ArdiChef Project

The Automated Kitchen Cooker

Started By: Thomas G (12/2014)

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1. INTRODUCTION

The ArdiChef project will reside within http://www.github.com/tgit23/ArdiChef/

1.1 Software

The software will mostly be written using the Arduino programming software package along with the "Processing" programming language.

1.2 Control

The ArdiChef project will be controlled using the Arduino project (http://www.arduino.cc/) micro-controller board and mimic a lot of the 3D RepRap printer project technologies.

1.3 Hardware

- ✔ Repository of Models - http://www.github.com/tgit23/Ardichef/ → Hardware/
- ✔ Bill of Materials

Many of the hardware parts are printed using a 3D printer while some will need to be purchased. Currently all 3D printed parts are designed in Google Sketchup and stored at

2. FOOD DISPENSERS

2.1 Granular Foods Dispenser (GFD-28BYJ)

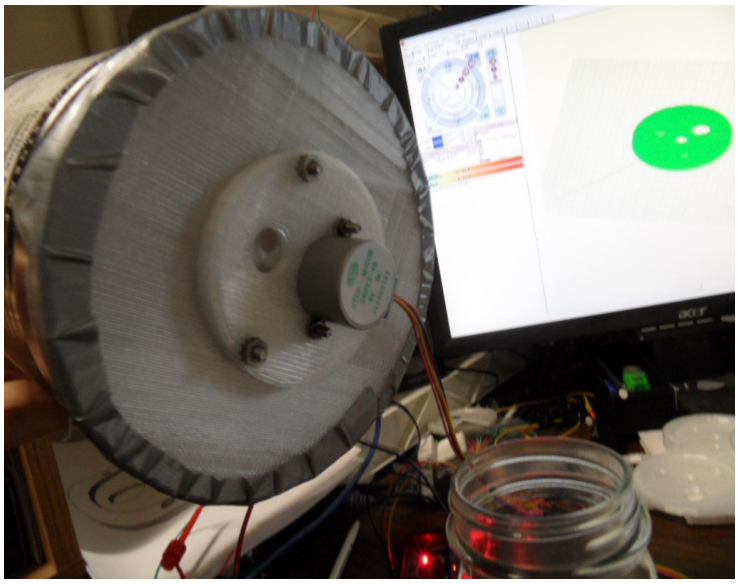
Granular foods like sugars and spices can be dispensed using what I'd call the Gumball approach. A circular plate with holes in it rotating to a covered drop-hole.

2.1.1 1-Gallon Can Granular Foods Dispenser (GC-GFD-28BYJ)

The 1-Gallon granular food dispenser requires

- ✔ One Gallon Tin Can with a base diameter that measures 16.125 inches
- ✔ 28BYJ-48 5Vdc 4-Phase 5-Line Stepper Motor with ULN2003 Driver Module Board
- ✔ 3D Printer for printing the following parts @ http://www.github.com/tgit23/ArdiChef → /Hardware/GranularDispensers

File-Name	Google Sketchup	Thumb	Description
MotorMount.skp	2014 - Inches		1) The 28BYJ Stepper motor is bolted into this motor mount (Shaft up)
DispGear_4inHoles.skp	2014 -Inches		2) The Disp (Dispense) gear is placed on the motor shaft
GallonCanBase_6pt125inchBase.skp	2014 - Inches		3) The "MotorMount/Stepper/DispGear" assembly is then bolted to the CanBase 4) The Assembly is then attached to the bottom of the One-Gallon tin can.
MotorMountSpout.skp	2014 - Inches		5) Optionally – A spout holder can be attached to the MotorMount under the dispensing hole.



2.2 Powder Foods Dispenser (PFD-28BYJ)

2.2.1 1-Gallon Can Powder Foods Dispenser (GC-PFD-28BYJ)

The 1-Gallon powder food dispenser requires

- ✔ One Gallon Tin Can with a base diameter that measures 16.125 inches
- ✔ 28BYJ-48 5Vdc 4-Phase 5-Line Stepper Motor with ULN2003 Driver Module Board
- ✔ 3/4" Shedule 80 PVC Pipe threaded and notched the height of the tin can
- ✔ 3/4" PVC Pipe Nut (Created by cutting a PVC cap)
- ✔ 3D Printer for printing the following parts

File-Name	Google Sketchup	Thumb	Description
MotorMountGearBox.skp	2014 - Inches		1) The 28BYJ Stepper motor is bolted into this motor mount gear box (Shaft up)
MotorGear.skp	2014 -Inches		2) The MotorGear is placed on the motor shaft
PipeDriverGear.skp	2014 - Inches		3) The PipeDriverGear is dropped freely into the MotorMountGearBox.
Scrapper.skp	2014 - Inches		5) The Scrapper is attached (glued) to the top of the 3/4" Threaded and notched PVC pipe.
GalCanBase_ThreeQtrNutBase.skp			6) The PVC Nut is glued into the CanBase 8) The CanBase is then attached to the bottom of a one-gallon tin can 9) The "MotorMountGearBox/MotorGear/PipeDriverGear" assembly is bolted to the CanBase. 10) The Threaded and Notched "PVC-Pipe/Scrapper" is threaded down the CanBase till the PipeDriverGear's Notches catches the Notches in the PVC pipe.

