2 Minute Limit
Problem Statement: Describe the problem you plan to address
Idea: What will you make? How will you solve the problem?
Plan: How will you bring your idea to life? (What will your prototype/working illusion be?)

Problem Statement:

When using a Toilet in a house it can become plugged. 27% of Americans experience clogged toilets in their homes each month and leaving a toilet clogged can lead to flooding. Furthermore, people find manually plunging a Toilet very unclean.

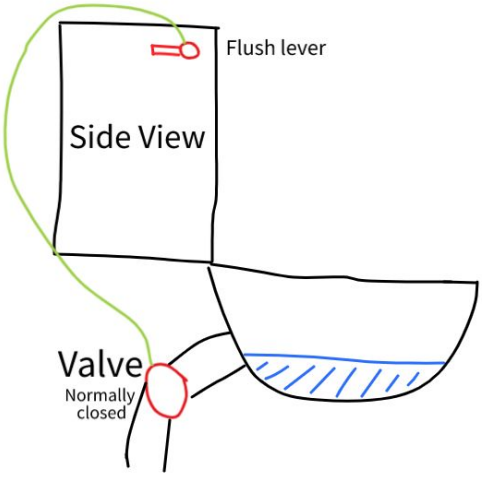
In the United States alone, up to 89 million people (27%) experience clogged toilets in their homes each month. Clearing a toilet manually with a plunger can be extremely inconvenient and unsanitary and poses the risk of splashing sewage water everywhere. Yet waiting for the clog to slowly disappear on its own can take days, and allows the sewage water to seep into the floor through the wax seal. The solution is to create a clean and efficient method of automatically removing clogs as soon as they happen.

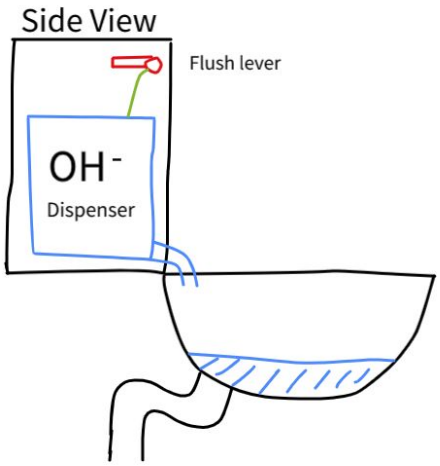
-Identifies and defines problem being solved
-Has researched problem and possible solutions

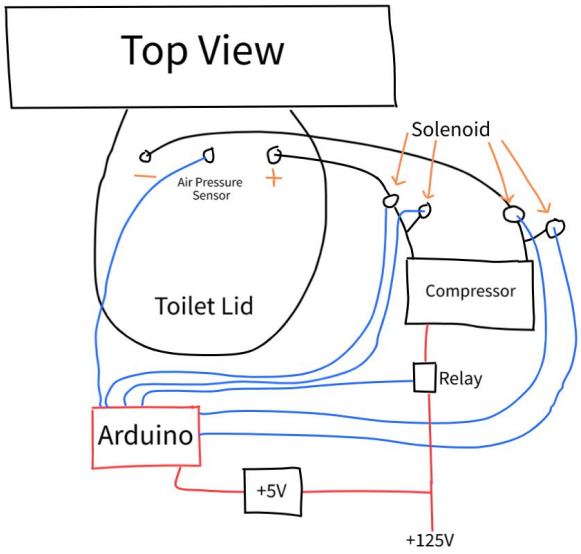
- Leaving a toilet clogged leads to flooding, also breeding ground for bacteria, airborne mold
- Manually unclogging a toilet can splash sewage water
- (76 **percent**) have experienced a **clogged toilet** in a public restroom
- 27% of Americans experienced clogged toilets in their homes each month, 89 million Americans

Idea:

We are looking to make a toilet that has the ability to unclog itself using air pressure. When the toilet is clogged we would pressurize the inside of the toilet bowl with a tightly sealed lid to push the clog down into the drain using alternating levels of pressure. We would have to have a well made toilet and a strong lid with a rubber seal to retain pressure.


