

3D Food Extruder

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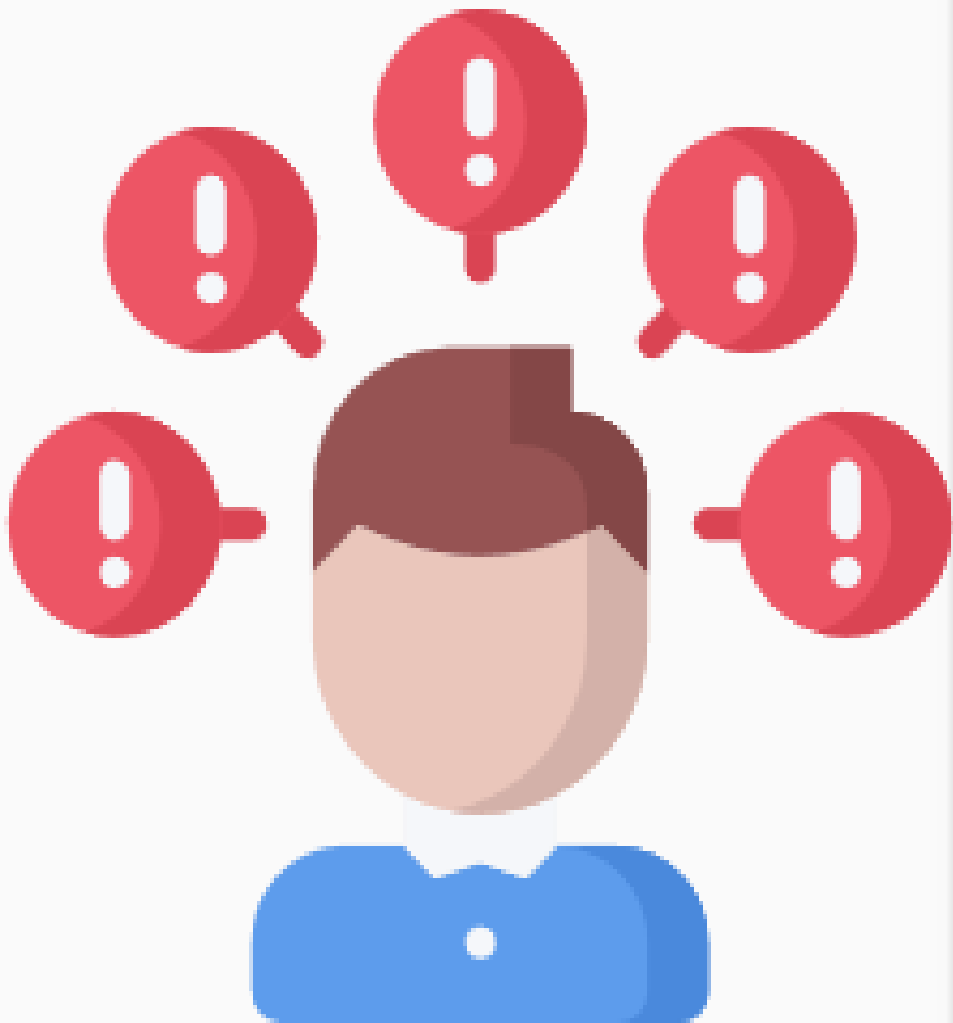
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Presentation Outline

- Problem
- Solution
- Prototype
- Drawback of the system
- Future Improvements

Project Brief

1. Solution for the aging population
2. Environmental Project
3. Healthcare



The Problem

“How are we going to
reduce Food Wastage?”

Background

Food wastage has been a Global concern as we have limited supply and the population is going to increase .This might lead food shortage.Preserving food is a way to deal with the demand of food shortage.Traditionally,this ugly fruits are not bought and hence thrown out regardless of whether is edible or not.



The year-long drive, part of the Year Towards Zero Waste campaign, was launched at Yishun Park Hawker Centre. PHOTO: LIANHE ZAOBAO

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Fabian Koh



SINGAPORE - With food waste among the five largest sources of waste in Singapore, the National Environment Agency (NEA) hopes to get people to adopt three habits when eating out so as to combat wastage.

