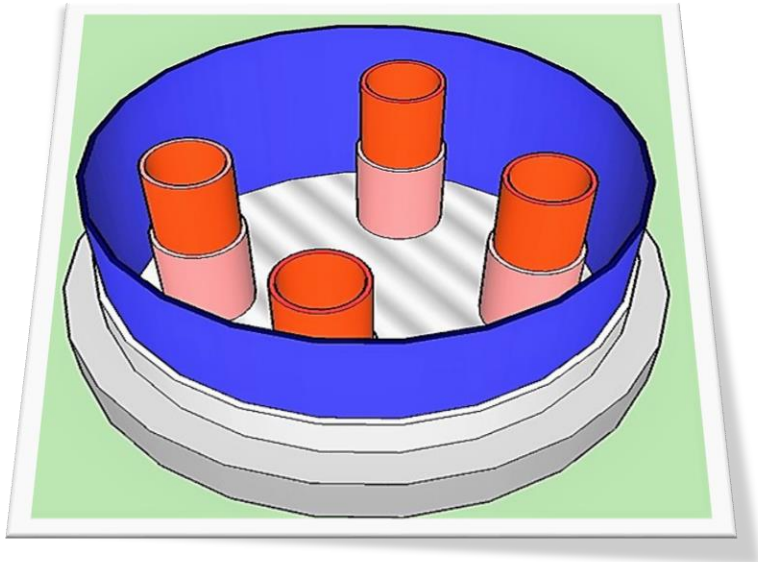


## Development of Preheat Machine for Chocolate 3D Printer



### **Mentor**

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## Existing preheater with one barrel:

- Chocolate preheater is used to heat chocolate in 3D chocolate printer.
- It can afford **only one barrel**.
- It takes **45 min** to heat chocolate.. To utilise the entire barrel of chocolate for printing a simple shape is **15-20 min**.
- In case there is any need for another syringe of chocolate, we have to wait for **25 min** and chocolate 3D printer will be **idle** for **25 min**.

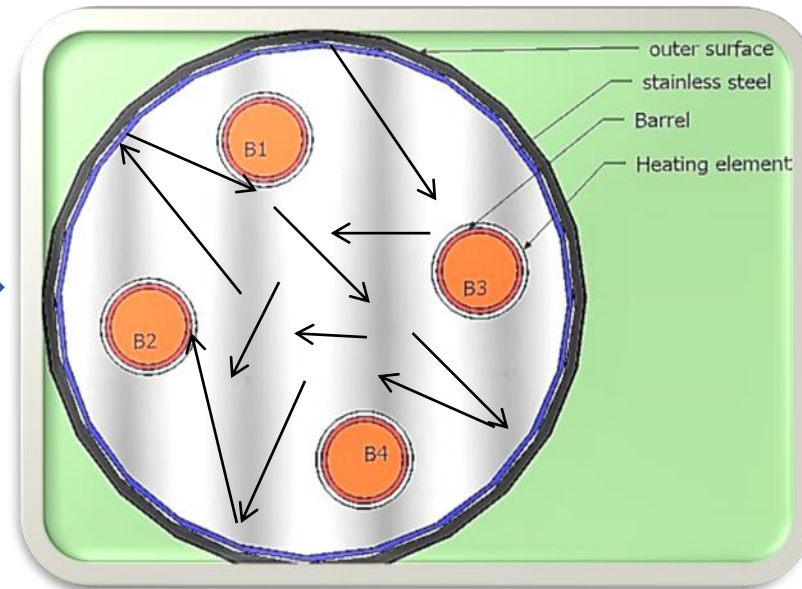


## Objective

- The main objective is to develop **multi-barrel preheater** for **better utilization of 3D chocolate Printer** by **reducing cycle time.**



