# FORM 2

**THE PATENTS ACT, 1970 (39 OF 1970)**

# AND

**THE PATENT RULES, 2003 COMPLETE SPECIFICATION**

# (See section 10 and rule 13) Title of Invention:

**“DEEP LEARNING BASED SYSTEM TO ANALYSE AND SUPPORT THE PROCESS OF CLEANING SOLAR SEPARATORS IN SOLAR ENERGY ENABLED DEVICES FOR HARVESTING SOLAR ENERGY”**

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The following specification describes the invention and the manner in which it is to be performed.

# FIELD OF INVENTION

The present invention relates to the field of designing & implementing a framework of deep learning-based system to analyze and support the process of cleaning of solar separators. The invention aims at increasing the efficacy of solar energy harvesting.

# BACKGROUND OF INVENTION

**[0001]** Background description includes information that may be useful in understanding the present invention. It is not an admission that any of the information provided herein is prior art or relevant to the presently claimed invention, or that any publication specifically or implicitly referenced is prior art.

**[0002]** A separator is a permeable membrane placed between a battery’s anode and cathode. The main function of a separator is to keep the two electrode apart to prevent electrical short circuits while also allowing the transport of ionic change carriers that are needed to close the circuit during the passage of current in an electro chemical cells. A separator generally consists of a polymeric membrane forming a micro corpus layer.

**[0003]** A number of different types of food packaging boxes and systems that are known in the prior art. For example, the following patents are provided for their supportive teachings and are all incorporated by reference.

**[0004]** WO012137149A3:- The present invention is related to a solar panels cleaning, protection and efficiency optimization system (1), that controls the solar panel (3) radiation harvesting in a modular and phased way. The system

has a set of solar tubes (5 - 12) cover equipment (2), that are enabled and disabled according with the measurements performed by a thermal sensor (4) placed at the panel (3) exit, or by other conditions defined by the electronics microcontroller (14) of the system, performing also cleaning and protection actions of the tubes (5 - 12) surface, by using a rubber connected to their surface. The present invention is useful to optimize the solar panels energy efficiency, eliminating the problems associated to the overheating, that occurs when the solar availability is high, allowing also to reduce the solar panels maintenance actions.

**[0005]** US8771432B2:- System and method for cleaning rows of solar panels. Each solar row has an upper edge elevated above ground level and a lower edge to provide an inclination of the solar row. A cleaning assembly cleans the solar panel surfaces. A support frame supports the cleaning assembly and enables upward and downward motion in the width and length directions of the solar row. Operation and movement of the cleaning assembly is controlled so as to clean a surface of the solar panels during downward movement. The cleaning assembly is preferably not operative during upward movement. During downward movement, the cleaning assembly removes dirt, debris and dust from the surface of the solar panels and generates an air stream to blow off the dirt, debris, and dust. The system further includes a guide system for moving the cleaning assembly to align with successive solar panel rows.

**[0006]** Solar panels are typically either horizontally or vertically stacked in a

box. Usually, separators are placed between each module, and extra protections are added to the four corners of each module stack. The proposed invention focuses on implementing algorithms of deep learning for cleaning the solar separators. The invention will improve the efficacy of solar energy utilization.

**[0007]** Above information is presented as background information only to assist with an understanding of the present disclosure. No determination has been made, no assertion is made, and as to whether any of the above might be applicable as prior art with regard to the present invention.

**[0008]** In the view of the foregoing disadvantages inherent in the known types food packing boxes and freezer packaging systems now present in the prior art, the present invention provides an improved system. As such, the general purpose of the present invention, which will be described subsequently in greater detail, is to provide a new and improved smart food packaging box that is user-friendly, cost-effective freshness indicator and an IOT based system that transparently discloses the detail of the packaged shrimps that has all the advantages of the prior art and none of the disadvantages.