The year-long drive, part of the [Year Towards Zero Waste](#) campaign, was launched by Senior Minister of State for the Environment and Water Resources Amy Khor at Yishun Park Hawker Centre on Saturday (Feb 16).

It encourages people to order only what they can finish; ask for less rice or noodles if they are unable to eat that much; and say "no" to side dishes they will not consume.



ST VIDEOS ▶



Hong Kong protests shut down airport in biggest disruption yet; flights could resume on Tuesday



Jeffrey Epstein's victims will pursue civil cases against his estate



India to bring supplies to Kashmir; Pakistan to go to UN



Food being distributed at a Food Bank Singapore event in Bedok. Food waste generated in Singapore has increased by 40 per cent in the last decade. PHOTO: THE FOOD BANK SINGAPORE

🕒 PUBLISHED SEP 10, 2018, 2:01 PM SGT



Gilaine Ng



SINGAPORE ([THE NEW PAPER](#)) - Last month, 24-hour store Mustafa Centre was found to be disposing of nearly 100kg of fruits and vegetables daily, sparking concerns about food waste in Singapore.

According to the National Environmental Agency, the amount of food waste generated in Singapore has increased by about 40 per cent over the past 10 years.

This number is expected to increase with Singapore's growing population and economic activity.

THE STORY BEHIND SINGAPORE'S FOOD LOSS & WASTE



2million*
tonnes of food
is imported



393,000
tonnes of food
IS LOST



UPSTREAM
Food loss that takes place
during **production**



MIDSTREAM
Food loss that takes place
during **processing and transportation**



167,000 tonnes of
Fruits & Vegetables lost

= 5,901 20-foot
Containers




25,000 tonnes of
Fish & Seafood lost

= 883 20-foot
Containers




5,500 tonnes of
Eggs lost

= 305 Double-Decker
Buses



342,000
tonnes food loss is equivalent to

\$S\$2.54 billion

Food and Agricultural Organisation (FAO) Definition

FOOD LOSS refers to any
food that is **lost in the
supply chain** between
the producer and the
market.

*Example: post-harvest
losses, handling,
storages, packaging or
transportation losses.*

FOOD WASTE refers
to the **discarding** or
alternative (non-food)
use of **food that is safe
and nutritious** for human
consumption.

*Example: disposal of
"Ugly Food", food close to
"Best-before" dates, edible
unused or leftover foods
discarded from kitchens.*

An average of
62 kg
of food
is lost per person
each year

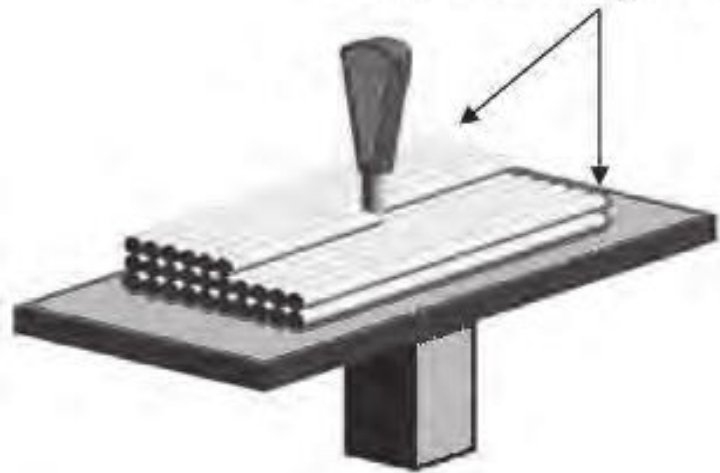
is equivalent to
177 cans
of 350g
Tomato
Canned Soup





The Solution

Consecutive layers of materials



3D Printing





Dehydration





Dry-Freezing



Pulverize



Can be used a
sweet toppings





Make Something
FUN!!

Nutrition for Elderly People



Nutrition for Seniors

Eating is one of the most basic of human needs. The United States has an abundance of food, but often our diets are still sometimes lacking in quality.

Being busy is often a reason for choosing fast, convenient, or pre-packaged foods for ourselves and our loved ones.

But, slowing down and involving your loved one in the preparation of food can be a very rewarding and nutritious way to improve the quality of our diets.

For some caregivers, the issue is that our loved ones have trouble eating, chewing, swallowing, etc.