Existing Preheater



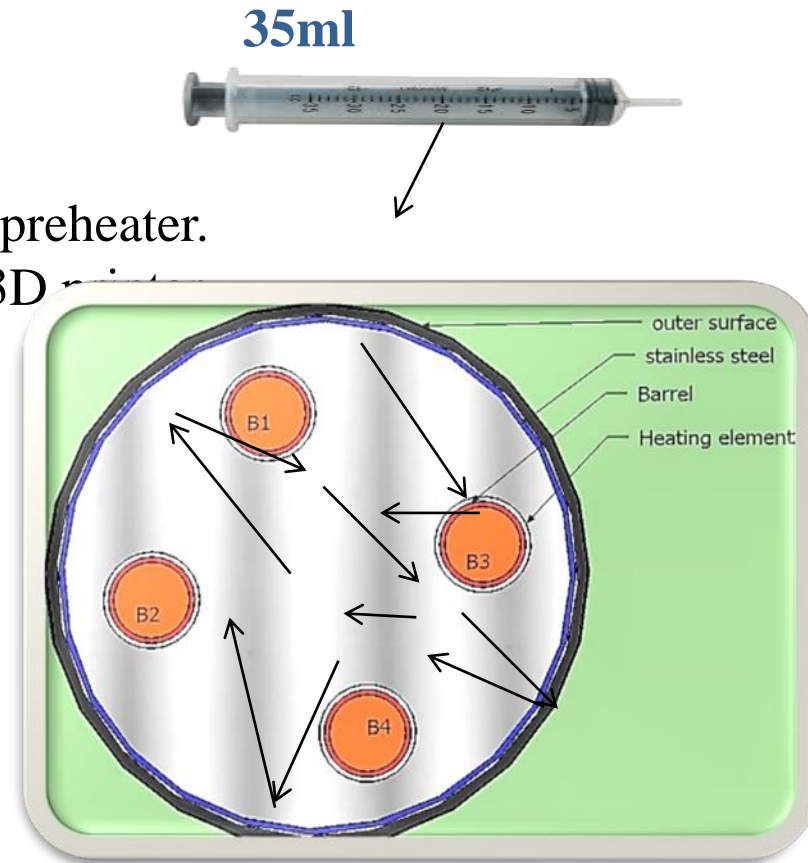
Proposed Preheater

## Present Method

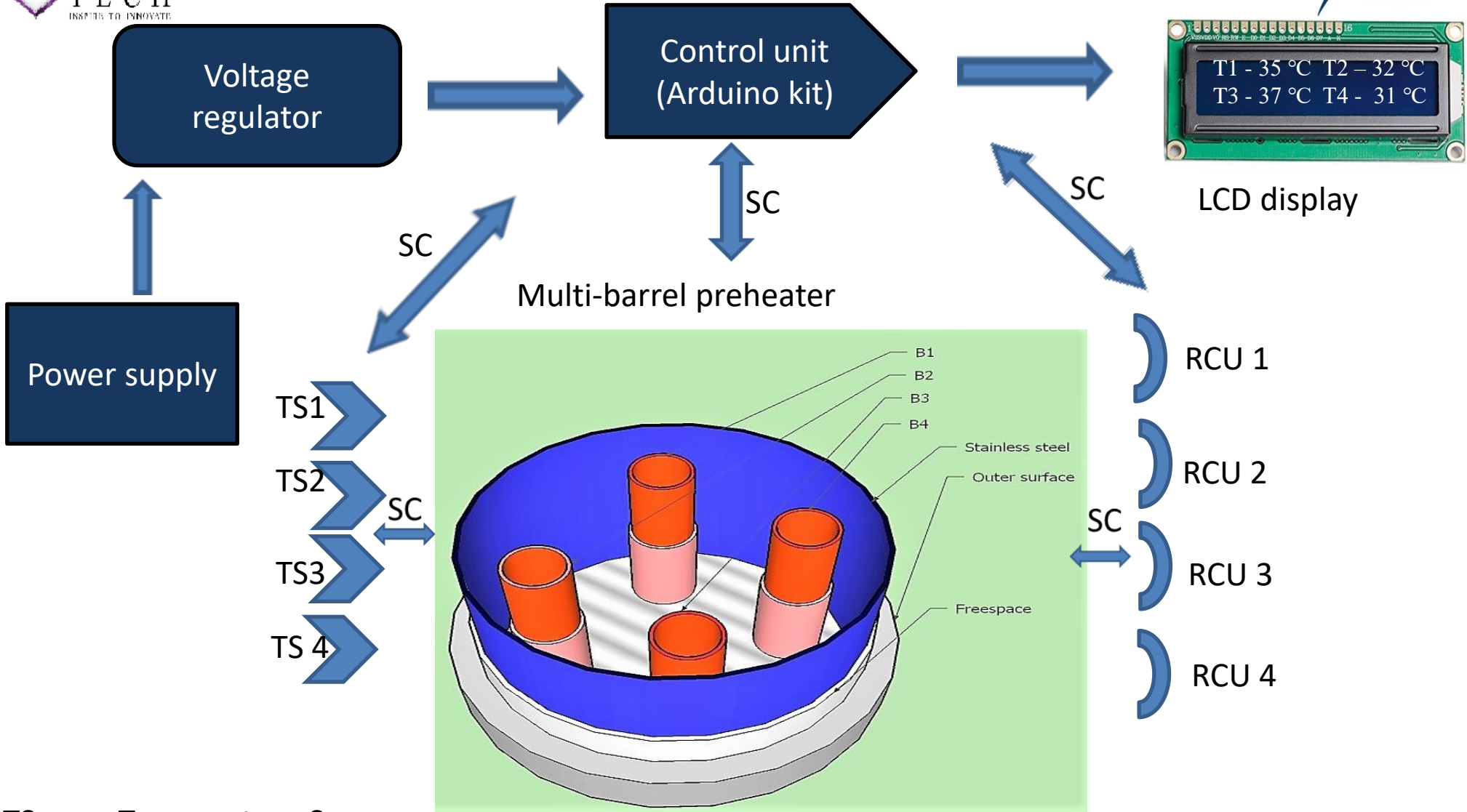
- Only one barrel is available in preheater.
- Approximately 45 minutes to heat the chocolate in preheater.
- Around 15- 20 minutes to empty the chocolate in 3D printer.

