SOLAR POWERD AUTOMATIC FRUIT DRYING SYSTEM

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ABSTRACT
Solar Powered Automatic Fruit Drying System is a small-scale fruit drying machine which is useful to dry different types of fruit. To make their usage efficient, they can be dried and preserved so that fruits can be used over a long period. Infrared radiation can be used for grape drying purpose. It is unique process and distinctly different from conventional or natural drying. The natural drying process has many drawbacks, such as requiring more time, large investment on space requirement and infrastructure for drying process, which cannot be afforded by a middle-class farmer. The financial up gradation of a farmer in developed countries is possible by providing him the modern, automatic and low-cost fruit drying unit. This paper describes a controlled environment which is suitable for small scale fruit drying process within a closed chamber, using Microcontroller (89s52).

I. INTRODUCTION
This project purpose of drying is to remove moisture from the agricultural products so that it can be processed safely and stored for increased periods of time. Open air sun drying is conventional source to dry plants, seeds, fruits, meat, fish, wood and other agricultural or forest products as a means of preservation. To overcome the limitation of sun drying, solar drying technique came in to existence. Solar drying also utilizes solar energy which is widely available source of renewable energy but in a different setup. The objective of a dryer is to supply the product with more heat than is available under ambient condition. Warm air can hold more moisture than cold air, so the amount required depends on the temperature to which it is heated in the collector.[1]

Material	Wet basis moisture (% by weight)	Time required to dry (hrs.)
Apples	84	6-2
Tomatoes	94	50
carrot	89	10-12
strawberries	90	24-36
Grapes	81	12-20

Table 1: moisture content in the material and time required to dehydrate.[3]

II.PROPOSED METHODOLOGY
Solar energy is used to dry the fruits and charge the battery to provide required power to the system. Microcontroller (89s52) is used to control the functions of heating, time indication. LEDs are used to provide heat in the drying chamber in absence of sunlight. After the completion of the drying process a buzzer is activated to indicate the end of the drying process. A text message is also sent to the mobile through GSM. The expectation by consuming less time compare to conventional drying process.[2]

III. BLOCK DIAGRAM

The fig. shows that the block diagram of Solar Powered Automatic Fruit Drying System. It consists of solar panel, battery, LDR, temperature & Humidity sensor, IR sensor, AT89c52 controller, LCD display, Exhaust fan, input switches, GSM module etc. Microcontroller 89c52 works as CPU. It controls all operation in system. Solar panel is used to charge the battery. Battery is used to supply power to the system.

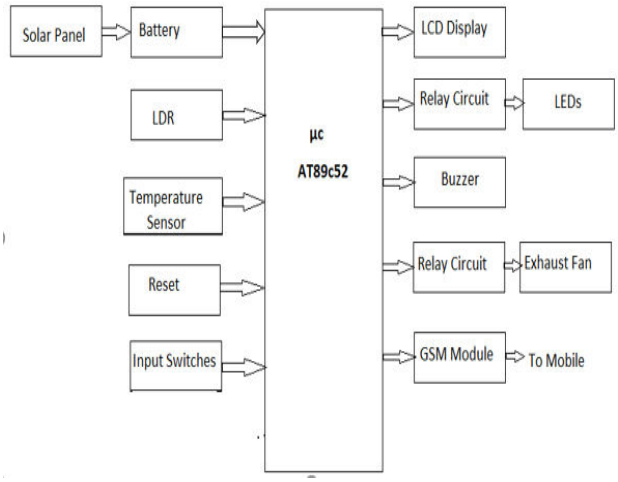

Figure 1: Block diagram of Solar powered automatic fruit drying system.

Temperature and moisture sensor senses the temperature and moisture from the drying chamber and gives signal to microcontroller for further processing. LDR is used to check the light intensity. If light intensity is low (in night or in rainy season) microcontroller will turns on the LEDs to produce heat in the drying chamber. Reset switch is used for initialization of circuit. When temperature of the drying chamber goes above the reference level exhaust fan will turn on to remove heat from the drying chamber. Input switches are used to set the temperature level and time. LCD display is used to display the temperature & moisture values, status of the process. When process is completed, Buzzer will make the sound and microcontroller will send the message to the mobile through GSM module.

IV. ADVANTAGES

- Solar dryer can save fuel, electricity and drying time.
- It does not cause pollution.
- It can dry fruit in rainy season also.
- Fruits and vegetables dried in solar dryer are hygienic and better in quality.
- maintenance cost is less.

V. APPLICATIONS

The vast applications of solar dryer are in agricultural and agro-industiries. It is used in drying spices like chilies, coriander, pepper, turmeric.

Dehydration of fruits and vegetables like mango, sapota, grapes, banana, papaya, amla, carrot, beetroot, potato, bitter guard and many more.

Also, it is very helpful in drying herbs like tulsi, neem and others which need to be protected from direct sun lights.

VI. CONCLUSION

Solar drying unit gives better performance in terms of drying rate. The temperature to be maintained within the chamber depends on the initial contents of the fruits and the effect of temperature on the contents. Drying times vary based on your location, humidity, temperature and size of item. The general rule is that the more surface area exposed; the faster the drying time.

VII. FUTURE SCOPE

- The disadvantages of temperature can be removed by increasing the number of fans.

- In the future the size of the unit can be increased to dry a greater number of fruits.
- Larger system could be designed utilizing solar, thermal, photovoltaic panels combined with wind energy.

VIII. REFERENCE

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