Seniors can have different challenges: a loss of appetite and unhealthy weight loss, problems chewing or swallowing, depression, or a need to reduce fat and sugar with certain chronic conditions.

For Dental, Chewing and Swallowing, or Motor Skill Feeding Problems

- **Make chunky stews** (like our **butternut stew**) that are soft and easy to eat.
- **Shredded and cutup meats**: For those with chewing and swallowing problems, shredded pork and chicken with a nice sauce can really help. If a person needs food cut up, do it before it is served to increase the dignity of the meal.
- **Think “Finger Food”**: Many seniors have eyesight and motor issues that make eating with a fork, knife and spoon downright difficult. Things like chicken nuggets, cheese sticks, cut up veggies with dip, etc. can help.
- **Smoothies** can be considered a light meal for breakfast - and are great for adding vitamins and nutrients for people who have trouble chewing or eating.

Tips for Better Elderly Nutrition

- **Increase Vegetables and Fruits:** Overall, the fiber, vitamins, and enzymes present in fresh plants are best for all of us. Steaming the vegetables so that they are softer for those with dental issues is easy to do. For those who have no trouble chewing, cut up raw vegetables with a tasty dip as a snack or a small meal.
- **Make Lunch the big meal of the day:** Often by dinner, seniors are too tired to finish meals. Also, some seniors can have more digestive problems that interfere with a good night's sleep. We all actually need more calories earlier in the day.
- **Stay Hydrated:** Remember to maintain fluid levels. It is important for all bodily processes to sip some liquids throughout the day. The more fruits and vegetables in our diets, the more naturally hydrated we are.
- **Go for the Grain:** when making decisions about which breads to choose, always go for the one higher in whole grains. Some people dislike the taste or texture at first. One way to work toward more whole grains is to mix whole grain pasta with regular pasta and gradually increase the whole grain levels.
- **Don't Skip Meals:** Skipping a meal usually makes someone eat more at the following meal and can drop blood sugars causing dizziness. If not hungry, it is better to eat a little than to skip.
- **Eat small Meals More Often:** It is better for most seniors to eat 5-6 small meals a day because this can:
 - Reduce the highs and lows of insulin levels
 - Help seniors who find it painful to eat large meals because of chest congestion or breathing problems
 - Encourage more calorie intake for those who have lost their appetites
 - Offer more opportunities to socialize and be with others



