

Bottoms Up - Universal Bottle Pourer

Start Date	01 Dec 2017
Initiated Activity	TOM:Melbourne Makeathon 2017
Challenge	Bottoms Up - Universal Bottle Pourer
Photo	
Stage	PROTOTYPE
Type	ACCELERATOR WORKSHOP EVALUATE

About the project

	English Details	Local Language Details
Need Knower Background	The need knower is Mandy McCracken - Mandy is a quadruple amputee with two prosthetic hands. Due to the rigid nature of her prosthetics, Mandy has difficulty gripping various shaped bottles and accurately pouring liquids.	
Challenge	Mandy's challenge is to create a universal and inclusive bottle pouring system.	
Solution	<p>The device uses tactile touch technology to activate an integrated dual process system, to safely and efficiently pour a variety of beverage (milk, orange juice, wine etc.) with a start/stop/reverse movement. The device is intended for universal use and can be modified to suit individual needs, other users could include those with:</p> <ul style="list-style-type: none"> • Muscle weakness • Rotation issues • Stroke • Motor neurone disease • Multiple sclerosis • Prosthetic limbs • Fatigue • Fractured arm/wrists/clavicle • Parkinsons • Arthritis • Limited fine motor skills and dexterity • Cerebral Palsy • Intellectual Disability • Down Syndrome • Visually Impaired • Vascular disorders 	
Team	Ryan Tilley, Edward Bennison, Rylan Fraser, Kyle Driscoll, Rebecca Pearce, Nicholas Perillo, Ruth Twardy, Stuart Enright, Joel Kuper, No'Am Geffen, Jeremy Kostecki, Natalie Rode and Mandy McCracken.	



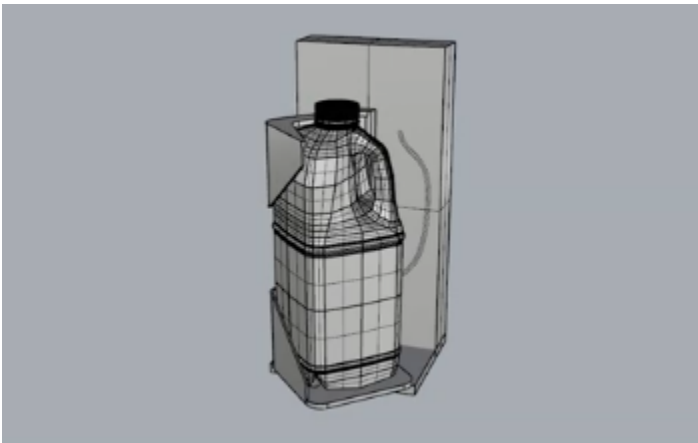
Timeline:

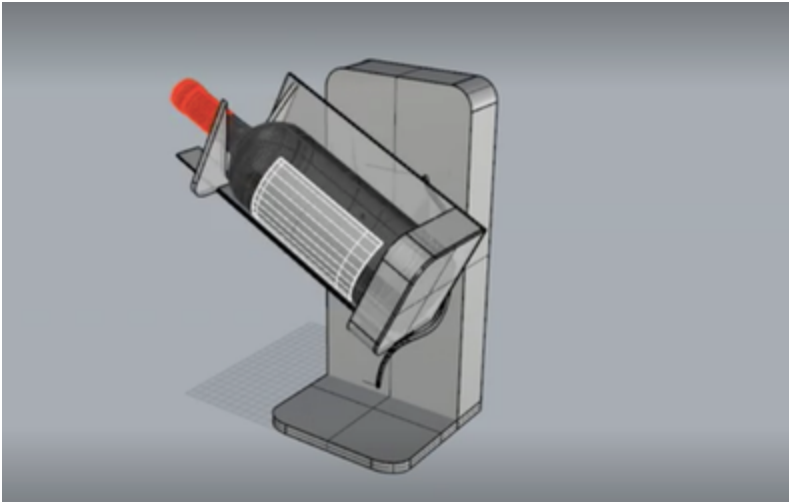
Initial Meetings

- *Pre-Tom event 25th October:* met team, need knower, discussed parameters, created facebook group/google drive, initial concepts formed
- *Secondary meeting 9th November:* met again, further analysis of concepts and limitations, discussion of possible ideas, initial CAD model created
- *Tom Induction 23rd November:* met after induction with Mandy and Rod, further discussed ideas and options, used Rhino to create 3D image idea
- *Goal:* To design a universal bottle pourer that will pour all types of bottles into all types of glasses and bowl with the press of a single button.
- *Key Themes:* small package, look like a general kitchen appliance, \$500 cost, no spillage/splashing/dripping down side of bottle

Initial Ideas

- Pump idea was explored but discarded as cleaning/maintenance issues
- Idea of using mechanics/electronics explored
- Touch button pad concept cemented for universal use





TOM Makethon

Day One:

