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FABRICATION OF SUN TRACKING INDIRECT SOLAR DRYER

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***Abstract*— The planned work is to style, develop associate degreed valuate performance of an indirect solar drier paradigm during a passive and active mode exploitation thermal energy storage and while not thermal energy storage for the drying of fruits. Drying is one in every of the oldest ways exploitation solar power wherever the merchandise like vegetables, fruits, fish, and meat to be dried exposed on to the sun. This technique has several disadvantages like spoilt merchandise thanks to rain, wind, dust, insect infestation, animal attack and fungi. Foods ought to be dried speedily, however the speed of drying can cause the skin becomes onerous before the wetness within includes a probability to evaporate and it'll have an effect on the standard of dried product thanks to over drying. the look of a purposeful solar drier system would minimize these disadvantages. This style of each modes was utilized and has compared with the performance testing through parameters like temperature, air flow. it absolutely was shown that the employment of this sort of solar drier reduced the drying time considerably and basically provides higher product quality compared with typical drying technique. The result of temperature to wetness contents against the clock and rate of drying are studied during this analysis.**

Index Terms- Liquid Crystal Display, Electro Magnetic Field, Signal Conditional Unit

I. INTRODUCTION

The North jap a part of the Indian ground has high wet content within the air. The presence of wet within the air becomes a crucial challenge within the food preservation stage. Annually, Bharat should bear large loss to monetary resource thanks to loss of the harvest. This loss is attributed to unsuccessful preservation of the agricultural product. So, drying of the merchandise becomes necessary during this context. Perhaps, it's the oldest operation of thermal removal of water, and is common to most industries. Drying is outlined because the cooccurring removal of warmth associate degreed mass from an object. Bharat being within the equatorial belt, receives lush radiation energy. It receives 4–7 kWh of radiation per square meter per day with 250–300 sunny days in a very year. The annual international radiation varies from 1600 to 2200 kW/hr. So, there's a decent chance of sound alternative energy within the domestic and industrial sector. this can be in line with the principle of property development that is that the want of the day. historically, the common drying method is sun drying. The sun drying is related to varied limitations like poor drying rate, poor product quality and probabilities of product contamination by dirt, dirt moreover as by bacterium. Therefore, solar drying has evolved which has drying the merchandise in a very closed cupboard with clear high. however this solar drying conjointly fails to deal with the problem of temperature regulation. This downside may be solved by employing a heat device. It minimizes the gap between energy provide and energy demand. the additional energy is absorbed and keep throughout the height hours of daylight and may be used as and once needed. Among the whole heat device, heat of transformation storage stores energy at a continuing temperature. The constant temperature regulation helps to stop degradation of product quality.

II. PROPOSED METHODOLOGY

1. Observation of analysis solar dryer along with tracking mechanism
2. Survey about different technologies about solar tracking and dryer
3. Analysis about the existing system of dryer and tracker
4. To find out main problems in existing system and develop proposed system
5. Possible approaches to overcome existing methodologies
6. Fabrication of the proposed model

Here, we are using PIC type microcontroller. The controller has totally 40 pins. 32 pins are used to common input and output functions and other pins are power pins. Pin 12 and 31 is connected with ground terminal. Pin 11 and 32 is connected with power supply terminal. Normally, controller internal clock source is not enough to execute a high-speed process. So, 4 MHz crystal oscillator is connected in Pin 13 and 14. The generating pulses consist with small number of harmonics. The capacitor is connected with crystal it's reduces the pulse harmonics. Controller has internal timer and counter module. We can handle the module using respective command lines. Proximity sensor has totally three pins; they are input supply, output and ground. The sensor is interfaced with controller interrupt handle pin. The proximity sensor is consisting with full of copper coils, if any metals

trying to absorb the electromagnetic field means, proximity sensor changing the output condition. In this project variable resistor acts like as accelerator. The variable resistor gives an analogy output depends on resistance value were the resistance value can vary using linear or rotary motion. Permanent magnet direct current motor is connected with a switching circuit. Controller generates a pulse width modulation pulse depends on variable pot and control the motor speed.

