Intelligent Automated Machine (IAM) for Dispensing Ready Fried Food (RFF)

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ABSTRACT

The present research paper generally relates to a fully automated machine for preparing food products, and particularly to a fully automatic machine for preparation and dispensing of fried foods such as chowmein or the like called as fried fast food chowmein (F3C). The FAM includes an instruction box through which the order can be placed; a plurality of openings for feeding food constituents into the machine. Further, FAM-F3C contains set of choppers for chopping various food ingredients; a boiling structure for boiling the desired constituent; a frying chamber with stirrers; an e- nose sensor to control the heat transfer to the frying box, at least two balancing devices; and a dispensing mechanism to dispense the ordered food and a rotary platform to hold the empty and filled plates with the dispensed food. The machine can quickly and automatically prepare fried fast foods (chowmein) and thus can realize an unmanned shop for such foods.

Keywords: Intelligent Automated Machine (IAM), Ready Fried Food (RFF)

I.   INTRODUCTION

Day to day increasing automation in every area also giving promising automation in the area of dispensing fried fast food machines and processing food in more automated and intelligent manner. Several prior arts exist pertinent to the field of the present research and the literature discloses automatic preparation and dispensing of noodles. The device maintains the taste of packaged noodles and expedites the sales and preparation processes for user convenience by using electricity to cook the noodles and automating the noodle preparation and sales processes. The art does not disclose any method for chopping of ingredients, and stirring and frying of the ingredients. Literature describes a machine for automatic preparing of Chowmein [1-7].

Although the machine facilitates an automatic frying process, yet it does not indicate of either automatic dispensing or fully automatic preparation of food. Literature Art discloses an automatic conveyor structure for preparing and dispensing of fried fast foods. However, this Literature fails to achieve automatic boiling or chopping of ingredients. Moreover, the order of dropping the ingredients into the frying box cannot be altered and the ingredients get fried separately in their respective containers. This conveyor-based structure requires a large number of burners and containers which leads to an additional cost and size of the machine. Various software techniques are also proposed for vending machines and software developed for vending machines can go through various testing phases to provide robust vending machine [7-14].

The present research paper relates to a fully automated machine for preparation and dispensing of cooked food, more particularly to a fully automated machine for preparation and dispensing of fried fast food.

II. OBJECT OF INTELLIGENT AUTOMATED MACHINE (IAM) FOR DISPENSING READY FRIED FOOD (RFF)

A fully automated intelligent automated machine (IAM) for dispensing ready fried food (RFF)for preparation and dispensing of fried fast food for fully automatic preparation and dispensing of cooked foods includes a main frame to house various intelligent automated machine (IAM) for dispensing ready fried food (RFF)components and a first upper section consisting of food ingredient specific FAM-F3C sections, each FAM-F3C section with an opening at its upper surface to feed desired food ingredients into the machine. A fully automated intelligent automated machine (IAM) for dispensing ready fried food (RFF)for preparation and dispensing of fried fast food further includes at least one chopping means included in at least one of the FAM-F3C sections and at least one boiling structure integrated with at least one of the FAM-F3C sections. A second middle section to carry out mixing and frying of the food ingredients, the section including : at least one balancing structure , a frying chamber, an electric heating means, and an electronic nose for controlling the frying process; a third lower section to dispense the prepared food into a container and to thereafter convey the container outside the machine, a rotary platform to hold multiple take away containers; a plurality of motors to supply mechanical energy to one or more intelligent automated machine (IAM) for dispensing ready fried food (RFF)components; a user interface panel, positioned on outer wall of the main frame, includes: a display screen, an instruction box and a payment structure ; plurality of sub-supervisors to activate one or more intelligent automated machine (IAM) for dispensing ready fried food (RFF)components; and a

master supervisor m communication with the plurality of sub- supervisors.