# SUMMARY OF INVENTION

**[0009]** In the view of the foregoing disadvantages inherent in the known types of food packaging systems now present in the prior art, the present invention provides an improved and cost-effective freshness indicator especially while exporting sea foods. As such, the general purpose of the present invention, which will be described subsequently in greater detail, is to provide a new and

improved packaging system for frozen shrimps which has all the advantages of the prior art and none of the disadvantages.

**[0010]** The main objective of the proposed invention is to design & implement a framework of deep learning for cleaning the solar separators at regular intervals. The proposed invention focuses on analyzing the framework of solar panels with the intention of increasing their harvesting capability.

**[0011]** Yet another important aspect of the proposed invention is to design a framework that will analyse the amount of dust accumulated on the solar panel. The deep learning unit will help to clean the solar separators to increase the efficacy of solar panels. The invention focuses on cleaning the solar separators at regular intervals.

**[0012]** In this respect, before explaining at least one embodiment of the invention in detail, it is to be understood that the invention is not limited in its application to the details of construction and to the arrangements of the components set forth in the following description or illustrated in the various ways. Also, it is to be understood that the phraseology and terminology employed herein are for the purpose of description and should not be regarded as limiting.

**[0013]** These together with other objects of the invention, along with the various features of novelty which characterize the invention, are pointed out with particularity in the disclosure. For a better understanding of the invention, its operating advantages and the specific objects attained by its uses, reference

should be had to the accompanying drawings and descriptive matter in which there are illustrated preferred embodiments of the invention.

# BREIF DESCRIPTION OF DRAWINGS

**[0014]** The invention will be better understood and objects other than those set forth above will become apparent when consideration is given to the following detailed description thereof. Such description makes reference to the annexed drawings wherein:

Figure 1 illustrates the schematic view of deep learning based system to analyse and support the process of cleaning solar separators in solar energy enabled devices for harvesting solar energy, according to the embodiment herein.

# DETAILED DESCRIPTION OF INVENTION

**[0015]** In the following detailed description, reference is made to the accompanying drawings which form a part hereof, and in which is shown by way of illustration specific embodiments in which the invention may be practiced. These embodiments are described in sufficient detail to enable those skilled in the art to practice the invention, and it is to be understood that the embodiments may be combined, or that other embodiments may be utilized and that structural and logical changes may be made without departing from the spirit and scope of the present invention. The following detailed description is, therefore, not to be taken in a limiting sense, and the scope of the present invention is defined by the appended claims and their equivalents.

**[0016]** While the present invention is described herein by way of example using several embodiments and illustrative drawings, those skilled in the art will recognize that the invention is neither intended to be limited to the embodiments of drawing or drawings described, nor intended to represent the scale of the various components. Further, some components that may form a part of the invention may not be illustrated in certain figures, for ease of illustration, and such omissions do not limit the embodiments outlined in any way. It should be understood that the drawings and detailed description thereto are not intended to limit the invention to the particular form disclosed, but on the contrary, the invention covers all modification/s, equivalents and alternatives falling within the spirit and scope of the present invention as defined by the appended claims. The headings are used for organizational purposes only and are not meant to limit the scope of the description or the claims. As used throughout this description, the word "may" be used in a permissive sense (i.e., meaning having the potential to), rather than the mandatory sense (i.e., meaning must). Further, the words "a" or "a" mean "at least one” and the word “plurality” means one or more, unless otherwise mentioned. Furthermore, the terminology and phraseology used herein is solely used for descriptive purposes and should not be construed as limiting in scope. Language such as "including," "comprising," "having," "containing," or "involving," and variations thereof, is intended to be broad and encompass the subject matter listed thereafter, equivalents, and any additional subject matter

not recited, and is not intended to exclude any other additives, components, integers or steps. Likewise, the term "comprising" is considered synonymous with the terms "including" or "containing" for applicable legal purposes. Any discussion of documents, acts, materials, devices, articles and the like are included in the specification solely for the purpose of providing a context for the present invention.

**[0017]** In this disclosure, whenever an element or a group of elements is preceded with the transitional phrase "comprising", it is understood that we also contemplate the same element or group of elements with transitional phrases "consisting essentially of, "consisting", "selected from the group consisting of”, "including", or "is" preceding the recitation of the element or group of elements and vice versa.