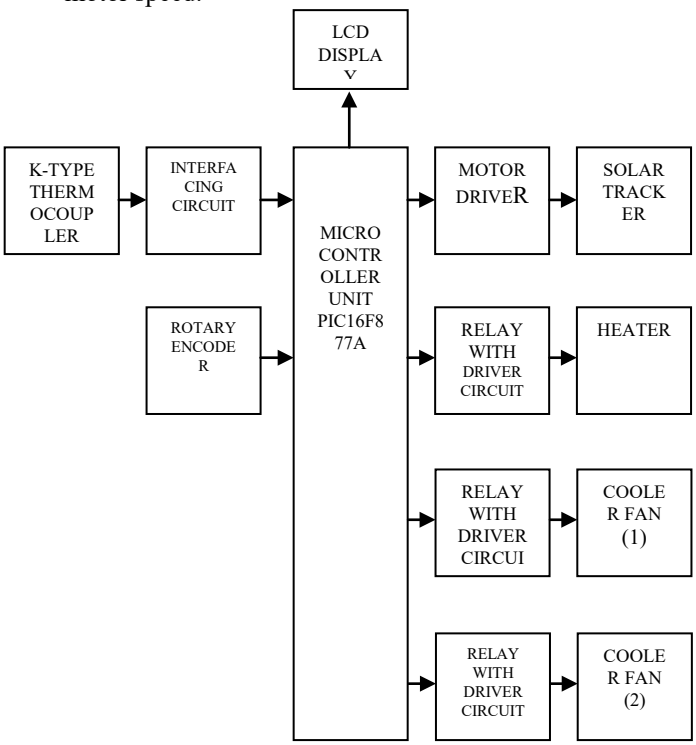


Figure 1: Block Diagram

III. COMPONENTS

DC Motor

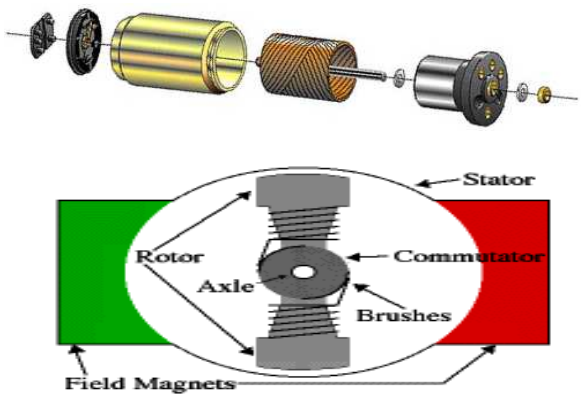
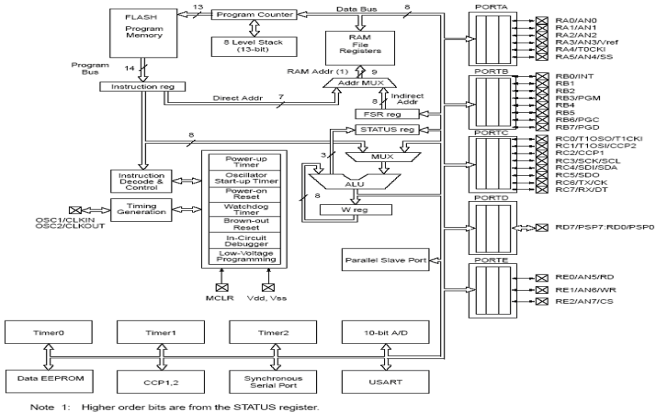


Figure 2: Construction of DC Motor

The coreless style conjointly permits makers to create smaller motors; meantime, because of the dearth of iron in their rotors, coreless motors are somewhat liable to heating. As a result, this style is mostly used simply in little, low-power motors. Beamers can most frequently see coreless DC motors within the type of beeper motors. Again, disassembling a coreless motor may be instructive -- during this case, my piteous victim was an inexpensive beeper vibrator motor. the center of this disassembled motor ar accessible for you to visualize here (on ten lines / cm graph paper). this can be (or a lot of accurately, was) a 3-pole coreless DC motor.



