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Fruit Drying System Based On Solar Power

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Abstract: Solar based Powered Automatic Fruit Drying System is a little scale natural product drying machine which is valuable to dry various sorts of organic product. To make their use productive, they can be dried and protected so natural products can be utilized over an extensive stretch. Saving organic products by drying is a significant activity proceeded from ancient period. Infrared radiation can be utilized for grape drying reason. It is one of a kind procedure and particularly not quite the same as traditional or common drying. The normal drying process has numerous disadvantages, for example, requiring additional time, enormous venture on space necessity and foundation for drying process, which can't be managed by a white collar class rancher. The budgetary up degree of a rancher in created nations is conceivable by giving him the advanced, programmed and ease organic product drying unit. This paper depicts a controlled domain which is reasonable for little scale organic product drying process inside a shut chamber, utilizing Microcontroller (89s52). To begin with, the infrared light is utilized to inside warmth the natural product to evacuate the water content inside the organic product. At that point the air is blown inside the chamber to keep up the stickiness underneath a predetermined level and fumes the hot let some circulation into of the chamber. Microcontroller (89s52) is utilized to control the elements of warming, blowing the air and giving time sign and keep up consistent all through the chamber. After the fruition of the drying procedure a signal is initiated for the length of ten seconds to show the finish of the drying procedure. An instant message is additionally sent to the rancher through GSM to insinuate him in the event that he isn't anywhere near. The desire by expending less time contrast with regular drying process. Solar powered board is utilized to supply capacity to microcontroller.

Keywords: Controller, Fruit, Fruit Drying, Microcontroller, LM 35, Solar, Sensor.

I. INTRODUCTION

Nourishment drying is a technique for nourishment conservation where nourishment is (dried out or dried up). Drying hinders the development of microscopic organisms, yeasts, and form through the expulsion of water. Lack of hydration has been utilized generally for this reason since antiquated occasions; the soonest realized practice is 12,000 B.C. By occupants of the cutting edge Middle East and Asia districts. Water is customarily evacuated through vanishing (air drying, solar drying, smoking or wind drying), albeit today electric nourishment dehydrators or freeze-drying can be utilized to speed the drying procedure and guarantee increasingly steady outcomes[1].

In India various kinds of foods grown from the ground are accessible in different areas of the nation. All these rural items develops in various seasons and in a specific region in particular. These horticultural items are utilized by individuals all over India and abroad. It likewise requires the transportation of organic products from the nourishment creation territories to the natural product customer regions. This needs an appropriate safeguarding of organic product during transportation, as the transportation time frame might be more noteworthy than the characteristic existence of the natural product. To keep away from organic product harm and long use, crisp natural products are changed over to dry organic products. Solid and nutritious organic products can be given to individuals to appreciate dry natural products as bite. Lack of hydration is likewise used to bring down the expense of pressing, putting away and as it diminishes weight and volume of the last item. Dried nourishment can be

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produced using lower quality products of the soil that may somehow or another be squandered[2].

A microcontroller based system that empowers to synchronous observing was used. There is a LM35 sensor as the contributions of system which is temperature. The yield of LM35 is persistently checked with the fundamental processor and given capacities dependent on natural product types are executed. The chose natural products were placed in a dryer. This will guarantee drying even in the poor climate conditions in view of an encased chamber. The exact power over the drying procedure because of a shut circle, control system lessens the drying time. Higher temperatures and the infiltration of infrared beams utilized in the minimized drying chamber encourage the restriction of warmth energy. This paper depicts a plan thought to create little scale ease with great quality dry natural product item to the buyer which is endures with its unique taste without prompting caramelization (Sugar Burning) and decrease in the healthy benefit. The quality and shade of the dried item rely on the methods utilized for drying process. Another parameter utilized in dissecting the drying procedure is drying rate which is alluded to as time taken to dry the natural product. The drying rate influences the shading and nature of the dried item[3], [4].

II. BLOCK DIAGRAM

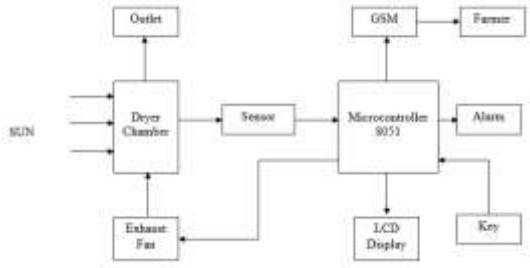

Fig.1: Block Diagram of Proposed System

The square outline of the whole system is appeared in figure 1. In this system a LM 35 sensor is utilized. Sensor is utilized to peruse the temperature in the unit. Sensor is associated with microcontroller through ADC. A controlled situation which is appropriate for little scale natural product drying process inside a shut chamber, utilizing Microcontroller (89s52). This computerization procedure when finished is educated to the rancher. Solar based energy is used for drying out the foods grown from the ground. Over drying and under drying are harmful, for horticultural items. Over drying causes staining because of caramelization and decrease in healthy benefit. Then again, under drying or moderate drying brings about decay of the nourishment quality because of contagious and bacterial activity[5].

