing an item from the receptacle 12e to a container 12g for hygienically storing the item. The mechanism 12f may be embodied in a variety of ways.

- 5 As particularly shown in Figures 3ai, 3aii and 3aiii, the receptacle 12e is configured to pivot about a horizontal axis so as to allow an item 12d placed on the receptacle 12e to fall into the container 12g. The classifying system 12 further includes an actuator 12i for controlling pivoting of the receptacle about the horizontal axis. When instructions are executed by the one or more processors 12c, the classifying system
10 12 performs the step of, after the step of storing, sending an activation signal to the actuator 12i to pivot the receptacle 12e from position as shown in Figure 3ai to the position as shown in Figure 3aii which displaces item 12d from receptacle 12e to the container 12g. After the item 12d is displaced from receptacle 12e, the one or more processors 12c sends instruction to actuator 12i to move receptacle 12e from position
15 as shown in Figure 3aii to the position as shown in Figure 3aiii.

- In a preferred embodiment, the receptacle 12e is mounted on an axle which allows rotation about an axis. The actuator 12i is linked to a rod that pushes the receptacle 12e from the position as shown in Figure 3ai to the position as shown in Figure 3aii
20 thereby allowing item 12d to fall into the container 12g. The actuator 12i is controlled by a main circuit board and is responsive to user input, for example.

- In another embodiment, as particularly shown in Figures 4ai, 4aii and 4aiii, the receptacle 12e partially covers an upper opening of the container 12g thereby leaving
25 an aperture 12f5 for accessing the contents of the container 12g. In this embodiment, the classifying system 12 includes a member 12f1 configured to slide from a first edge of the receptacle 12e towards an opposing second edge so as to move an item 12d placed thereon towards said aperture 12f5 so as to dispose the item 12d in the container 12g. For example, the classifying system 12 includes a plate 12f1 extending
30 from the receptacle 12e to the mounting mechanism 12f2. The plate 12f1 is fixed to the mounting mechanism 12f2. The mounting mechanism 12f2 is slidably coupled to a track 12f3 on one end and slidably coupled to a guiding mechanism 12f4 on the other end and is configured to move along an axis for displacing an item 12d on receptacle 12e into container 12g. The classifying system 12 preferably includes an

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actuator 12i for controlling sliding of the member 12f1 which is configured to move, on receipt of activation signal from one or more processors 12c, from the position as shown in Figure 4ai to the position as shown in Figure 4aiii (via the position in Figure 4aii). The mechanism 12f preferably further includes a limit switch 12c2 for stopping
5 the motor 12c4 and a servo 12c3 to lock the plate 12f1 in place.

The one or more processors 12c may be part of a main circuit board, for example a raspberry pi 12c5. Preferably, classifying system 12 includes other components such as a weight sensor circuit, load cell 12c8, hx711 amplifier 12c7 and an Arduino 12c1,
10 for example. Preferably, the processors 12c of the main circuit board execute software and communicate with the weighing system 12a (via a HX711 Amplifier IC 12c7 for example), ultrasound sensor (for example, a HC-SR04 12c9), recognition system 12b and mechanism 12f (via a controller SN754410NE Dual H-Bridge motor controller IC 12c10 for example) and sends instructions to these components when it is appropriate
15 to do so, as described by process 200 in the section below.

For example, a first Arduino 12c1 may be used to connect to the weighing system 12a as particularly shown in Figure 3b and a second Arduino 12c6 to control an actuator 12i of mechanism 12f as particularly shown in Figure 3c or Figure 4b. Both Arduinos
20 are preferably connected and powered by the main circuit board.

An actuator 12i, or programmable motor, for controlling the mechanism 12f is linked to the main circuit board via a motor driver circuit with Arduino 12c1, for example. This is powered from an external power source 12c11, for example a battery source or
25 mains.

Preferably, recognition system 12b includes a camera 12h in communication with the main circuit board for capturing one or more images of the item, and wherein when the instructions are executed by the one or more processors 12c, the system 12
30 performs the step of:

- (a) sending an activation signal to the camera 12h to capture image data of the item 12d placed on the receptacle 12e;

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- (b) receiving captured image data representing an image of the item 12d placed on the receptacle 12e;
- (c) identifying image data stored in data storage that matches with said captured image data; and
- 5 (d) generating classification data by determining a classification associated with the image data stored in data storage that matches with said captured image data.