III. DETAILS OF INTELLIGENT AUTOMATED MACHINE (IAM) FOR DISPENSING READY FRIED FOOD (RFF)

The intelligent automated machine (IAM) for dispensing ready fried food (RFF)of fully automated intelligent automated machine (IAM) for dispensing ready fried food (RFF), further the chopping means are specific to the food ingredients. The intelligent automated machine (IAM) for dispensing ready fried food (RFF)of fully automated intelligent automated machine (IAM) for dispensing ready fried food (RFF), further the quantity of food ingredients is controlled optionally in a time-based or a mass-based manner.

The intelligent automated machine (IAM) for dispensing ready fried food (RFF)of fully automated intelligent automated machine (IAM) for dispensing ready fried food (RFF), further the frying chamber consists of a plurality of stirring devices. The intelligent automated machine (IAM) for dispensing ready fried food (RFF)of fully automated intelligent automated machine (IAM) for dispensing ready fried food (RFF), further the electronic nose detects and recognizes odours, flavors and smoke present in the middle section of the machine. The intelligent automated machine (IAM) for dispensing ready fried food (RFF)of fully automated intelligent automated machine (IAM) for dispensing ready fried food (RFF), further the electric heating means includes a plurality of electric heating plates. The intelligent automated machine (IAM) for dispensing ready fried food (RFF)of fully automated intelligent automated machine (IAM) for dispensing ready fried food (RFF)further includes a conveyor structure to convey the food filled container outside. The intelligent automated machine (IAM) for dispensing ready fried food (RFF)of fully automated intelligent automated machine (IAM) for dispensing ready fried food (RFF), further the rotary platform can hold variable sized take away containers. The intelligent automated

machine (IAM) for dispensing ready fried food (RFF)of fully automated intelligent automated machine (IAM) for dispensing ready fried food (RFF), further the intelligent automated machine (IAM) for dispensing ready fried food (RFF)can be instructed through the instruction box to vary the amount, degree of frying and quantity of ingredients according to the taste of the user. The intelligent automated machine (IAM) for dispensing ready fried food (RFF)of fully automated intelligent automated machine (IAM) for dispensing ready fried food (RFF), further the payment structure is optionally coin-based, card-based or user-identification-based. The intelligent automated machine (IAM) for dispensing ready fried food (RFF)of fully automated intelligent automated machine (IAM) for dispensing ready fried food (RFF), further an alert structure is conjugated to give an alert for refilling of food ingredients into the FAM-F3C sections.

In view of the foregoing, the main objective of the present research paper is to provide a fully automated machine for preparation and dispensing of cooked food, incorporating an e- nose sensor for controlled heating of the frying pan. Another objective of the present research paper is to provide a fully automated machine which integrates the mechanisms for chopping, boiling and frying of food constituents to accomplish the preparation of cooked food. Yet another objective of the present research paper is a fully automatic machine for preparation and dispensing of cooked food that can dispense a desired quantity upon acceptance of coin or a card or by authentication of the user.

Accordingly the research paper provides a fully automated machine for preparation and dispensing of cooked food, which integrates the mechanisms for chopping, boiling and frying of food constituents to accomplish the preparation of cooked food. The intelligent automated machine (IAM) for dispensing ready fried food (RFF)includes various sub-sections as shown in figure 1 and discussed like:

- ✓ an instruction box through which the order can be placed
- ✓ a plurality of openings for feeding food constituents into the machine
- ✓ set of choppers for chopping various food ingredients
- ✓ a boiling structure for boiling the desired constituent
- ✓ a frying chamber with stirrers
- ✓ a frying pan
- ✓ a sensing structure attached with the frying chamber
- ✓ at least two balancing devices and
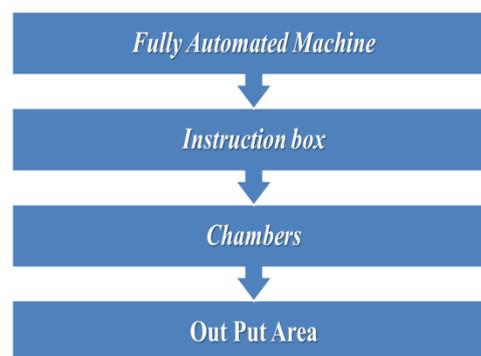- ✓ a dispensing mechanism to dispense the ordered food in the output area

