

RESEARCH ARTICLE



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## ADVANCED JAGGERY MAKING MACHINE

MALI PRIYADARSHANI S<sup>1</sup>, TIRMARE AARTI H<sup>2</sup>, PATIL VIKAS D<sup>3</sup>

<sup>1,2</sup>Student, <sup>3</sup>Assistant Professor

E & TC Department, Bharati Vidyapeeth's College of Engineering,  
Kolhapur, Maharashtra, India,



### ABSTRACT

India is an agricultural country. More than 70% of Indian population lives in villages. Their main source of income comes from agriculture. Today the use of technology in India in the field of agriculture is not up to the mark. Kolhapur is at leading position in Jaggery production in Maharashtra. Traditional method for production of Jaggery is manual. It results in low profit, wastage of time, wastage of man power. This paper focuses on atomization of Jaggery production. Which will result in to increased production in less time.

**Keywords-**Atomation, jaggery

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### INTRODUCTION

Jaggery is a traditional unrefined sugar, which is consumed in Asia, Africa, Latin American and also the Caribbean. It is made from concentrated sugarcane juice, but the molasses are not separated, as is the case with sugar. The color of jaggery can vary from golden brown to dark brown. Although traditional jaggery is manufactured using either sugarcane or date palms, but in recent times jaggery is also made from sap of coconut and sago palms. To make jaggery, raw sugarcane or palm juice is boiled in iron pans. Then the jaggery is made into blocks. Since, it does not go through additional processing; some of the natural vitamins and minerals are retained, although some of them do get depleted, due to the boiling process. In Ayurveda, it has been used to treat various ailments. It is also said to be rich in iron, apart from the

various vitamins and minerals. Hence, it is often seen that, jaggery is eaten in small slices along with a dessert or it can also be combined with various other ingredients to make a variety of desserts.

If you wonder about the taste of jaggery, the taste of jaggery can be compared to brown sugar and other raw sugar. Normally, jaggery is brown in color, but the color of jaggery is dependent on the base ingredient used to make it. This project is based on mechatronics. Which is combination of electronics & mechanical assembly.

The main aim of our paper is to advance processing of Jaggery. In this topic Microcontroller 89c52 is used to control whole system operation. Different sensors are used like Temp sensor, Level sensor, Motors and Electrical valve.

**Block diagram**

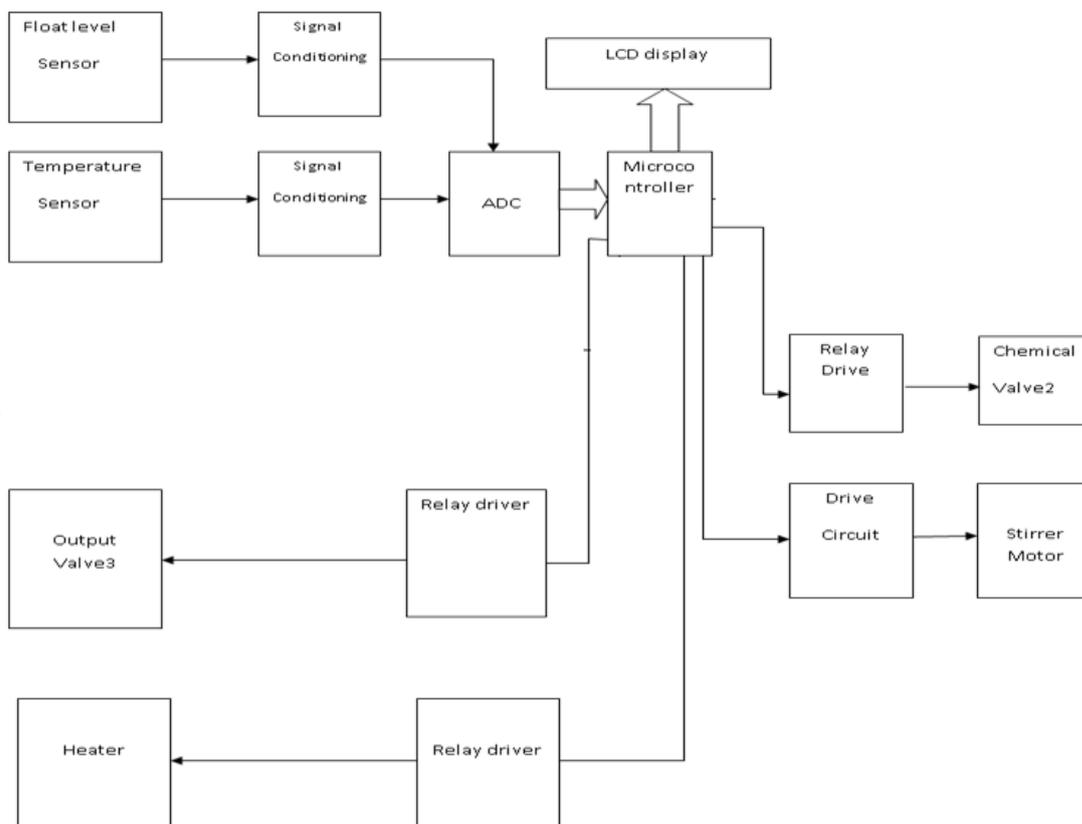


Figure 1. Block Diagram

The system used is a microcontroller based system which will be dynamic as far as signaling time is concerned. This is a making the whole system automatic.