10 For example, the step of sending an activation signal to the camera 12h is performed after the main circuit board receives data from weighing system 12a that there has been a change of weight detected indicating that an item 12d has been placed on the receptacle.

15 In an alternate embodiment, the recognition system 12b includes a camera 12h for capturing one or more images of the item 12d, and wherein when the instructions are executed by the one or more processors 12c, the system 12 performs the step of:

- (a) sending an activation signal to the camera 12h to capture image data of the item 12d placed on the receptacle 12e;
- 20 (b) receiving captured image data representing an image of the item 12d placed on the receptacle 12e; and
- (c) generating classification data by sending said captured image data to a remote image processing server, such as computing system 14, and receiving classification data back from the remote server.

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In another embodiment, the recognition system 12b includes a microphone 12j for capturing one or more voice commands from a user, and wherein when the instructions are executed by the one or more processors 12c, the classifying system 12 also performs the step of:

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- (a) receiving captured voice command data from the microphone 12j;
- (b) identifying voice command data stored in data storage that matches with said captured voice command data; and

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- (c) generating classification data by determining a classification associated with the voice command data stored in data storage that matches with said captured voice command data.

5 In an alternate embodiment, the recognition system 12b includes a microphone 12j for capturing one or more voice commands from a user, and wherein when the instructions are executed by the one or more processors 12c, the classifying system 12 also performs the step of:

- 10 (a) receiving captured voice command data from the microphone 12j; and
- (b) generating classification data by sending said captured voice command data to a remote voice processing server, for example computing system 14, and receiving classification data back from the remote server.

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In some embodiments, more than one classification may be generated for each item 12d.

For example, the data is processed by running it through a machine learning model, or
20 through an API, that provides the identity of the waste from the data it receives, be it an image or sound byte. The system for providing the identity of the waste can be located off-site or on-site on a separate computing device.

For example, the image processing system first breaks down the image into its base
25 form. The image processing system further includes an application with a database for storing a set of images, the images each having one or more corresponding tags. The image processing system processes the image received by the camera 12h and compares it against one or more set of images and determines the most likely tag in its database. This may be performed by machine learning algorithms such as
30 classifiers or neural nets.

In an embodiment, a training system for image recognition is used to identify the category of item 12d. For example, users can train the monitoring system 10 to identify specific waste items such as a menu of a restaurant including all the

ingredients required to make all dishes in the menu. In some embodiments, the user inputs the identity of all the items using a display 16. A database of images is then built by the user. This may be by using camera 12h to capture one or more images of an item and the user associating an identity or category to the item via display 16.

5 The more images taken, the more accurate the system will be at predicting the item.

For example, the system 12b uses a machine learning model which first divides the data received during the training module into subsets. The system 12b then inputs a subset of data into the model and tests the model upon the other subsets to improve

10 efficiency.

For example, the voice recognition system uses an API to translate the captured voice command data into English text which is then compared with a selected dictionary including classification data such as menu items. In some embodiments, this is done

15 by way of fuzzy string matching using vector edit distances.

In another embodiment, a display 16, such as a touchscreen display or tablet computer, is linked to the main circuit board for displaying output to a user. For example, data associated with the item 12d such as the weight and category of food

20 detected by classifying system 12 can be displayed on the display 16.

The display 16 can also be used to receive input from the user. For example, users may input the dish or type of ingredient that has been placed on the receptacle 12e. Alternatively, the user may classify the item 12d as a non-food waste. Preferably, the

25 display 16 is in communication with computing system 14 by network 20 for example. For example, a graphical user interface running on the display 16 is provided for the user to manually input the type of waste.

The classifying system 12 and any peripheral components may be powered in various

30 ways, for example, a power bank with amperage of equal to or more than 3A may be used to power the main circuit board or a 12V 4000mah lithium polymer can be used to power the motor. This will allow the classifying system 12 to be mobile for easy transport. Alternatively, power may be drawn from mains power supply.

Classifying system 12 may be housed in a single housing. In other embodiments, classifying system 12 may not be housed entirely in a single housing. The components of classifying system 12 may be integrated into an existing item such as the lid of a dustbin.