## Innovation Involved

- **CIRCULAR ARRAY OF HEATERS.**
  - Since it is circular, the heat developed will be kept inside by aluminium sheet and heat can be utilized effectively.
- Monitor temperature for 4 barrels individually.
- Multi-colours of chocolate can be heated simultaneously.



# Proposed Methodology

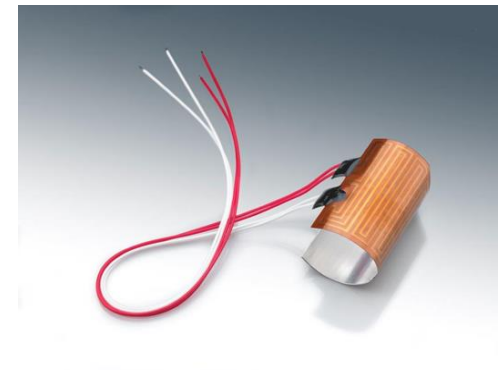


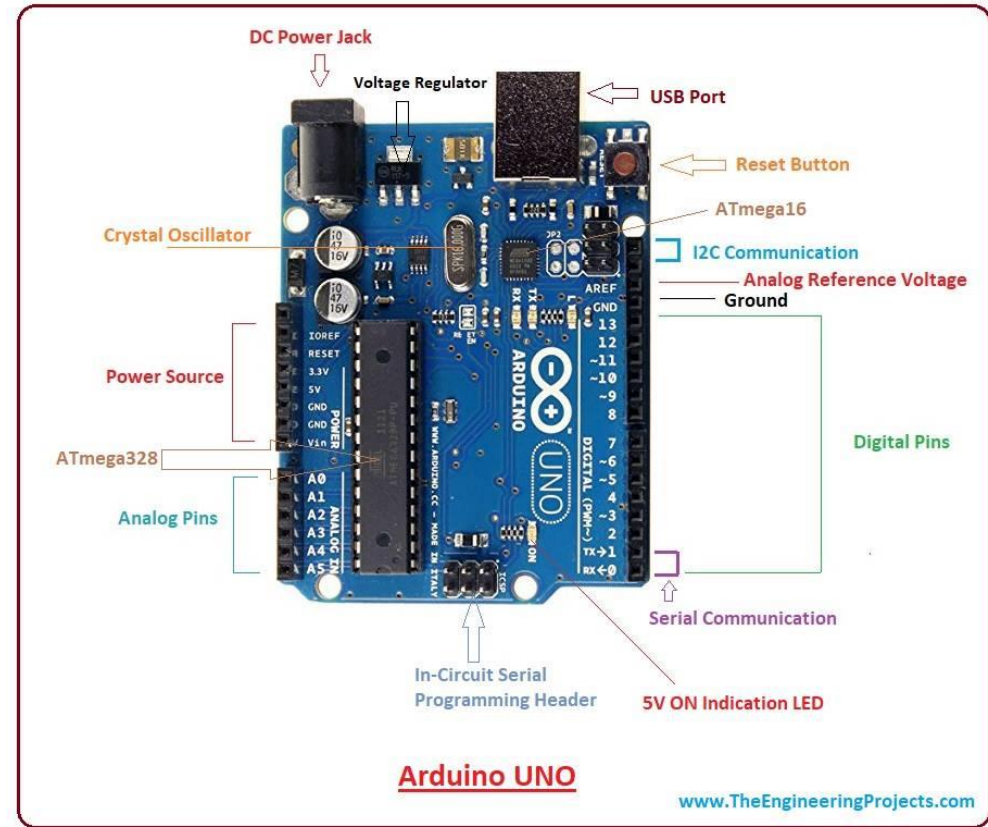
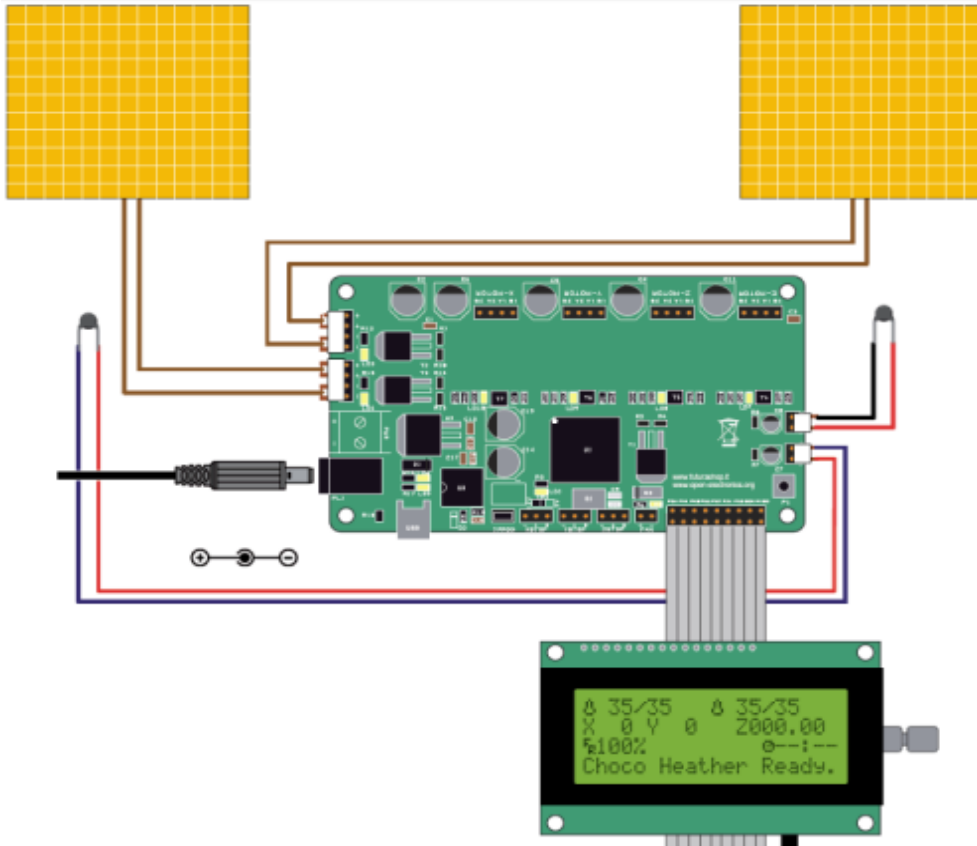
- TS - Temperature Sensor
- RCU - Relay Control Unit
- SC - Serial communication

- The main principle is based on **flask heat conservation principle**.
- Input supply is given to the Kapton heating element, which heats the aluminium barrels
- Since the syringe is placed inside the aluminium barrel, its started to getting heated up.
- Once any of the **4 barrels** reaches **the target/cut-off(say 35°C)** temperature, the signal is given to Arduino through the temperature sensors.
- The actual temperature value and the reference temperature value is compared in **Arduino uno board** and sends the command signal to corresponding relay unit which turns off the supply to the particular heating barrel.
- Cut-off temperatures are **monitored** through **LCD Display**.