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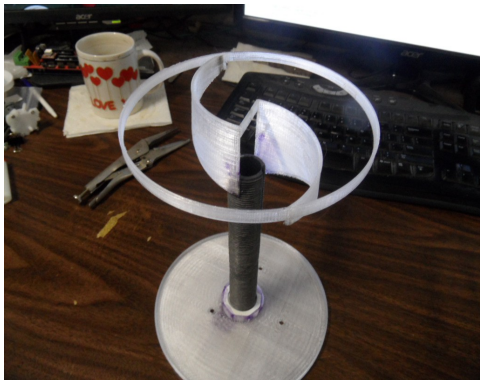


2.3

3. Up For Discussion

1) 4- Canisters into one spout or 4-spouts together
2) Turn-table or Conveyor
3) Mixer on mixing bowl over head?

4. Bill Of Materials (BOM)

4.1 Tools

- ✔ 3D Printer
- ✔ Pipe Threader Die for 1/2" and 3/4" pipes

4.2 Materials

- ✔ 1/2" Schedule 80 PVC Pipe
- ✔ 3/4" Schedule 80 PVC Pipe

4.3 Original Purchases

From http://www.gearbest.com/

GZGW09 3D Printer Reprap Stepper Motor Driver Module Works with Official Arduino	106842801	2	$30.54

```
GZGW09 3D Printer Reprap Stepper Motor Driver Module
Step angle: 1.8 degree
Rated voltage: DC 4.83V
Rated current: 0.84A
Phase impedance: 5.75 Ohm + / - 10 degree centigrade
Phase inductance: 9.3 mH + / - 20 degree centigrade (1kHz 1V RMA)
Shaft diameter: 5mm / 0.188
Shaft length: 20mm
Motor height: 34mm
Number of lead wire: 4 wires
```

```
                    Product Weight: 0.22 kg
                    Package Weight: 0.23 kg
Product Size(L x W x H): 5.8 x 4.2 x 4.2 cm / 2.28 x 1.65 x 1.65 inches
            Package Size(L x W x H): 8.0 x 6.0 x 5.0 cm
```

NZ0019501	3	$11.22

28BYJ-48 5V 4-Phase 5-Line Stepper Motor with ULN2003 Driver Module Board

Google Sketchup 3" x 5 3/16" Rectangular Drive Hole

Arduino MEGA2560 RepRap Circuit Sets for 3D Printer Ramps	NZ0049801	2	$75.24

Package Contents:
1 x MEGA2560 Circuit Sets
1 x Ramps 1.4
4 x A4988
1 x USB Cable

SKU	Product Name

(1)
112766
$3.15

WEITUS A05 Anti-Slip Stainless Steel Precision Angled Tweezers (120mm)

(1)
277147
$4.99

Double Tip 21cm Dupont Cable - Black + Multicolored (70 PCS)

(1)
145357
$7.91

3-Pin Power Adapter Socket with Rock Switch for DIY Project - Black + Red (5-Piece Pack)

(1)
344826
$4.80

S401 1/4" Water Flow Sensor for Dispenser / Coffee Machine - White

(1)
263660
$10.99

DIY Copper Breadboard DuPont Connection / Test Cables - Multicolored (200 PCS)

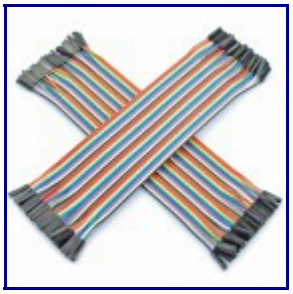
(1)
120283
$2.20

20A Battery Terminal Alligator Crocodile Clamp Clip (Pair)

(1)
123648
$1.46

2.54mm Mini Jumper Connector - Black (50-Piece Pack)

(1)
162180
$3.91

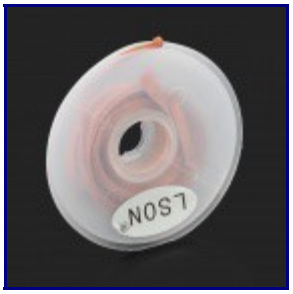


1-Pin Female to Female DuPont Cables for Arduino (2 x 40 PCS / 21cm)