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Process 200

Preferably, process 200 is performed by classifying system 12 as part of a waste monitoring system 10. At step 202, the processors 12c receive data from weighing system 12a that a change in mass has been detected indicating that an item 12d has been placed on the receptacle 12e. At step 204, the processors 12c receive data from weighing system 12a associated with the weight of item 12d. At step 206, the processor 12c causes the recognition system 12b to classify the item 12d. For example, one type of classification includes categories such as fruits, vegetables, meat, rice or dessert. Another example includes dishes such as chicken rice, curry, lasagne, tomato soup. Alternatively, classification may include types of meals such as breakfast, lunch or dinner. Additionally, classification may include ingredient type such as apple, pear, chicken, beef or pork.

For example, the processor 12c causes a camera 12h to take one or more images of the item 12d or a microphone 12j to activate and record a voice command. In some embodiments, the recognition system 12b is in communication with a data processing system on computing system 14 via network 20. The data processing system may be a remote image processing server or a remote voice processing server.

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The remote image processing server compares an image from the camera 12h to a database of images. The data processing system may use machine learning technology, through an API for example, to produce a set of predictions about the identify of the image and a certainty value. The identity of the image is predicted by comparing a set of pre decided waste items and relative certainty values, for example.

In other embodiments, other information such as the time that the item 12d was placed on the receptacle 12e may be recorded. Other sensors may be incorporated to capture other pertinent information such as a temperature sensor.

At step 206, the processor receives classification data from recognition system 12b indicating the classification of the item 12d. At step 208, the processor sends data associated with the item 12d from the weighing system 12a and recognition system 12b to data storage, for example a cloud based storage system on computing system 14.

In some embodiments, the data is stored and accessed by computing system 14 to produce a report for the user for monitoring the waste generated. For example, a daily report could be compiled by computing system 14 and pushed to display 16 or sent as an email to the user. The report could also be made accessible to one or more users through an online portal. The report would collate data based on the amount of waste for the day identifying the classification or category of the item. Data could be presented in the form of graphs and tables.

In some embodiments, the monitoring system 10 is integrated with external systems such as procurement, sales or weather. This allows more correlations to be made between waste and other external factors to be generated which may allow users to take further steps to reduce waste. In addition, machine learning algorithms could be used to predict future procurement, sales or waste data based on historical data.

Computing System 14

Computing system 14 is in communication, via network 20, with the cloud based storage system which receives data from classifying system 12. The computing system 14 maintains a database, for example of images of voice commands, from recognition system 12b. In some embodiments, the computing system 14 is configured to generate reports for the user for monitoring of waste.

As shown in Figure 5, the computing system 14 may comprise a computing system 14. In some embodiments, the system may comprise multiple servers in communication with each other, for example over a local area network or a wide-area network such as the Internet. As described in the preceding section, the computing system 14 is able to communicate with other components of the monitoring system 10

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over the wireless communications network 20 using standard communication protocols.

The components of the computing system 14 can be configured in a variety of ways.
5 The components can be implemented entirely by software to be executed on standard computer server hardware, which may comprise one hardware unit or different computer hardware units distributed over various locations, some of which may require the communications network 20 for communication. A number of the components or parts thereof may also be implemented by application specific
10 integrated circuits (ASICs) or field programmable gate arrays.

In the example shown in Figure 5, the computing system 14 is a commercially available server computer system based on a 32 bit or a 64 bit Intel architecture, and the processes and/or methods executed or performed by the computing system 14 are
15 implemented in the form of programming instructions of one or more software components or modules 322 stored on non-volatile (e.g., hard disk) computer-readable storage 324 associated with the computing system 14. At least parts of the software modules 322 could alternatively be implemented as one or more dedicated hardware components, such as application-specific integrated circuits (ASICs) and/or
20 field programmable gate arrays (FPGAs).

The computing system 14 includes at least one or more of the following standard, commercially available, computer components, all interconnected by a bus 335:

- 25 (a) random access memory (RAM) 326;
 (b) at least one computer processor 328, and
 (c) external computer interfaces 330:
 (i) universal serial bus (USB) interfaces 330a (at least one of which
30 is connected to one or more user-interface devices, such as a
 keyboard, a pointing device (e.g., a mouse 332 or touchpad),
 (ii) a network interface connector (NIC) 330b which connects the
 computer system 300 to a data communications network, such
 as the wireless communications network 20; and
 (iii) a display adapter 330c, which is connected to a display device

334 such as a liquid-crystal display (LCD) panel device.