Micro Controller

Figure 3: Micro Controller

Microcontrollers area unit destined to play associate degree a lot of} necessary role in revolutionizing numerous industries and influencing our day to day life more powerfully than one will imagine. Since its emergence within the early 1980's the microcontroller has been recognized as a general-purpose building block for intelligent digital systems. it's finding victimisation numerous spaces, solar ting from easy children's toys to extremely complicated craft. thanks to its skilfulness and plenty of blessings, the applying domain has unfold all told conceivable directions creating it omnipresent. As a co rest and enthusiasm among students, academics and active engineers, making associate degree acute education want for conveyance the data of microcontroller based mostly system style and development. It identifies the important options accountable for their tremendous impact, the acute academic want created by them and provides a glimpse of the most important application space.

Worm gear

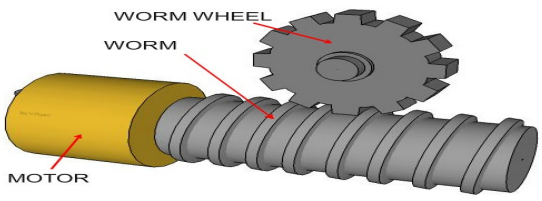


Figure 4: Worm gear arrangement in gear

Worm gears square measure used once giant gear reductions square measure required. it's common for worm gears to own reductions of 20:1, and even up to 300:1 or larger. Many worm gears have a motivating property that no different gear set has: the worm will simply flip the gear; however, the gear cannot flip the worm. this is often as a result of the angle on the worm is therefore shallow that once the gear tries to spin it, the friction between the gear and also the worm holds the worm in situation. This feature is helpful for machines like conveyor systems, during which the protection feature will act as a brake for the conveyor once the motor isn't turning. One different terribly fascinating usage of worm gears is within the Torsion differential, that is employed on some superior cars and trucks.

IV. IMPLEMENTATION AND RESULT

Microcontroller is main unit of this project. The only device can monitor and control the whole process. Here we are using PIC type microcontroller. The microcontroller has some advanced special function registers. Here, the controller has internal Pulse width generation module, Analog to digital converter module and read only memory. We can handle those modules using respective commands. Rotary encoder is modernized variable resistor, which does not have an end point for rotation. The encoder consist pair of sensors to intimate the user whether the knob is rotated clock and anti-clock. According to the result value may increment or decrement. The encoder is used to set the temperature value. This project consists Dryer tray, CPU Fan, Heater, Sensor, PV Panel and control unit. After powered the controller, it will initialize the LCD. After end of LCD Initialization controller proceed to maintain the temperature from set range. When the current temperature ranges far below than set one, controller will deactivate both cooler fan and turn on heater independently. If the current temperature is matched with tuning temperature then controller activates heater along with cooler fan. In thus state heat air will travel through dryer and controller keep try the temperature by switching on and off

Time of drying (hrs.)	Tray1	Tray 2	Tray3	Total mass	Moisture loss	%moisture loss
0	500	500	500	1500	0	0
2	452	462	469	1386	114	7.6
4	346	366	382	1094	292	21.06
6	235	280	304	819	275	25.15
8	175	237	268	680	139	16.97
10	160	209	234	603	77	11.32

the heater coil. In that state any fruits or leaves placed in dryer, controller keeps it a constant temperature. If the temperature far exceeds than set range, controller deactivates both heater and cooler fan and activate air out cooler fan. This is used to reduce internal temperature to safe the dryer objects from damaging. Pair of Light depend resistors keeps track the sun direction and send the analogy signal to the microcontroller unit. Controller will check the signal and control the panel direction to attain maximum power. This process has concede as secondary state of microcontroller process and Dryer remains primary.