Figure 1. Basic sub-structure s of Intelligent Automated Machine (IAM) for Dispensing Ready Fried Food (RFF)

The intelligent automated machine (IAM) for dispensing ready fried food (RFF)can be divided into three major sections as shown in figure 2 and discussed below:

- ✓ a first upper section for feeding raw ingredients into the machine
- ✓ a second middle section for carrying out the frying process and
- ✓ a third lower section for dispensing the prepared cooked food item

The upper section includes various FAM-F3C sections having food ingredient specific functionalities. Some of these FAM-F3C sections include choppers and at least one of the FAM-F3C sections includes a boiling structure while other

FAM-F3C sections do not have either of choppers or boiling structure . All the above-mentioned FAM-F3C sections can also serve the purpose of storing their specific ingredients. The raw food ingredients are manually fed in to their respective FAM-F3C sections through openings to these FAM-F3C sections, where these ingredients can be chopped or boiled or simply stored.

The second section of the intelligent automated machine (IAM) for dispensing ready fried food (RFF)has a balancing structure and a frying chamber integrated with stirrers, electric heaters and an e-nose sensing structure . Certain ingredients from the upper section are first weighed by the balancing structure , and are thereafter dropped in to the frying chamber. While certain other ingredients from the upper section are directly dropped into the frying chamber. There are two types of mechanisms to drop the ingredients one is through time setting (TS) and another is through mass setting (MS). The stirrers of the frying chamber are characterized with oscillatory and rotary movements which help in homogeneous mixing and frying of the dropped ingredients.
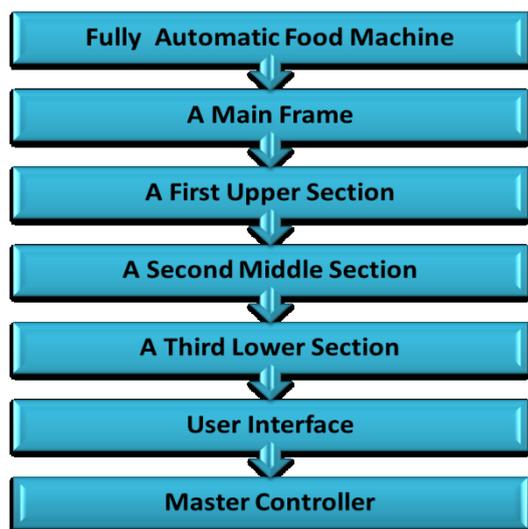

Figure 2. Major Sections of intelligent automated machine (IAM) for dispensing ready fried food (RFF)

The heat transfer to the frying chamber can be controlled by an electronic nose (e-nose) sensor. The e-nose sensor can check the status of the fried food and based on that the amount of heat transfer can be controlled for the frying chamber. The e-nose has the capability to sense the gas or odor and give the electrical output signal based on the sensed gas. The e-nose also assures adequateness and accuracy of ingredients in food preparation process. This is done by checking weather odour and flavor of the food is consistent with that of ordered food. The prepared cooked food from the second section is dropped on to the balancing structure of third section and thereafter dispensed out of the intelligent automated machine (IAM) for dispensing ready fried food (RFF)through a conveyor in a take away container.

The take away container can be placed on a rotary platform so that if chowmein is to be prepared for multiple plates, these plates are placed on the rotary platform and the platform will rotate the each plate to fill the chowmein from the chowmein dispensing machine.

The dispensing intelligent automated machine (IAM) for dispensing ready fried food (RFF)can have a com based, or card swipe based or user authentication based food dispensing. The intelligent automated machine (IAM) for dispensing ready fried food (RFF)can be instructed to deliver the quantity and taste as opted from multiple options offered to the user by the instruction box. For example the user can vary amount of vegetables and spices. Moreover the user can also opt for a lesser or more boiled food and similarly for a lesser or deep- fried food according to his choice.