(1)
4593
$2.33

Heatsink Thermal Compound (Grease-like)

(1)
285349
$2.77



LSON 3mm x 1.5m Desoldering Wire Solder Wick - Brown

(1)
206265
$1.77

SZF303 Small Water Pump Motor Water / Oxygen Pipe / Tube - Transparent (100cm)

(1)
232242
$2.41

DIY Plastic Water Pump Line Tube - White (4 PCS)

(1)
203330
$4.99

20904 Silicone Tube Pipe - Translucent White (5 Meters)

(1)
219983
$41.23

YZ02-175 ABS 1.75~1.8mm 3D Printer Consumables Filaments for Makerbot / RepRap / Mendel - Black

(1)
268732
$41.67

Heacent P175 3D Printers Dedicated 1.75mm Filament PLA Print Materials - Transparent (1kg)

HSYY01 Micro Gear Water Pump Motor w/ Hose - White + Silver

$5.23

(2)
236808
$5.23

Brand N/A
Model HSYY01
Quantity 1
Color White + Silver
Material Iron casing + PVC
Specification
Working voltage: 4~12V; Working current: 0.8A;
Motor diameter: 2.7cm; inlet opening outer diameter: 0.4cm **Features**
Working voltage: 4~12V; Working current: 0.8A;
Motor diameter: 2.7cm; inlet opening outer diameter: 0.4c.
Water flow rate: Approx. 1.2L/M (5V)
Application DIY project
English Manual/Spec NO
Packing List
1 x Motor
1 x Hose (100cm)

Dimensions: 2.56 in x 1.69 in x 1.61 in (6.5 cm x 4.3 cm x 4.1 cm)
Weight: 3.03 oz (86 g)

(1)
229082
$5.92

DIY Electric Motor Mini Water Pump

$5.92

(1)
300904
$8.48

5.5V- 12V Submersible Water Pump - Black

(1)
185970
$6.49

MPX08 Micro Liquid Gear Pump w/ Silicone Tube - White (DC 5V)

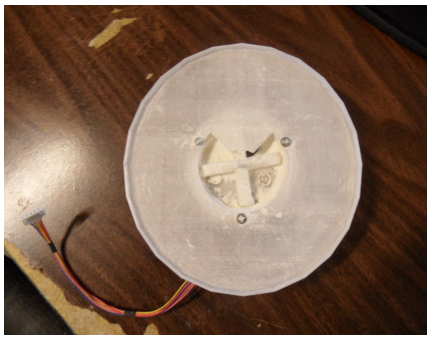
Order Subtotal:	USD$ 206.92
Shipping Cost:	USD$ 1.70
Handling Fee:	USD$ 0
Discount Total:	- USD$ 1.70
Grand Total:	USD$ 206.92

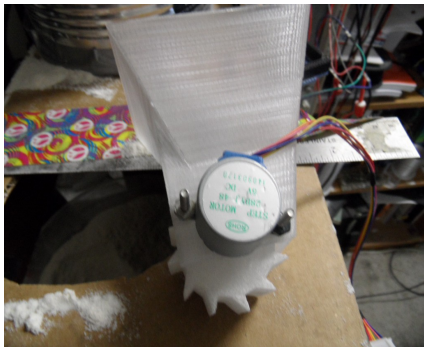
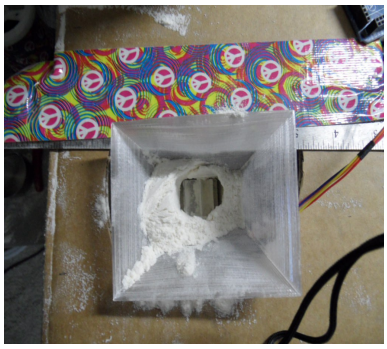
5. Failed Attempts For Reference

5.1 Powder Dispensing

Dispensing powder proved to be quite challenging

- ✔ Large holed Granular type approach – FAILED
- ✔ Funnel container – FAILED (Didn't attempt a super-long auger approach as it was thought to fail also)
- ✔ Large bottom "Water Wheel" type approach - FAILED



- ✔ Partial Solution "Top Down" – WORKS (But needs refinement – as per actual unit)
  - ○ Creating a scrapper that falls down as product is removed while scrapping product to a center drop hole.
  - ○ While this worked for flour – corn starch and small holed center (1/2" pipe) will most likely still be an issue
  - ○ Disadvantages
    - ▪ The scrapping gear must be held up while filling the cannister
    - ▪ The center shaft has large holes that leak while filling the cannister
    - ▪ A cap must be put on the end of the shaft to keep it from binding the gear
    - ▪ Filling with flour is more difficult due to motor being attached at the top
    - ▪ The flour did dispense well as shown above the can has been dispensed of flour completely without any intervention.