## Advantages / Uniqueness

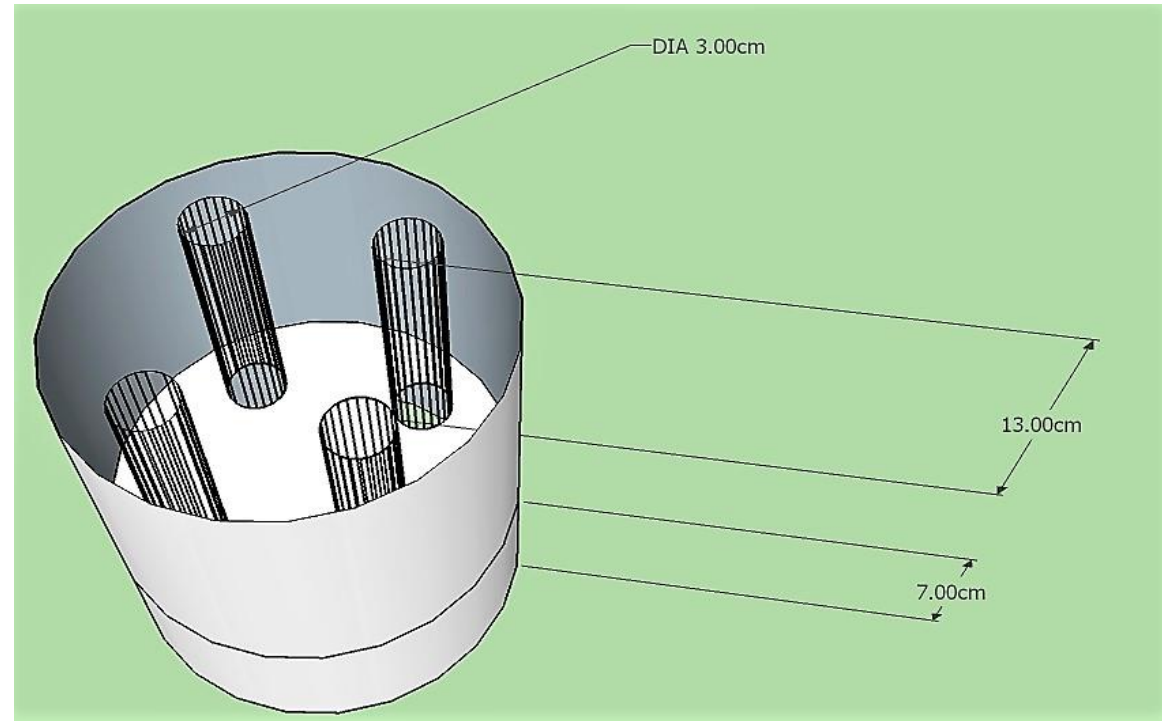
- **Better utilization** of chocolate 3D printer.
- Reduces **the waiting time for heating** the chocolates in syringe.
- Reduce **the idle time** of chocolate 3D printer





- Arduino - It is a device used to communicate easily with software & hardware.
- C ,C++ ,JAVA ,PYTHON ,ORACLE are the languages used as input.

- Since this **product( Multi-barrel Preheater)** is not available in the present Indian market, it will create a **big impact** in 3D Chocolate printer market.



## Conclusion

- Thus by using our **Multi-barrel Preheater** , we can effectively use the 3D chocolate printer.



S.No	Name of the Item	Quantity	Cost/Unit in Rs	Total in Rs
1.	Aluminium Sheets (70*30*0.02)cm	4 SHEETS	5000	20000
2.	Arduino	1	4500	4500
3.	Temperature sensors	4	1540	6160
4.	4 channel Relay control unit	4	500	2000
5.	LCD display	1	850	850
6.	Circuit Design	-	3000	3000
7.	Kapton Heating Element	4	2350	9400
8.	Fabrication	1	2000	2000
<b>Total Cost (Forty seven thousand Nine hundred and ten only)</b>				<b>Rs.47,910/-</b>