The computing system 14 includes a plurality of standard software modules, including:

- 5 (a) an operating system (OS) 336 (e.g., Linux or Microsoft Windows);
- (b) web server software 338 (e.g., Apache, available at
 <http://www.apache.org>);
- (c) scripting language modules 340 (e.g., personal home page or PHP,
 available at <http://www.php.net>, or Microsoft ASP); and
- 10 (d) structured query language (SQL) modules 342 (e.g., MySQL, available
 from <http://www.mysql.com>), which allow data to be stored in and
 retrieved/accessed from an SQL database 316.

Advantageously, the database 316 forms part of the computer readable data storage
15 324. Alternatively, the database 316 is located remote from the computing system 14
shown in Figure 5.

Together, the web server 338, scripting language 340, and SQL modules 342 provide
the computing system 14 with the general ability to allow the other components of the
20 monitoring system 10 to communicate with the computing system 14 and in particular
to provide data to and receive data from the database 316. It will be understood by
those skilled in the art that the specific functionality provided by the computing
system 14 to such users is provided by scripts accessible by the web server 338,
including the one or more software modules 322 implementing the processes
25 performed by the computing system 14, and also any other scripts and supporting
data 344, including markup language (e.g., HTML, XML) scripts, PHP (or ASP), and/or
CGI scripts, image files, style sheets, and the like.

The boundaries between the modules and components in the software modules 322
30 are exemplary, and alternative embodiments may merge modules or impose an
alternative decomposition of functionality of modules. For example, the modules
discussed herein may be decomposed into submodules to be executed as multiple
computer processes, and, optionally, on multiple computers. Moreover, alternative
embodiments may combine multiple instances of a particular module or submodule.

Furthermore, the operations may be combined or the functionality of the operations may be distributed in additional operations in accordance with the invention. Alternatively, such actions may be embodied in the structure of circuitry that implements such functionality, such as the micro-code of a complex instruction set
5 computer (CISC), firmware programmed into programmable or erasable/programmable devices, the configuration of a field-programmable gate array (FPGA), the design of a gate array or full-custom application-specific integrated circuit (ASIC), or the like.

10 Each of the blocks of the flow diagrams of the processes of the computing system 14 may be executed by a module (of software modules 322) or a portion of a module. The processes may be embodied in a non-transient machine-readable and/or computer-readable medium for configuring a computer system to execute the method. The software modules may be stored within and/or transmitted to a computer system
15 memory to configure the computer system to perform the functions of the module.

The computing system 14 normally processes information according to a program (a list of internally stored instructions such as a particular application program and/or an operating system) and produces resultant output information via input/output (I/O)
20 devices 330. A computer process typically includes an executing (running) program or portion of a program, current program values and state information, and the resources used by the operating system to manage the execution of the process. A parent process may spawn other, child processes to help perform the overall functionality of the parent process. Because the parent process specifically spawns
25 the child processes to perform a portion of the overall functionality of the parent process, the functions performed by child processes (and grandchild processes, etc.) may sometimes be described as being performed by the parent process.

Display 16

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The display 16 generally operates to provide a presentation of content to a user, and may be realized by any of a variety of displays (e.g., LCD, CRT, micro-projector and OLED, AMOLED displays). Advantageously, the display 16 is in communication with processor(s) 12c of the classifying system 12. Preferably, display 16 is configured to

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receive user input. In some embodiments, the display 12 is embodied by a touchscreen display.

Preferably, the display 16 is configured to receive instructions from processor(s) 12c
5 of the classifying system 12. The display 16 is also configured to transmit user instructions to the processor 12c.

In some embodiments, the display 16 is configured to receive data from computing
10 system 14 via network 20 for displaying information to the user.

In other embodiments, the display 16 is embodied by a mobile computing device such as a tablet, smart phone or personal data assistant.

Throughout this specification, unless the context requires otherwise, the word
15 "comprise", and variations such as "comprises" and "comprising", will be understood to imply the inclusion of a stated integer or step or group of integers or steps but not the exclusion of any other integer or step or group of integers or steps.

The reference to any prior art in this specification is not, and should not be taken as,
20 an acknowledgment or any form of suggestion that the prior art forms part of the common general knowledge.