Flush lever
Side View
Valve
Normally closed


Side View
Flush lever
OH-
Dispenser

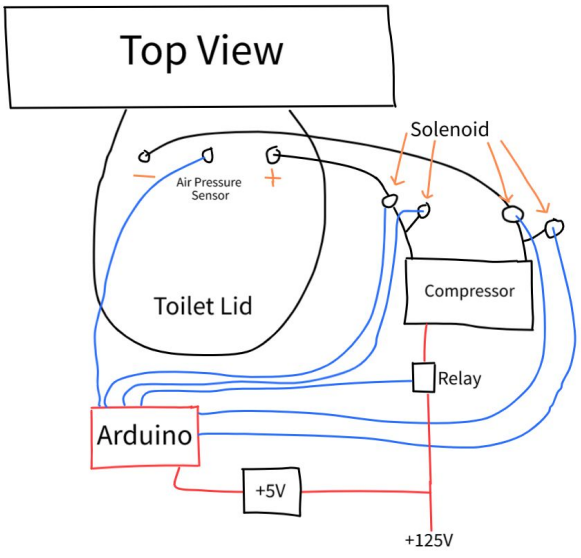

Top View
Solenoid
Air Pressure Sensor
Toilet Lid
Compressor
Relay
Arduino
+5V
+125V

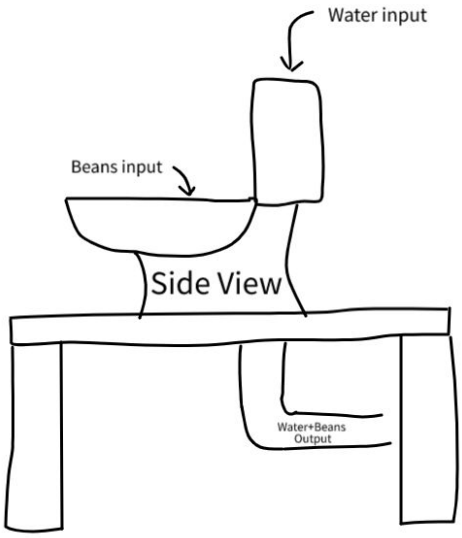
Decision Matrix:

Criteria	Design 1	Design 2	Design 3
Automation	10	5	10
Environmental Impact	10	1	10
Cost	1	10	5
Easiness to Implement	1	10	10
Customer Appeal	1	5	10
Safety/Risk of Failure	1	5	10
Total	24	36	**55**

Worst(1) to Best (10)

Final Sketch:




Water input
Beans input
Side View
Water+Beans
Output

Needed Materials:	Maybe Materials:

• Toilet
• Hose to toilet connection/buckets
• 2x Pump to lid connections
• 2x Rubber Gasket to seal lid
• 2x4+Plywood to make base
• Wax ring
• Toilet Flange
• 2x Bike Pump
• Acrylic Seat Lid
• Crimps
	• 2x Outlets
	  ○ GFCI
	  ○ Box
	  ○ 14/2 w/ground
	  ○ Sacrificial Extension Cable
	  ■ 14/2
	  ■ 16/2
	• Toilet Inner Workings
	  ○ Flush valve
	  ○ Gasket
	  ○ Fill Valve
	• ¼ NPT Tap

Needed Electronics: • Air pressure sensor • **Arduino+Cable+Shield** • 2x 5V relay • Stranded Wire • Solenoid • **Desoldering wick**	Maybe Electronics: • LCD Display

Electronics:

- Air Pressure Sensor ($27.59)
- Snubber Diode ($8.99)
- 12V Power Supply ($6.99) For Solenoids
- **4 x Solenoid Valve (4 x $9.30)**
- Relays 5V DC 125V AC ($8.69)
- 22 Gauge Stranded Wire ($15.29)
- LCD ($12.99) $117.74

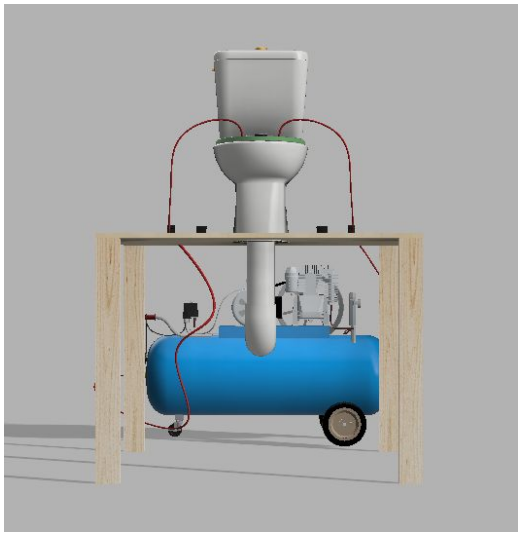
Pneumatics:

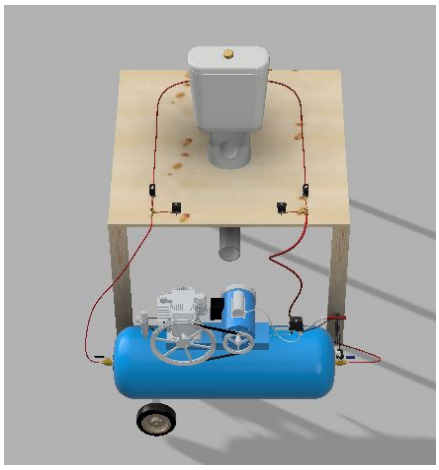
- ¼ NPT Male Fittings ($9.99)
- ¼ NPT Connectors (T-Joint) ($14.99)
- ¼ NPT Nut (Female Connector) ($9.99)
- ¼ NPT O-rings ($7.98)
- ⅜ Hose ($14.99) $57.94

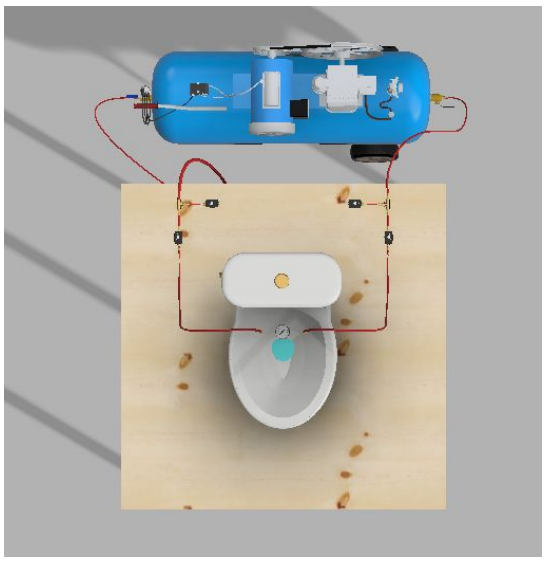
Materials:

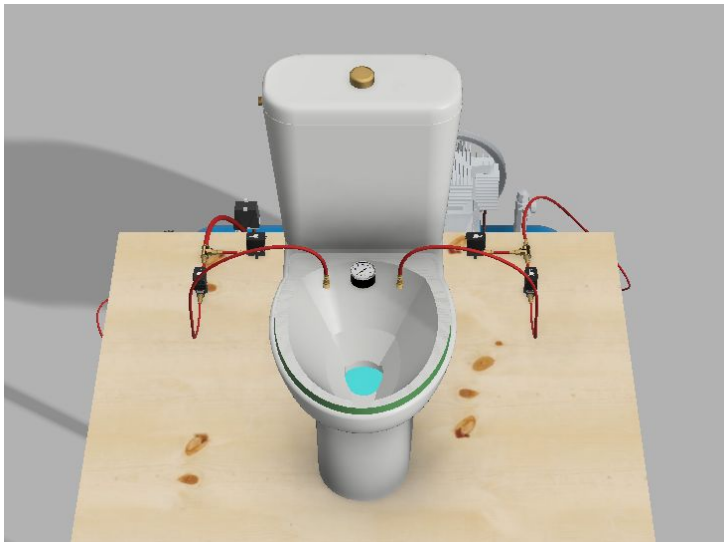
- **Acrylic Sheet ($37.95) minimum 18” x 18”**
- Wax Ring ($1.97)
- Flange ($6.27)
- 3 x 2x4 Wood (3 x $5.98)
- **Plywood ($38.68)**
- **Gasket Sheet ($28.99)** Alternative: Plumbers Putty ($1.27)
- Crimps ($11.98) $143.78