Banana Purée





Prototype

3D Extruding Unit
+
Peltier Unit

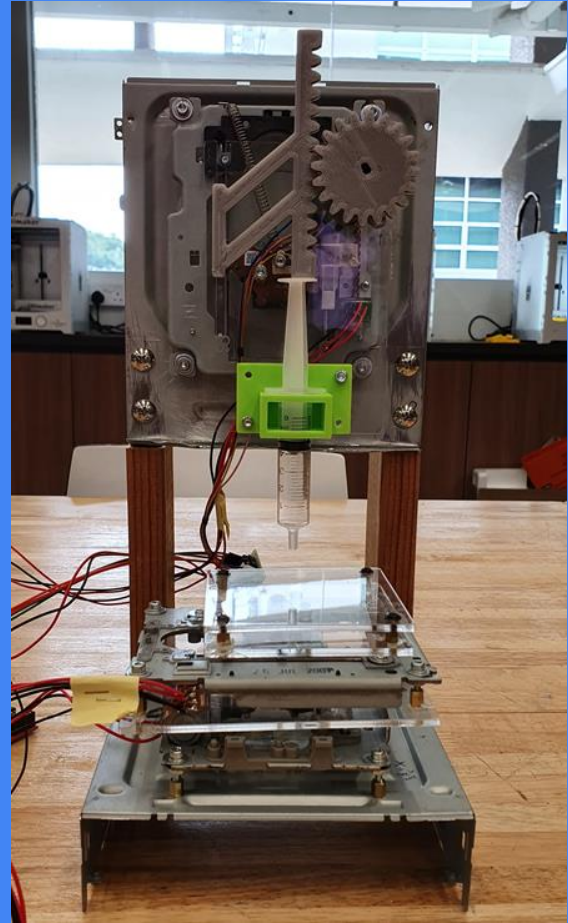
3D Extruding Unit

CD Drives

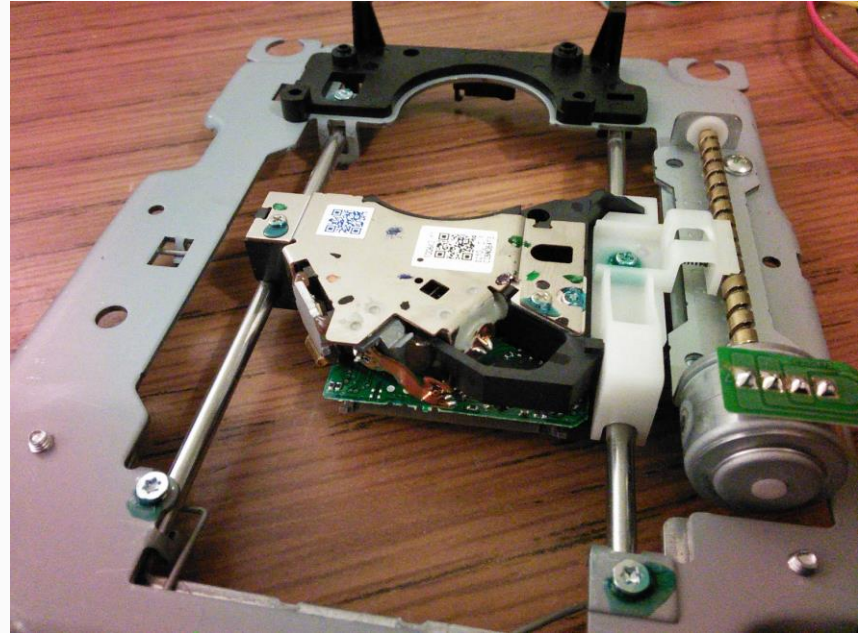
Acrylic

4 stepper motors

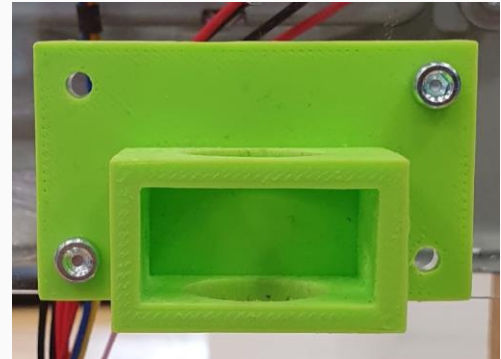
2 Arduino (1 master 1 slave)