The quantity of the input ingredients like noodles, vegetables and spices etc. consumed is measured and indicated automatically on a display screen so that the input ingredients can be refilled into the machine. Measurement is taken based on the weight or volume of the input material and displayed in grams or any other units. For a more complete understanding of the present research, including its features and advantages, reference is now made to the following detailed description, taken in conjugation with the accompanying drawings.

IV. INTELLIGENT AUTOMATED MACHINE (IAM) FOR PREPARATION, PROCESSING AND DISPENSING READY FRIED FOOD (RFF)

The block diagram of the intelligent automated machine (IAM) for dispensing ready fried food (RFF)is shown in figure 3. The intelligent automated machine (IAM) for dispensing ready fried food (RFF)includes three major sections: a first upper section, a second middle section and a third lower section . The upper section is includes plurality of food ingredient specific FAM-F3C sections. . The food ingredient is fed into the FAM-F3C section through an opening provided at the top surface of the FAM-F3C section. Some of these FAM-F3C sections may include a chopping means. The chopping means are also ingredient specific to ensure effective chopping of each ingredient. These FAM-F3C may further consist of a boiling structure . The FAM-F3C sections also serve to store the food ingredients when not in the chopping or boiling mode. An opening is provided at the bottom surface of each FAM-F3C section to transfer the food ingredients from the upper section to the second middle section.

The middle section mainly includes a balancing structure and a frying chamber . The food ingredients from the upper section are dispensed upon a balancing plate of the balancing structure . This dispensing can take place either in a time-based or in a mass-based manner. The balancing plate is attached with a support structure that can rotate about its vertical axis. This arrangement helps in collecting food ingredients from various FAM-F3C sections. All the food ingredients dispensed upon the balancing plate are dropped into frying chamber. The frying chamber includes an assembly of stirrers and an electric heating plate. The assembly of stirrers consists of multiple numbers of stirrers that exhibit a simultaneous rotary and oscillatory movement and thus provide a homogeneous mixing of the food ingredients. The electric heating plate is comprised of a plurality of individual plates . These plates impart an

electrical heating to the food ingredients, and can converge in order to drop the prepared food further into the third lower section. The lower section , is a storing box which includes an opening at its bottom. The prepared food from the middle section is dropped into the storing box and is further dispensed into a container . The container is placed upon a balancing plate of a second balancing structure . The lower section further consists of an electronic circuit and a conveying structure . The conveying structure conveys the container to a rotary platform where the food is dropped into a take- away container.
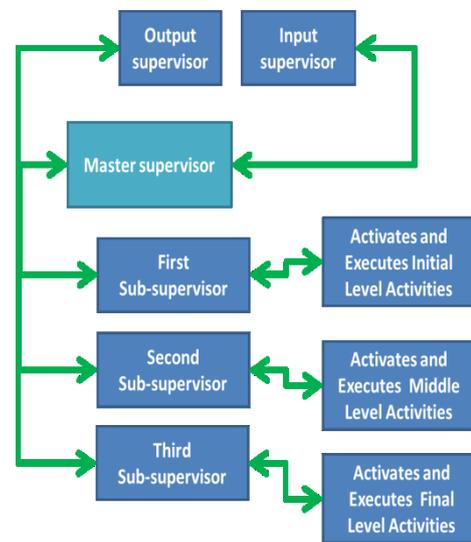

Figure 3. Block diagram of intelligent automated machine (IAM) for dispensing ready fried food (RFF)

A housing unit that houses various components of the FAM-F3C machine and a user interface panel is mounted on the outer periphery of the housing. The panel further includes a display screen , an instruction box and a payment structure . The instruction box helps user place his order by opting for the quantity and the taste of the food as desired by him. The user can vary the amount of vegetables and spices in his order and can also opt for a lesser or more boiled food and similarly for a lesser or deep- fried food. The payment structure allows for either of coin based, card swipe based or user authentication based transaction.