The solar based board is utilized to control the microcontroller. The microcontroller is utilized and customized to control and deal with the general procedure of the unit. Various organic products will have various temperatures to dry. The switch catches are utilized to set required temperature. LM 35 Sensors is utilized to peruse the temperature in the bureau associated with 89s52 Microcontroller through ADC. A showcase is use to see the procedure consistently for the temperature worth and time to dry the specific organic product. On the off chance that the checking temperature is more noteworthy than the set temperature esteem, turn on the fan else turn off. When the procedure is finished it will produce the caution and send SMS to the rancher as appeared in fig.1.

A solar based dryer chamber involves a wooden box with certain length and width secured with a glass as appeared in fig 2. Within surface is made dark in light of the fact that a dark surface assimilates 98% of the episode warmth of the daylight. So, to retain the most extreme warmth, the surfaces of the solar powered chamber are painted dark. Furthermore, this unit are allowed in the outside. In this way, there are greatest potential outcomes that the warmth might be lost in the air. Along these lines, our errand of drying would not be cultivated if the warmth is lost. Subsequently, to forestall the loss of warmth this unit is made with encasings[6]–[8]. The programmed drying unit is appeared in fig 2.

III. WORKING

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Fig.2: Automatic Drying Unit

A piece of frequency solar powered radiation on the glass spread is reflected back to air and remaining is transmitted inside the drying chamber. Further, a piece of transmitted radiation is reflected back from the outside of the yield on the wire work. The rest of the part is consumed by the outside of the harvest. Because of the retention of solar powered radiation, crop temperature increments and the yield begins producing long wavelength radiation which isn't permitted to disappear to air because of quality of glass spread dissimilar to open solar drying. Therefore the temperature over the harvest inside drying chamber gets higher.

The glass spread fills one more need of lessening direct convective misfortunes to the encompassing which further gets gainful for ascend in crop and drying chamber temperature individually [4]. Be that as it may, convective and evaporative misfortunes happen inside drying chamber from warmed yield. The dampness, that is the fume framed because of vanishing, is removed by the air going into the drying chamber from one end and getting away through the opening furnished at the top with the guide of the provided dc fan as appeared in Fig.2.

IV. CIRCUIT CONSTRUCTION & WORKING

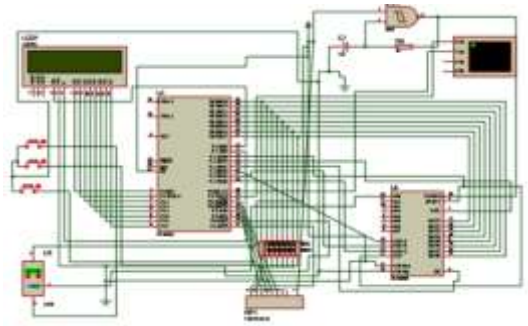

Fig.3: Circuit Diagram

The circuit graph is an appeared in fig 3.The 5v power supply given to the observing and controlling unit with microcontroller (89C52) is gotten utilizing the solar based board. The figure shows that by the VOUT of temperature sensor for example LM35 is associated with IN0 (pin 26) of ADC 0808. The yield of ADC is given to port 0 (pin 32-39) of microcontroller[9]. The microcontroller forms this information. The LCD is associated with port 1 and 2.

When unit is turn on, reference temperature is set by utilizing three switches which will be shown on LCD. The temperature is persistently detected by temperature sensor for example LM35. The LM35 sensor are mounted on a bureau and interfaced with 89c52 microcontroller. This thus thinks about the reference chamber temperature and show on LCD associated with 89s52 microcontroller as appeared in fig.3. In light of examination of reference temperature worth and sensor esteem the fan will be rushed to sparkle the air in the chamber to keep up consistency and diminish the chamber temperature, via consequently turning on the fan through setting off the hand-off circuit which is associated with yield pin of microcontroller. The tourist created in the chamber, disregards the plate where it comes into contact with the substance to be dried and diverts the dampness.