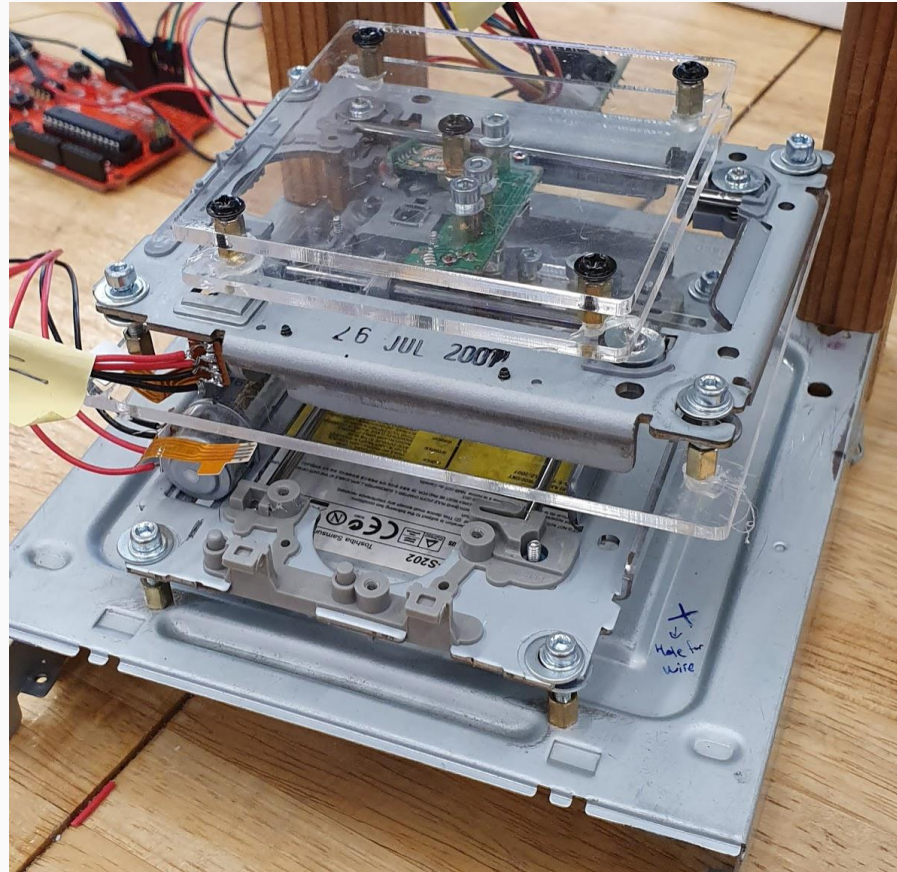
Axes made from CD drives



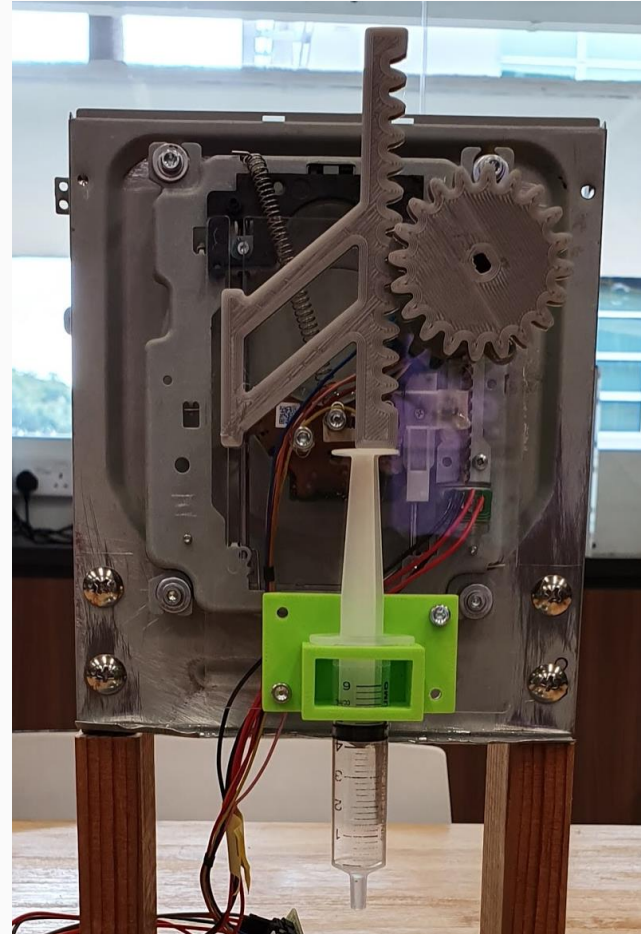
3D Printed Parts



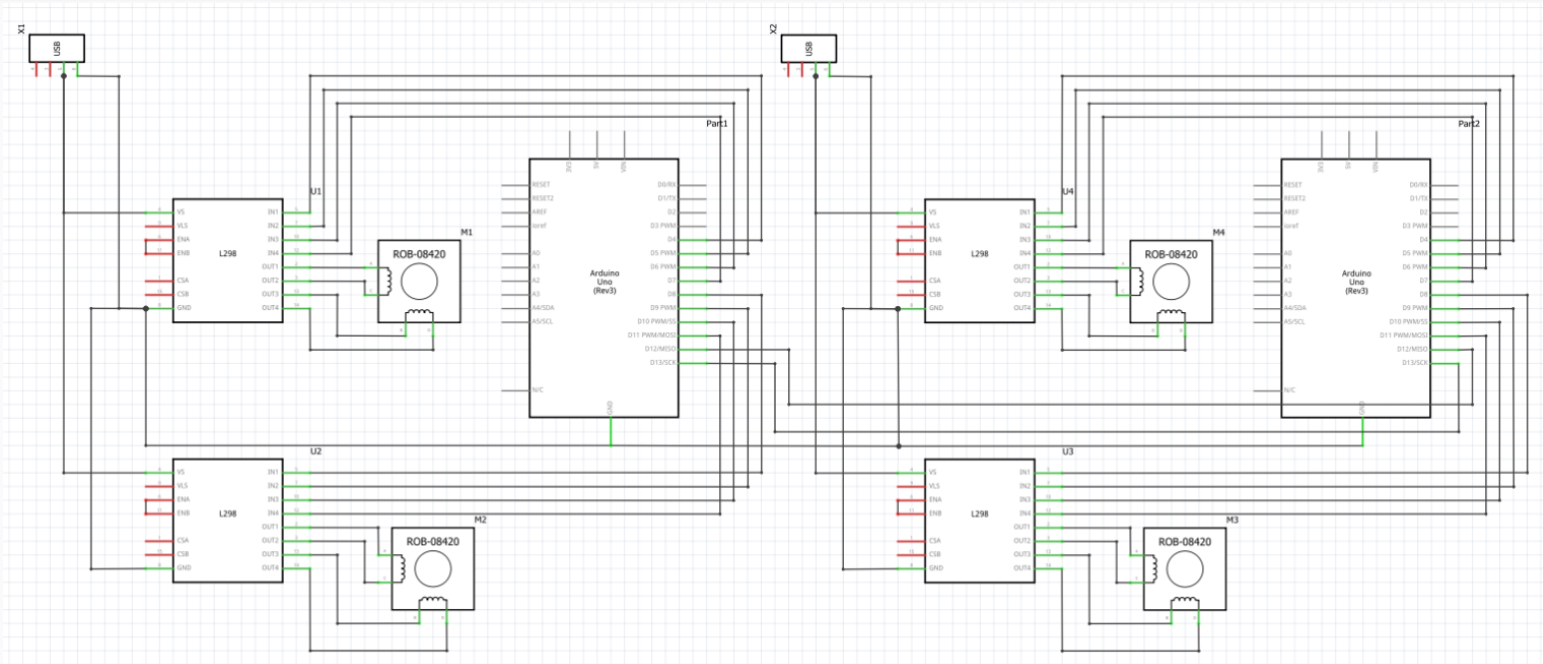
Bottom Platform - X & Y Axes



Z-axis - Extruder Head



Schematics



Peltier Unit

50mm Thick Styrofoam

CPU Fan

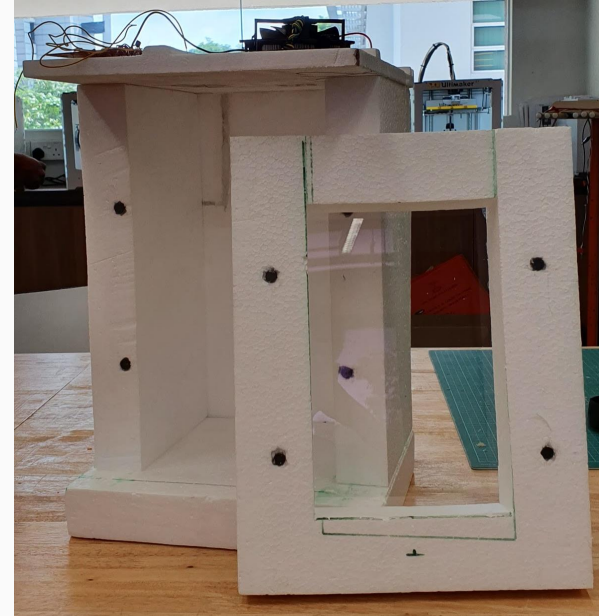
Heatsinks

Peltier