An alert structure is conjugated with the intelligent automated machine (IAM) for dispensing ready fried food (RFF)to give an alert when the quantity of any food ingredient in its FAM-F3C section is not sufficient to prepare the ordered food. The alert structure can give an alert by means of light indication. For example, green light when the ingredient is in sufficient quantity, orange light when it needs to be refilled soon and a red light to indicate that the ingredient is exhausted or not in a quantity required to prepare the present order. The alert structure can also be sound based that plays a particular sound to indicate the need for refilling of the food ingredients.

The intelligent automated machine (IAM) for dispensing ready fried food (RFF)includes various motors for the various sections depending upon the requirement and the motors are programmed according to provide the mechanical energy to the various sections/ modules of the machine. The motors can be synchronous. asynchronous, step or any other types of motor.

The intelligent automated machine (IAM) for dispensing ready fried food (RFF)also includes a master supervisor and a plurality of sub-supervisors to affect working of the machine as discussed below and shown in figure 4. The sub-supervisors are in communication with the master supervisor in a bi-directional manner for carrying out various functions synchronously and in a coordinated fashion. The order fed by the user through the user interface is transmitted to an input sub-supervisor. Data related to user order is than re- transmitted from the input sub-supervisor to a central master supervisor. The central master supervisor is an intelligent supervisor with database information necessary for the intelligent automated machine (IAM) for dispensing ready fried food (RFF)to prepare cooked food. The database stores information such as food name, ingredients to be used, quantity of ingredients, temperature, time for initiating certain activity, order of addition of ingredients, order of performing activities like chopping, boiling, stirring, frying, addition of ingredients, heating, mixing, cooling, dropping, dispensing and the like.

The database also stores information about odours and flavors of different types of cooked food offered by the machine. Based on the user order the central master supervisor sends out one or more instructions to the plurality of sub- supervisors which then implements the instructions received. Based on the instruction from master supervisor the plurality of sub-supervisors generates drive signals to corresponding electrical or mechanical components to execute the sequence of timed control signals corresponding to user order. The electrical or mechanical components include electrical and mechanical components of conveyor, dispensing structure , boiling structure , balancing structure , frying chamber, electric heating means, sensing structure , chopping means, motors, user interface panel, e-nose etc.

FAM-F3C contains a beep structure is incorporated within the intelligent automated machine (IAM) for dispensing ready fried food (RFF)to indicate that the ordered food has been dispensed into the takeaway container. The beep is comparatively a longer one in case of a multiple order to indicate that all the ordered numbers of containers have been filled. The rotary platform can hold different sized containers. The rotary platform rotates to position the containers of the required size so as to collect the food to be dispensed. Same sized containers are stacked together such that that the container immediately below the top container comes at the top when the user has collected his order.
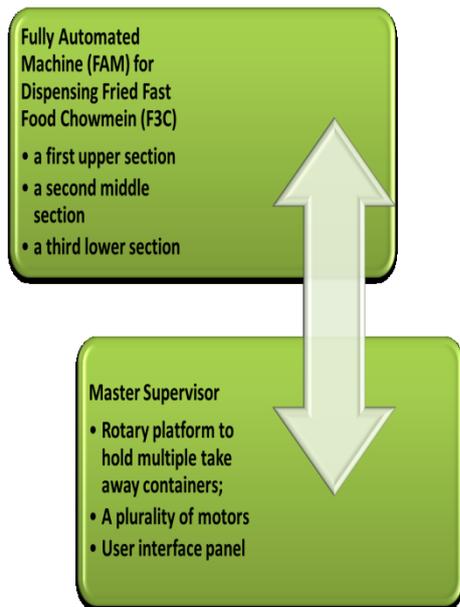
Figure 4. intelligent automated machine (IAM) for dispensing ready fried food (RFF)along with master supervisor