The AT89C52 is a low-power, high-performance CMOS 8-bit microcontroller with 8Kbytes of Flash programmable and erasable read only memory (PEROM). The devices manufactured using Atmel's high-density nonvolatile memory technology and compatible with the industry-standard 89C51 and 89C52 instruction set and pin-out. The on-chip Flash allows the program memory to be reprogrammed in-system or by conventional nonvolatile memory programmer. By combining a versatile 8-bit CPU with Flash on a monolithic chip, the Atmel AT89C52 is a powerful microcontroller which provides a highly-flexible and cost-effective solution to many embedded control.

Microcontroller plays the role of the central processing unit. For microcontroller & other circuits power supply circuit is designed using rectifier filter

& regulator ICs 7805, 7812 .Which generates 5V&12V voltage.

Micro-controller is here is connected to two gear dc motors with the relay drivers. Micro-controller controls the motor to start and to stop. To sense level, juice Level sensor is used. It is 2 points level sensor. There are 2 pins, in that 1 pin is connected to ground and other pin is connected to the pin2.7 of microcontroller. When the juice get poured to the required level ,then these two points get short and level is sense.Pin2.7 get low signal . After this the stirrer and heater get started. Heater is used in the container to heat the juice. which is also connected to the MC through the relay-drive.

Temp-senso which is connected to signal conditioner & also connected to ADC. It sense the temperature of juice and display on LCD .ADC changes the analog signal to the digital signal which is then given to the micro-controller .we have used one Electronic-valve. When we get the required temperature the MC gives the command to add the Chemical using Chemical inlet motor. After that

stirring and heating continuous upto given specific time period. Then the liquid juice converted into semisolid paste. The controller gives command to the output valve to open the valve get open for specific time as given in programming. When complete semisolid paste is come out of container then the output valve automatically closed. Thus whole process is controlled by the micro-controller.

#### Hardware SETUP

Hardware setup includes both electronic circuit & mechanical setup .Mechanical setup is controlled using electronic circuit.



Figure 2. Hardware setup

#### 3.1 Micro-controller 89c52

The AT89C52 is a low-power, high-performance CMOS 8-bit microcomputer with 8Kbytes of Flash programmable and erasable read only memory (PEROM). The devices manufactured using Atmel's high-density nonvolatile memory technology and incompatible with the industry-standard 80C51 and 80C52 instruction set and pin-out. The on-chip Flash allows the program memory to be reprogrammed in-system or by conventional nonvolatile memory programmer. By combining a versatile 8-bit CPU with Flash on a monolithic chip, the Atmel AT89C52 is a powerful microcomputer which provides a highly-flexible and cost-effective solution to many embedded control.

#### 3.2PT100-Temperature-Sensors

TF101 temperature sensors use DIN 43 760 platinum resistance temperature detectors (RTD). For precise temperature measurement the Platinum Resistance Thermometer offers the best overall advantages in repeatability and stability over a long period. High accuracy allows replacement of a

sensor without any need for re-adjust of the connected measuring devices or thermostats. TF101 temperature sensors are available in different designs Platinum resistance temperature sensor built into steel tube V4A, 1/2 inch, suitable for installation in pipes. Thermal response time T<sub>0,9</sub> in the air 255 s, in water 45 s. Suitable for transmission in 2- or 3-wire technique. Weight 120 g (Dimensions see Dimension illustrations) Order numbers: 110 mm insertion depth The Pt1000 sensor is the "big brother" of the Pt100 sensor. Its nominal resistance at 0°C is 1000 Ω. Resistance values of the whole series are higher by a factor of 10. The sensor is used in the same way as the Pt100 sensor. Its dimensions are slightly larger (4 x 5 uninsulated). Thermostats and sensors for Pt1000 on request. Pt1000 resistance table values see Pt100, multiplied by the factor of 10.



Figure 3. Temperature sensor

#### 3.3 Level Sensor



Figure 4. Level Sensor

It is 2 points level sensor. There are 2 pins, in that 1 pin is connected to ground and other pin is connected to the pin2.7 of microcontroller. When the juice get poured to the required level, then these 2 points get short and level is sense.Pin2.7 get low signal . After this the stirrer and heater get started.

#### 3.4 DC Motor

A Geared DC motor has a gear assembly attached to the motor; The speed of the motor is counted in terms of rotation of the shaft per minute and termed as RPM.The gear assembly helps in increasing the torque and reducing the speed. Using

the correct combination of gears in the gear motor, its speed can be reduced to any desirable figure. This concept where the gears reduced speed of the vehicle but increase the torque is known as Gear reduction. This insight will explore all the minor and major details. That make the gear head and hence working of geared DC motor.



**Figure 5. DC Motor**

The lateral view of motor shows the outer protrude of the gear head. A nut is placed near the shaft, which helps in mounting the motor to the other parts of assembly. Also an internally threaded hole is there on the shaft to allow attachment or extension such as wheel to be attached to motor. Thus from above we can conclude that atomizing traditional process for jaggery can result in to increased production in less time & with more accuracy.

#### **Future scope**

Large scale jaggery making power plant can be built up by using PLC .Heat seal machine can be used for packaging.

#### **Conclusion**

From above we can conclude that mentioned system can be advantageous over traditional method as this system results in increased production in less time with less human power & increased quality.

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