AUTOMATIC ROTI MAKER

This project was aimed at making roti from using flour and water. In this machine, when a person adds a flour and water in respective containers and by press of a button, it would mix the flour with water, make a dough ball and press it and heat it to make it roti.We planned to make this process as a type of contraption as it was seen in this video :
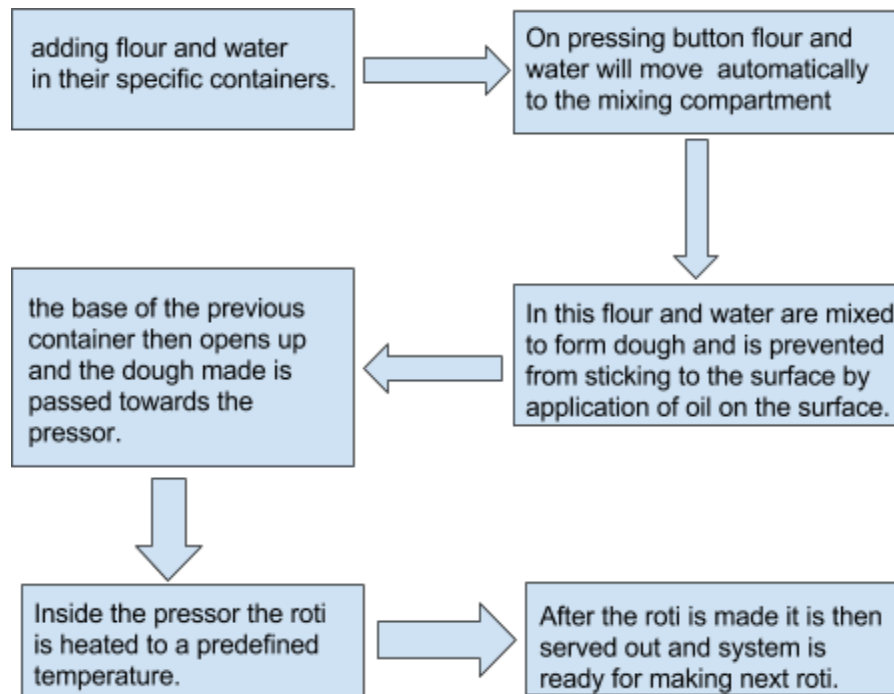

[video of an automated lays making machine](#)

TECHNICAL ASPECTS OF THE PROJECT

The following technical modules were used :

- Iris Valve : The valve was used to regulate flow of flour.
- Solenoid Valve : The valve was used to regulate water flow.
- Stepper Motor : To control the flap which acts as bottom of mixing container.
- Containers : To store the flour and water and for mixing purposes.
- 3D printed blade : To mix the flour and water and form the dough ball.
- A heater and presser : This would be used to make the dough ball to roti.

THEORY INVOLVED IN THE PROJECT :

 The basic plan of implementation of the roti making process was designed as follows :

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┌─────────────────────────┐          ┌──────────────────────────┐
│ adding flour and water  │ ───────▶ │ On pressing button flour │
│ in their specific       │          │ and water will move      │
│ containers.             │          │ automatically to the     │
│                         │          │ mixing compartment       │
└─────────────────────────┘          └──────────────────────────┘
                                                  │
                                                  ▼
┌─────────────────────────┐          ┌──────────────────────────┐
│ the base of the previous│          │ In this flour and water  │
│ container then opens up  │ ◀─────── │ are mixed to form dough  │
│ and the dough made is   │          │ and is prevented from    │
│ passed towards the      │          │ sticking to the surface  │
│ pressor.                │          │ by application of oil on │
└─────────────────────────┘          │ the surface.             │
         │                           └──────────────────────────┘
         ▼
┌─────────────────────────┐          ┌──────────────────────────┐
│ Inside the pressor the  │ ───────▶ │ After the roti is made   │
│ roti is heated to a     │          │ it is then served out    │
│ predefined temperature. │          │ and system is ready for  │
│                         │          │ making next roti.        │
└─────────────────────────┘          └──────────────────────────┘
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- **IRIS VALVE:** The iris valve is a valve used for flour-like materials to regulate their flow from one place to another. The working is nicely seen in the video given below. The valve can be opened and closed with the help of a shaft. It was designed with a little bit of constraint mechanics. The parts were made using laser cutting.
- **SOLENOID VALVE :** The valve is designed such that on applying 24V across the motor it would allow flow of water. It works on the principle of electromagnetism.
- **STEPPER MOTOR :** The theory behind the stepper motor could be understood in the video given below : https://www.youtube.com/watch?v=ePSCZ_DtF7c. The accuracy of stepper motor is up to 1.8 degrees. This was used in the working of a flap which acted as bottom of the mixer container. It has good holding capacity so it was used for controlling the flap which was used as a removable bottom of mixer container to act as base when mixing and when the dough ball is formed, the dough ball would fall down as the flap is removed using stepper onto the heating plates.
- **BLADE FOR MIXING :** The mixing blade was inspired from already available food processors. The design was such that flour and water were mixed by rotating the blade for some time to get a dough ball directly.

- **HEATER AND PRESSER :** The heater and presser would be custom made. In this a heater plate would be present on the bottom and another heater plate above. The latter would be held by using a stepper motor to control its movement as and when needed.
- **SMPS :** It is a device used to convert AC supply to DC of a particular voltage. The voltage supply was given from regular mains and SMPS was used to get a supply of 24V from it to control Solenoidal Valve using relays.
- **RELAYS :** Relays are used to control switching of circuits of higher ratings by applying smaller voltages. This was useful to turn on and off solenoid valve using arduino. The relay can be understood from the links given in the list below.

YOUTUBE LINKS

- The Iris Valve : https://www.youtube.com/watch?v=4d76litF4wY
- The atta flow using Iris Valve : https://www.youtube.com/watch?v=v-rxuM_eTz4 :
- The Progress in a video : https://youtu.be/8bP-Eguir0Q

LINKS REFERRED TO :

- http://www.circuitmagic.com/arduino/how-to-run-a-stepper-motor-with-an-arduino-l293d-ic/
- https://grabcad.com/library/mechanical-iris-3
- http://www.circuitstoday.com/working-of-relays

PICTURES :

THE SETUP

AS ON LAST DAY