V. INTELLIGENT AUTOMATED MACHINE (IAM) FOR PREPARATION, PROCESSING AND DISPENSING READY FRIED FOOD (RFF) & SUPERVISION

FAM-F3C contains four sub-supervisors namely an input sub-supervisor , a first sub-supervisor, a second sub-supervisor and a third sub-supervisor. These are in communication with the central master supervisor for the execution of user order. Communication between the central master supervisor and the sub-supervisors is in a bi-directional manner. The first sub-supervisor controls, in the upper section of the machine, initial stage activities like chopping of raw food ingredients, boiling of raw food ingredients in their respective FAM-F3C sections. As soon as the user places an order with the machine, the input sub-supervisor sends data related to user order to the central master supervisor . The data includes, food type, quantity, flavour ordered by the user. Based on user order and instructions stored in database the central master supervisor sends out one or more instructions to the first sub-supervisor , for activating and executing various time controlled activities like ingredient chopping, ingredient boiling, in their respective chambers in the upper section of the

machine. On completion of initial stage activities, the first sub-supervisor sends out a feedback signal to the master supervisor which also includes indication about quantity of ingredients left in FAM-F3C sections for ingredients storage.

After receiving feedback signal from the first sub-supervisor , the master supervisor activates the second sub-supervisor to execute next set of instructions together with first sub-supervisor . The second sub-supervisor controls middle stage activities, time controlled activities, like collecting food ingredients by balancing them either in a time-based or in a mass-based manner, stirring and frying of food ingredients. The second sub-supervisor performs these activities by activating the balancing structure , frying chamber, stirrers, electric heating plates and electronic nose (e-nose) structure . The-nose structure detects and recognizes odours and flavors of food in the middle section and matches this data with the odours and flavors stored in the database that corresponds to the user order. Thus e-nose also checks adequateness and accuracy of ingredients in food during food preparation process. During middle stage activities in the machine, the e-nose is in continuous communication with the master supervisor through the second sub-supervisor to report readiness of food or any inadequacy or inaccuracy of ingredients. The master supervisor commands first sub-supervisor for the dropping of needed ingredients from ingredient specific FAM-F3C sections to middle section, to even off inadequacy of ingredients reported by the e-nose. In addition, the e-nose also detects smoke level to indicate burning of food or fire in the machine. The e-nose transmits the smoke level data to the master supervisor which raises a fire alarm in an instance of a fire inside the machine. On completion of middle level activities, the master supervisor activates the third sub-supervisor through sending out further set of instructions to the third sub-supervisor. The third sub-supervisor executes and 8 activates final stage activities 108 by driving signals to execute dispensing of the food according to quantity ordered. The third

sub-supervisor performs dispensing of food by activating rotary platform, beep structure and other electrical or mechanicals components in the lower section of the machine.

Thus there has been shown and described a novel fully automated intelligent automated machine (IAM) for dispensing ready fried food (RFF)for preparation and dispensing of fried foods which fulfills all the objects and advantages sought therefore. Many changes, modifications, variations and other uses and applications of the subject research paper will, however, become apparent to those skilled in the art after considering this specification together with the accompanying drawings and claims. All such changes, modifications, variations and other uses and applications which do not depart from the spirit and scope of the research paper are deemed to be covered by the research paper which is limited only by the claims which follow.

VI. CONCLUSION

In view of the foregoing, the main objective of the present research paper is to discuss a fully automated intelligent automated machine (IAM) for dispensing ready fried food (RFF)for preparation and dispensing of cooked food. Fully automated machine (FAM) for dispensing ready fried food (RFF)includes the e- nose sensor for controlled heating of the frying pan. Another objective of the present research paper is to provide a fully automated intelligent automated machine (IAM) for dispensing ready fried food (RFF)which integrates the process for chopping, boiling and frying of food constituents to accomplish the preparation of cooked food. Further, it discusses a fully automatic intelligent automated machine (IAM) for dispensing ready fried food (RFF)for preparation and dispensing of cooked food that can dispense a desired quantity upon acceptance of coin or a card or by authentication of the user.

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