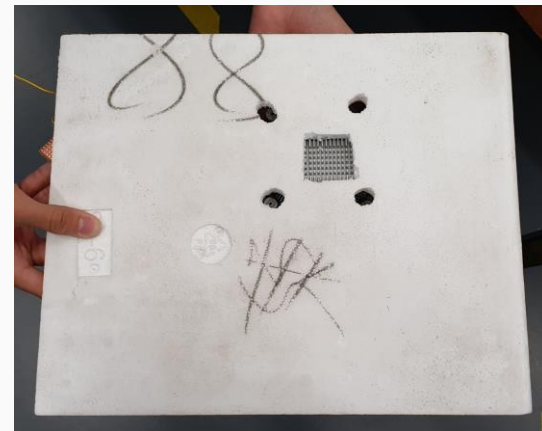
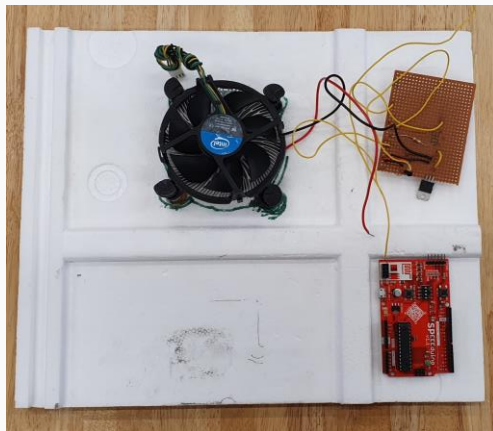
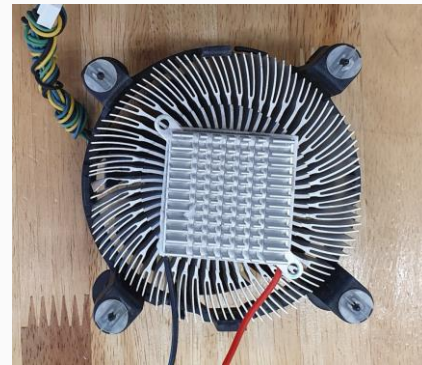
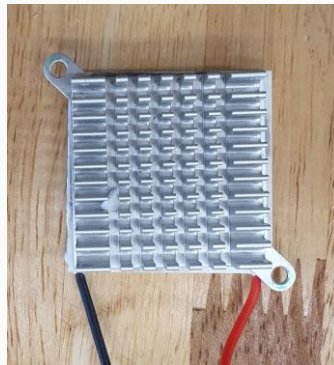
1 Arduino



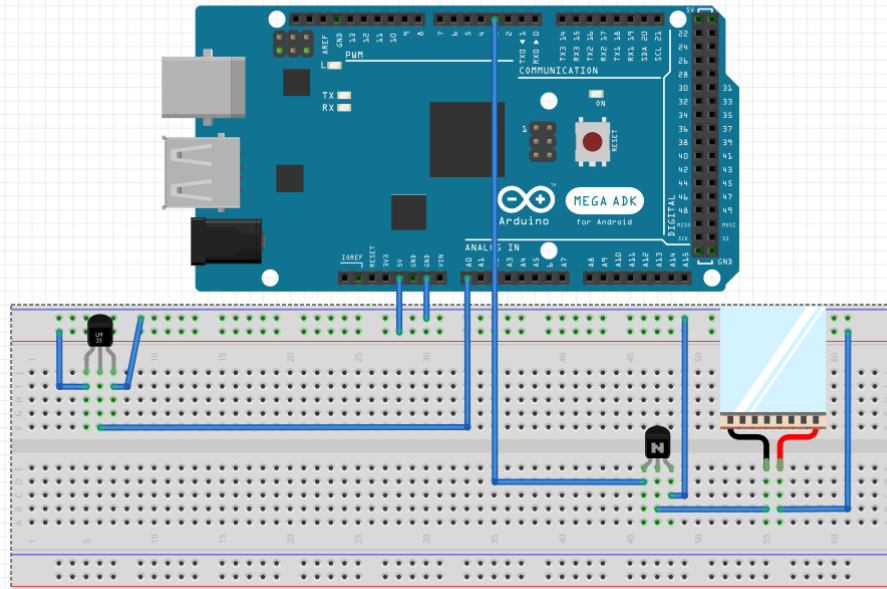
Insulation - 50mm
thick styrofoam



Cooling Unit



Schematics





Limitations

Limitations

3D Extruding Unit

- Need to manually code the design of the extruded part
 - Basic shapes
- Low Printing Capacity

Peltier Unit

- Not Energy Efficient
- Insufficient Insulation
 - Slow Freezing of Food Puree

Further Improvements

- More energy efficient cooling unit
- High Printing Capacity
- Freedom of Printing (G-codes)
- CNC shield
- Food Grade Materials
- IOT

Live

Demonstration

Thank You
QnA