The hot air, is therefore ousted out from the chamber through a dampness exhaust. When the procedure is finished, it create the caution by turning on signal circuit and send SMS to the rancher to demonstrate status of the drying procedure through GSM module[10] which is interface with UART module of microcontroller as appeared in fig.3. The dampness

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substance of the organic product concerning time of the common drying process is contrasted and structured programmed drying unit. It was seen that programmed drying unit gives better execution regarding drying rate contrasted with customary strategy. The temperature to be kept up inside the chamber relies upon the underlying substance of the products of the soil impact of temperature on the substance.

V. RESULTS

The dryer chamber is of a wooden box coated with square shading. Top surface is secured with glass of thickness 2cm .The fan is associated inside the chamber as appeared in fig.4. Infrared radiation can be utilized for grape drying reason. Analysis was directed for the organic products like grapes for a day and the consequences of dampness substance and time were recorded. It was seen that programmed drying unit gives better execution regarding drying rate contrasted with ordinary technique. The temperature to be kept up inside the chamber relies upon the underlying substance of the leafy foods impact of temperature on the substance. The temperature and moistness are reliant on the client necessity. Stickiness inclination to expel the water content in the natural product was fluctuated by differing the fan speed. Drying times fluctuate dependent on your area, moistness, temperature and size of thing. The general principle is that the more surface zone uncovered; the quicker the drying time. It is essential to cut nourishments to a similar thickness for a progressively steady drying time. A typical slip-up in getting dried out is thinking on the off chance that you increment the temperature, you decline the drying time. On the off chance that you increment the temperature to an extreme, case solidifying may happen.

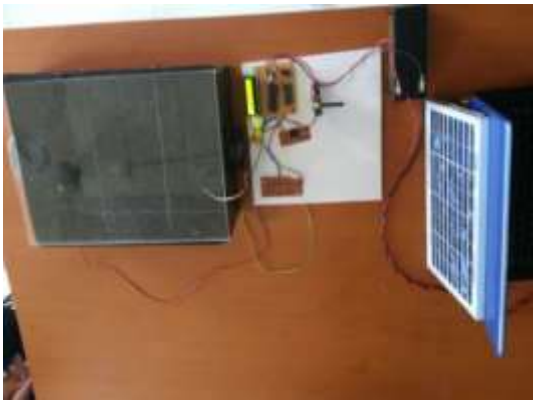

Fig.4: Organic Product Drying System.

VI. ADVANTAGES

1. It was seen that programmed drying unit gives better execution as far as drying rate contrasted with customary strategy. Utilizing programmed drying unit it expects 3 to 4 days to dry grapes whereas customary strategy expects 7 to 8 days for the equivalent.

2. Nature of dry organic product is better when contrasted with ordinary strategy.

3. As solar based board is utilized for it doesn't cause contamination. Additionally the support cost is less.

4. This unit can be utilized in remote zone as solar powered energy is accessible all over the place.

5. Residue doesn't interact with the produce consequently guaranteeing great nature of the dried item.

6. The unit additionally sends SMS to the rancher to show status of the drying procedure through GSM module

VII. DISADVANTAGES

1. As this unit utilizes just one fan the temperature inside may go past the temperature required for drying the organic products.

2. Constrained measure of organic products can be dried.

VIII. FUTURE SCOPE

The hindrance of temperature going past required temperature can be expelled by expanding the quantity of fans. The quality and shade of the dried item rely on the methods utilized for drying process. Another parameter utilized in examining the drying procedure is drying rate which is alluded to as time taken to dry the natural product. The drying rate influences the shading and nature of the dried item. The system can be utilized in nourishment industrial facilities. The size of the unit can be expanded to dry more measures of organic products.

IX. CONCLUSION

It was seen that programmed drying unit gives better execution regarding drying rate contrasted with customary strategy. Utilizing programmed drying unit it expects 3 to 4 days to dry grapes whereas regular technique requires 7 days for the equivalent. Nature of dry organic product is better when contrasted with regular technique. As solar based board is utilized for it doesn't cause contamination. Additionally the support cost is less. This unit can be utilized in remote zone as solar powered energy is accessible all over. Residue doesn't interact with the natural products along these lines guaranteeing great nature of the dried item.

The system requires lower space and negligible establishment time, less time to dry the item (when contrasted with regular drying), is sturdy with insignificant support. Unit can be made accessible in differed limits, contingent upon the powerful plate zone and client prerequisite. The system can be made progressively prudent by making an arrangement for drying assortment of organic products in a solitary unit. This game plan can be made conceivable by utilizing sensor systems for different organic products. To make it monetarily feasible for ranchers, an application explicit incorporated circuit by inserting the advanced circuit into a chip, can be delivered in a huge scale.

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