**Project Name:**

DESIGN AND DEVELOPMENT OF INTELLIGENT TABLE TOP WET GRINDER

**Introduction/Motivation:**

In olden days classic conventional wet grinders are used to grind the rice and lentil grams (urad dal) to produce flour which is extensively in south Indian cuisine for preparing classical Tamil food items like idly, dosa etc. The pair of stone is rotated in metal drum in which the grains are crushed between them. Conventional wet grinders are bulky in size and costly in price. Women cannot lift the stone while taking flour from grinder. And also women suffer a lot while cleaning the grinder after the batter making process.

So **‘ULTRA’** launched it’s first ever table top wet grinder in 1992. Table top wet grinder is more reliable, lighter and economic than conventional model. As it is lighter women feel easy to carry the stone. In table top model stones are easy to fix and it require small space than conventional model.

But this is not automatic system. Still women feel very hard to lift the stone while taking flour from grinder and cleaning the grinder after the grinding process. So it stimulates our team to design the fully automated wet grinder which is easy to operate and efficient in working as compare to conventional and normal table top wet grinder.

**Market Research / Literature Survey:**

Now existing grinding system is classified into two types. One is table top wet grinders and another is tilting type wet grinders. Tilted type wet grinders are evaluation of table top wet grinders. Nowadays tilting wet grinders are available in market in **PREMIER**, **SOWBAGHYA**, **AMIRTHAA** and etc. These tilted grinders are conventional in setup and also in normal table top setup. This tilted system is said to be a semi-automated with button type. But this method needs manual mechanism to operate button. They are provided with two to three conical stones as like table top wet grinder. But these tilting wet grinders are not successful in market because the drum of this tilting wet grinder is non-removable. As these drums are non-removable, the cleaning process is very difficult. Till now there is no any automatic system of grinders to spray water by checking viscosity of flour and there is no any automatic cleaning system.

**Hardware requirements:**

1. Normal table top
2. Current sensors
3. Viscosity sensors
4. Temperature sensor
5. Microcontrollers
6. Solenoid valves
7. Water spray
8. Tilted motor
9. Vessel which attach at bottom.
10. Funnel for grains
11. Motor deriver board
12. Power card
13. 555 timer
14. Relay and relay driver board

**Software requirements:**

1. Arduino ide software.

**Implementation:**

Implementation of this table top wet grinder required following hardware as normal table top wet grinders, current sensor, viscosity sensor, temperature sensor, microcontroller, control valves, water spray, tilted motor, vessel which attach at bottom, funnel for storing grains such as lentil grams(urad dal), rice etc. At first rice and lentil grams (urad dal) is to be sock in water for 2 hours. After that the rice and lentil grams should be loaded to the separate respective funnel type storage container. At every separate funnel container exit valve is present. At first solenoid valve in rice containing funnel get opened. Previous process is to spray water to empty drum of grinder. Then the rice gets released in drum. The motor get start to run. First the current sensor check the current and if the current level is exceed the standard value then the water pump start to spray the water to drum by simultaneously checking the viscosity using viscosity sensor.

Check the time by using the microcontroller. If the time is greater than or equals to standard time then it goes to stop mode. After that the exit valve at bottom of drum got released and the rice flour which is grinded is stored in the vessel which is attached at bottom of grinder for storing purpose. After that the exit valve got closed and the solenoid valve of the lentil gram (urad dal) funnel container get open. Then little amount of water is sprayed in the drum. Then the lentils grams (urad dal) get poured into the drum by solenoid valve. Then the lentils grams (urad dal) get grinded into fine particle. It senses the current by current sensor and if the current value is greater or equals to the standard value then the water spray pump get open. It sprays the water to the flour to avoid the jamming of flour in drum. Viscosity sensors sense the viscosity of flour simultaneously with current sensors. After grinding the lentil gram, the flour got poured into the same vessel which is attached at the bottom of vessel.

After the grinding process some of flour in the drum got drained by the tilted mechanism. Now the grinder drum is tilted to certain angel. Fin type structure with up and down motion gets inserted into to the inverted grinder. Now the grinder start to rotate and the fin structure begin to move up and down. So the rest of the flour in drum got taken by this mechanism. Our proposal involves the cleaning mechanism too. So now the water is sprayed very fast and the flour which gets clogged in the drum is removed. Now place the grinder close to wash sink. Now taken out the solenoid valve and put it into the sink. Now the water which is used to clean the drum gets disposed to sink via solenoid valve. Now it takes its own time to dry the drum.

Now the salt and readymade yeast is mixed with flour in collecting vessel at bottom of drum by using the fin type structure.

**BLOCK DIAGRAM:**

Block diagram / Flow chart

1.Set input (standard current & time value)

2.Load the rice in drum via funnel container

3.Start the motor

4.Check the current value by current sensor

5.Check the viscosity by viscosity sensor

6.Check the temperature using temperature sensor

7.if current value exceeds than standard value then spray the water to drum

8.Check the standard time value. If exceeds stop the motor

9.Open the solenoid valve in drum and drain the flour to vessel

10.Repeat the same procedure for lentil gram

11.Tilted the grinder for some angle and insert the fin structure to clean the drum

12.Close the solenoid valve and force the water

13.Open the solenoid valve and let the water be drain

14.Mix the yeast and salt in the vessel using fin structure

15.Wash the drum using designed program

16.Open the solenoid valve to sink

**Feasibility:**

The current method of grinding uses two types of grinders which is having multiple disadvantages. Tilted grinders are non removable and normal table top wet grinders are non automatic hence it is very hard to handle. Hence this project proposal consists of system which completely automates the grinding process. Here we use viscosity sensors to monitor the viscosity system. The grinding system itself consists of the automation system to spray the water by comparing the standard viscous value which we set previously. Temperature sensor automatically senses the temperature of the current carrying coil and control the temperature o such coil. Because temperature due to current carrying coils in drum play a vital role in characteristics of batter. After batter prepared, the drum tilted automatically to certain degree to drain the batter to the vessel which is attached at bottom of the grinder. For complete draining of batter from drum we use specially programmed motors with microprocessors. It also adds the yeast to batter for fermentation process. It includes automatic cleaning of drum. It saves the time and let women to do some work simultaneously. It is work free and hygiene. Our project is a step forward to the digitalized lifestyle.

**References:**

International Journal of Innovative Research in Science, Engineering and Technology (An ISO 3297: 2007 Certified Organization) Vol. 4, Issue 1, January 2015 DOI: 10.15680/IJIRSET.2015.0401062 www.ijirset.com 18907 Analysis and Improvement of Quality in Wet Grinder Manufacturing Industry Through Customer Complaint Investigation L.Initha1 , J.Jegan2 , R.Kumar3 Assistant Professor, Department of Mechanical Engineering, SNS College of Engineering, Coimbatore, India1,3 P.G.Scholar, Department of Mechanical Engineering, SNS College of Engineering, Coimbatore, India