Claims Defining the Invention

1. A system for weighing and classifying a food item in a kitchen, the system including:
 - 5 (a) one or more processors in communication with a non-transitory data storage media having instructions stored thereon;
 - (b) a weighing system for generating data representing a weight of a food item placed thereon; and
 - (c) a recognition system for generating classification data representing a
10 classification of the item placed on the weighing system;wherein the instructions are executed by the one or more processors to perform the steps of:
 - (a) receiving, from the weighing system, weight data representing the
weight of the item placed thereon;
 - 15 (b) receiving, from the recognition system, classification data representing the classification of the item placed on the weighing system; and
 - (c) storing the weight data and the classification data to the storage media.
2. The system claimed in claim 1, wherein the weighing system includes a
20 receptacle for receiving the item to be weighed.
3. The system claimed in claim 2, further including a container inferiorly coupled to the weighing system such that an item placed on the receptacle can fall therefrom into the container.
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4. The system claimed in claim 3, wherein the receptacle is configured to pivot about a horizontal axis so as to allow an item placed thereon to fall into the container.
5. The system claimed in claim 4, including an actuator for controlling pivoting of
30 the receptacle about said horizontal axis.
6. The system claimed in claim 5, wherein when the instructions are executed by the one or more processors, the system also performs the step of, after said step of storing, sending an activation signal to the actuator to pivot the receptacle.

7. The system claimed in claim 3, wherein the receptacle partially covers an upper opening of the container thereby leaving an aperture for accessing the contents of the container.

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8. The system claimed in claim 7, further including a member configured to slide from a first edge of the receptacle towards an opposing second edge so as to move an item placed thereon towards said aperture so as to dispose the item in the container.

10 9. The system claimed in claim 8, including an actuator for controlling sliding of the member.

10. The system claimed in claim 9, wherein, when the instructions are executed by the one or more processors, the system performs the step of, after said step of
15 storing, sending an activation signal to the actuator to slide the member towards the second edge.

11. The system claimed in any one of claims 1 to 10, wherein the recognition system includes a camera for capturing one or more images of the item, and wherein
20 when the instructions are executed by the one or more processors, the system also performs the step of:

- (a) sending an activation signal to the camera to capture image data of the item placed on the receptacle;
- (b) receiving captured image data representing an image of the item placed
25 on the receptacle;
- (c) identifying image data stored in data storage that matches with said captured image data; and
- (d) generating classification data by determining a classification associated with the image data stored in data storage that matches with said
30 captured image data.

12. The system claimed in any one of claims 1 to 10, wherein the recognition system includes a camera for capturing one or more images of the item, and wherein

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when the instructions are executed by the one or more processors, the system also performs the step of:

- (a) sending an activation signal to the camera to capture image data of the item placed on the receptacle;
- 5 (b) receiving captured image data representing an image of the item placed on the receptacle; and
- (c) generating classification data by sending said captured image data to a remote image processing server and receiving classification data back from the remote server.

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13. The system claimed in any one of claims 1 to 12, wherein the recognition system includes a microphone for capturing one or more voice commands from a user, and wherein when the instructions are executed by the one or more processors, the system also performs the step of:

- 15 (a) receiving captured voice command data from the microphone;
- (b) identifying voice command data stored in data storage that matches with said captured voice command data; and
- (c) generating classification data by determining a classification associated with the voice command data stored in data storage that matches with
- 20 said captured voice command data.

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14. The system claimed in any one of claims 1 to 12, wherein the recognition system includes a microphone for capturing one or more voice commands from a user, and wherein when the instructions are executed by the one or more processors, the system also performs the step of:

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- (a) receiving captured voice command data from the microphone; and
- (b) generating classification data by sending said captured voice command data to a remote voice processing server and receiving classification data back from the remote server.

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15. The system claimed in any one of claims 13 or 14, wherein the step of generating classification data includes the step of matching the captured voice command data to a set of words and generating a classification data.

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16. The system claimed in claim 15, wherein the step of matching include fuzzy string matching using vector edit distances.

17. The system of any one of claims 1 to 16, wherein the weighing system includes
5 a load sensor or strain gauge for obtaining the weight of an item placed thereon.

18. The system of any one of claims 1 to 17, further including a display for displaying information to a user.

10 19. The system of claim 18, wherein the display is configured to receive user input.