It can be noticed in Fig 5 that initially moisture removal rate was very high and the slope of mass versus time line confirming this phenomenon. Initially slope of the line is higher because there was high amount of the water present in the product and it was coming out easily with respect to time. Going towards the end, it can be seen that slope of line is decreasing rapidly because of the presence of less amount of water in the product, for removing same amount of water it took more time in the last in comparison to beginning and the main reason of this was deficiency of the moisture in the product.

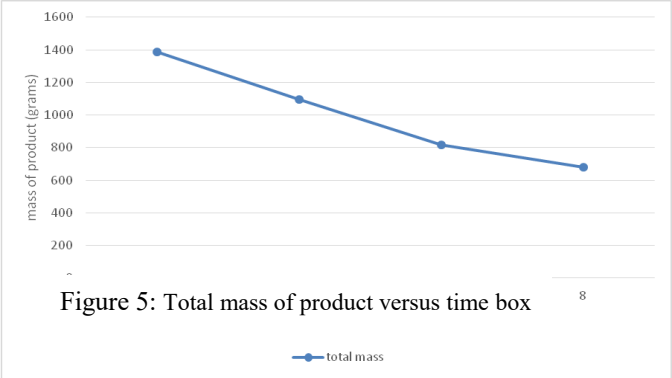


Figure 5: Total mass of product versus time box

With this proposed model we can dry variety of fruits with the

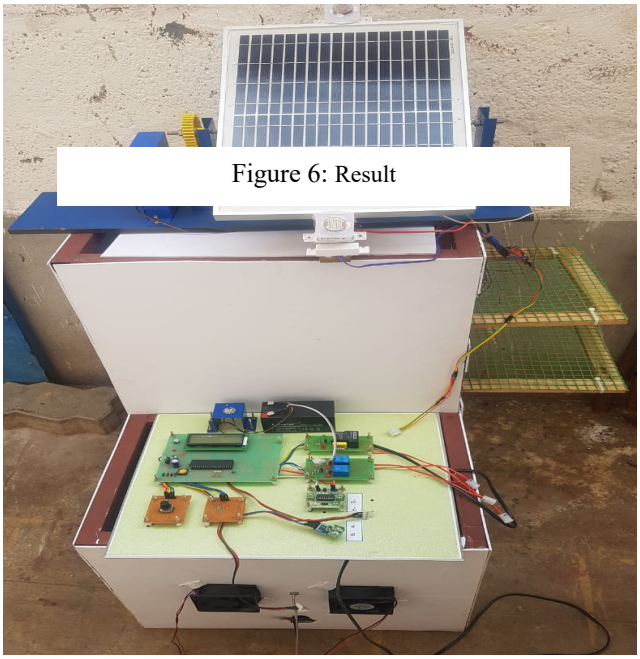


Figure 6: Result

certain temperature level. Existing does not have this future like threshold level and solar tracking. By using this module, we can assure that the quality of product will not change like taste and odour. To dry a 1.5kg of chilli the dryer will took nearly 10 Hour (assuming). The solar tracking is the main advantage of this system which will give power at during night.

V. CONCLUSION

A solar appliance is meant and created supported preliminary investigations of drying underneath controlled conditions

(laboratory dryer). The created appliance is to be wont to dry vegetables underneath controlled and guarded conditions. The designed appliance with a collector space of 1m2 is anticipated to dry 20kg recent vegetables from 89.6% to thirteen wet basis in 2 days underneath close conditions throughout gather amount. An example of the appliance with one.03m2 reflector space was created to be employed in experimental drying tests. in conjunction with this the water heating is additionally used to the appliance to recover the waste heat obtaining from the appliance. thus, the sensible usage of appliance is greatly raised by using the solar hunter with appliance.

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