**[0018]** Solar Photovoltaic (PV) panels require minimal maintenance once they are installed and are designed to operate for 28-30 years. But it’s still important to keep them clean to continue achieving optimal power generation. Accumulated dust and dirt on solar panels can result in soiling energy losses of up to annually in parts of the us and as much as 50% in the middle east.

**[0019]** There are several ways to keep your solar panels clean, from manual washing to fully automated technologies. While rain water can remove some of the grime that collects on panels overtime. It can also cause dirt to accumulate at the bottom of the panels. And it is not sufficient to remove heavy pollution. The proposed invention focuses on increasing the efficacy of solar panels

through cleaning solar separators at regular intervals.

**[0020]** Reference will now be made in detail to the exemplary embodiment of the present disclosure. Before describing the detailed embodiments that are in accordance with the present disclosure, it should be observed that the embodiment resides primarily in combinations arrangement of the system according to an embodiment herein and as exemplified in FIG. 1

**[0021]** Figure 1 illustrates the schematic view of deep learning-based system to analyse and support the process of cleaning solar separators in solar energy enabled devices for harvesting solar energy 100. The proposed system 100 includes a solar panel 101 which is analyzed by the algorithms of deep learning 103 for predicting the intensity of dust that are accumulated on the solar panel

101. The prediction unit 104 will predict the amount of dust that is accumulated on the solar panel 102. The results of prediction unit i.e., resultant unit 105 will trigger the cleaning of the solar panel surface 102. The details regarding the cleaning of solar panels are displayed on the display unit 106.

**[0022]** In the following description, for the purpose of explanation, numerous

specific details are set forth in order to provide a thorough understanding of the arrangement of the system according to an embodiment herein. It will be apparent, however, to one skilled in the art that the present embodiment can be practiced without these specific details. In other instances, structures are shown in block diagram form only in order to avoid obscuring the present invention.

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Date: 18/10/2022

# WE CLAIM

1. Deep Learning based system to analyse and support the Process of Cleaning Solar Separators in Solar Energy enabled Devices for Harvesting Solar Energy comprises of

Deep learning unit; Predictive unit; Display unit; Resultant unit and Solar panel.

1. Deep Learning based system to analyse and support the Process of Cleaning Solar Separators in Solar Energy enabled Devices for Harvesting Solar Energy, according to claim 1, includes a deep learning unit, wherein the deep learning unit
2. Deep Learning based system to analyse and support the Process of Cleaning Solar Separators in Solar Energy enabled Devices for Harvesting Solar Energy, according to claim 1, includes a predictive unit, wherein the predictive unit
3. Deep Learning based system to analyse and support the Process of Cleaning Solar Separators in Solar Energy enabled Devices for Harvesting Solar Energy, according to claim 1, includes a display unit, wherein the display unit
4. Deep Learning based system to analyse and support the Process of Cleaning Solar Separators in Solar Energy enabled Devices for Harvesting Solar Energy, according to claim 1, includes a resultant unit, wherein the resultant unit
5. Deep Learning based system to analyse and support the Process of Cleaning Solar Separators in Solar Energy enabled Devices for Harvesting Solar Energy, according to claim 1, includes a solar panel, wherein the solar panel

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# ABSTRACT

**DEEP LEARNING BASED SYSTEM TO ANALYSE AND SUPPORT THE PROCESS OF CLEANING SOLAR SEPARATORS IN SOLAR ENERGY ENABLED DEVICES FOR HARVESTING SOLAR ENERGY**

Deep Learning based system to analyse and support the Process of Cleaning Solar Separators in Solar Energy enabled Devices for Harvesting Solar Energy is the proposed invention. The invention aims at cleaning the solar separators at regular intervals. The algorithms of deep learning will help to predict the volume of dust that is accumulated on the solar panels. The invention focuses on increasing the efficacy of solar panels through monitoring their condition.

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