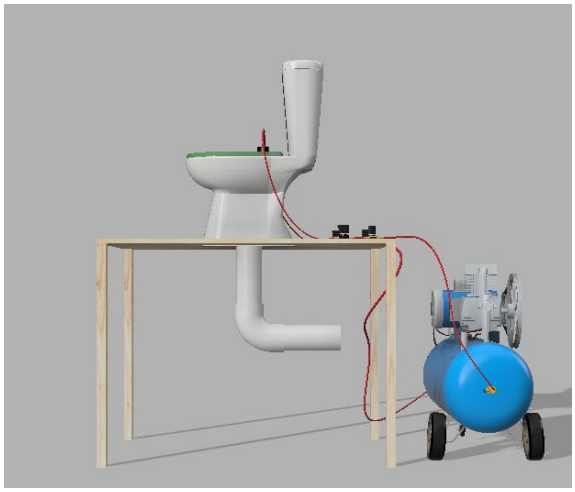
$319.46

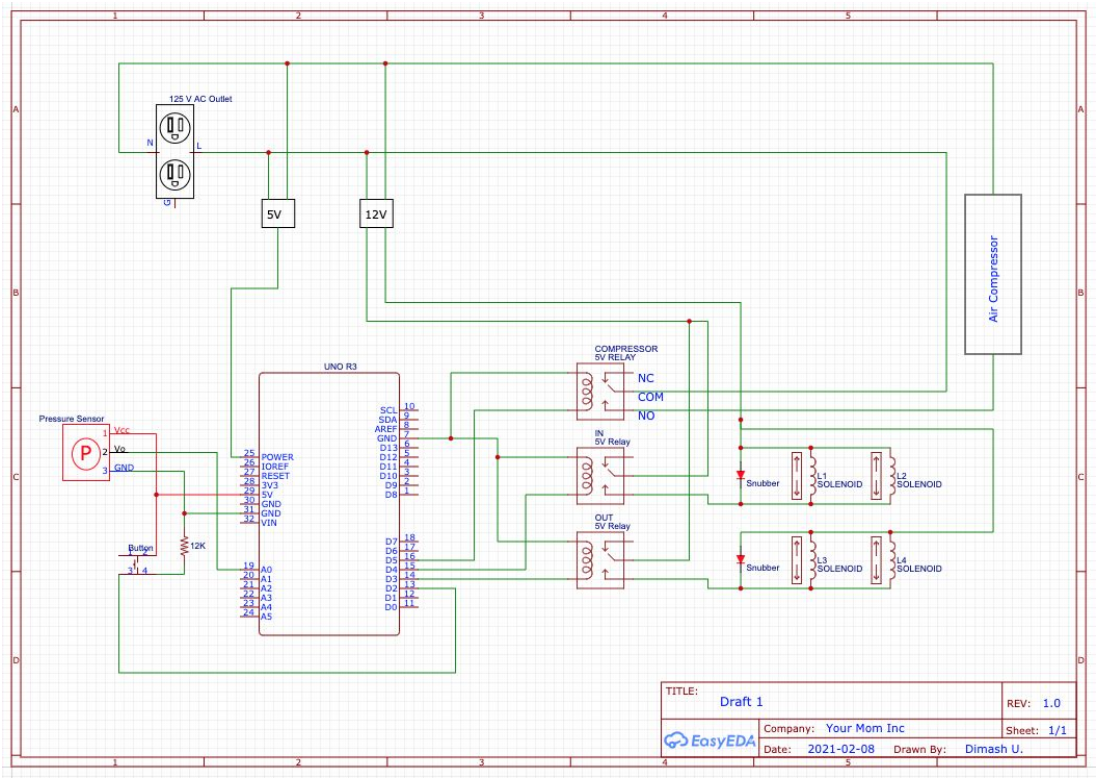











125 V AC Outlet
N
L
5V
12V
Air Compressor
COMPRESSOR
5V RELAY
NC
COM
NO
IN
5V Relay
OUT
5V Relay
UNO R3
Pressure Sensor
Vcc
Vo
GND
Button
12K
POWER
IOREF
RESET
3V3
5V
GND
GND
VIN
A0
A1
A2
A3
A4
A5
SCL
SDA
AREF
GND
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SOLENOID
L2
SOLENOID
Snubber
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SOLENOID
L4
SOLENOID
TITLE:
Draft 1
REV: 1.0
EasyEDA
Company: Your Mom Inc
Sheet: 1/1
Date: 2021-02-08
Drawn By: Dimash U.

Resources:

- https://www.korky.com/toilet-help/troubleshooting-guide/anatomy-toilet
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