- After previous team meetings and consultation with Mandy the concept of the bottle pourer had already taken shape
- Video simulating pouring technique, mapped and created wooden track prototype
- This was excluded as difficulty linking motors and coding
- Carriage printed to moc model up inside of base
- Trialling streamline design where server motor couples with the drive shaft
- Bottle will be on opposite side to driver
- Test whether motors can lift the required weight
- Cradle prototype / option for segments
- Cradle prototype of cradle in foam then 3D printed cradle
- 3D printed carriage to hold server motor



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IMG_7938.MOV



Day Two:

- The aim for the electrical team was to finalise the code to make the pouring motion smoother
- An integrated circuit design was prototyped
- Frame was welded
- The final design was mounted onto the prototyped board
- The iterations of software were tested on the microprocessor
- A solid acrylic design for the cradle was cut, assembled and tested
- A new and lighter version of the cradle was design and set up to print on the 3D printer



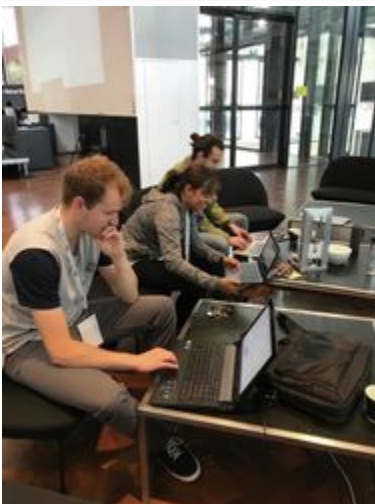
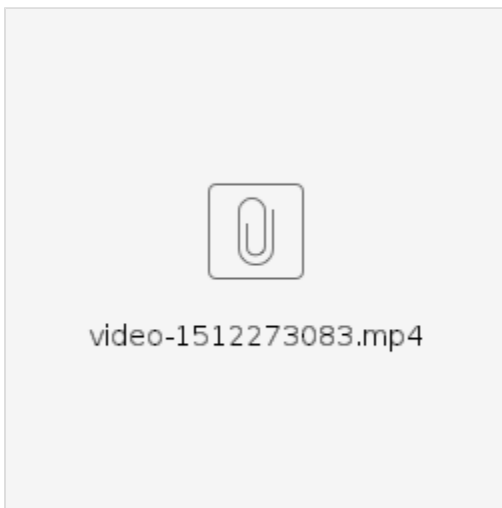
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Day Three:

- 3D printed parts of the cradle were put together, glued and spray painted
- The parts for the outside facade were laser cut, shaped and assembled
- Coding was reiterated
- Components were finalised and assembled
- Pourer was tested and corrections were made



Approximate Time to Build

Approximate Cost to Build

10-12 hours

\$500 and 3D printing costs

General Warnings and Cautions

- Read through entire manual before attempting to build this device.
- Do not attempt a step if you are unsure of what you are doing. Certain steps in this manual require experience with fabrication tools. Incorrect implementation can lead to injury of yourself and others. For assistance or clarification of any step, contact team members.

Meet the Team

Makers:



Ryan Tilley

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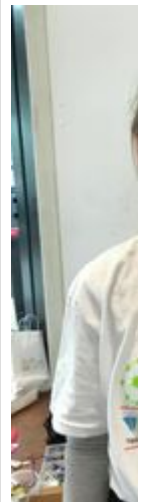
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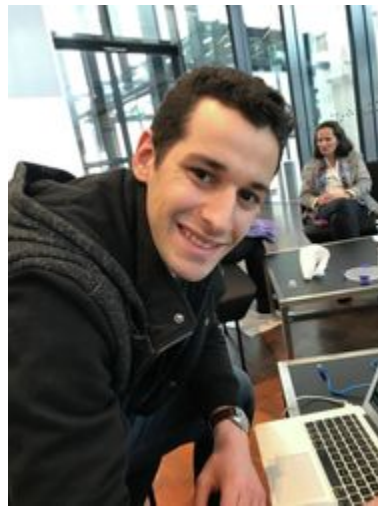
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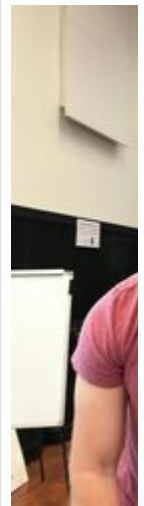
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∨ [Icon Glossary](#)

The following icons may be used throughout this manual—each with its own purpose.

The warning icon is used to signify whenever someone who is attempting the procedure may injure themselves or damage the equipment.

The info icon is used to signify useful bits of information that complement the instructions.

The tip icon is used to provide information for after the procedure is completed, such as tips for disassembly.

∨ [Device's Timeline](#)

History of Device

Project Start Date: 01/12/2017

Project End Date: 03/12/2017

Origin of Project: TOM Melbourne

Potential Improvements

Cycle #	Cycle Start Date	Cycle End Date	Suggested Modifications	Need Knower Feedback
1				
2				
3				

Physical Description

Brief Physical Description

The frame of the device is an aluminium chassis which holds the lifting and rotating mechanism and is integral to the strength of the device. The outside facade is acrylic and bent tubing.

Components of Device

Mechanical Hardware:

Type 1: Carriage (what is lifted holding the rotation motor)

Type 2: Cradle (3D printed cradle to hold the bottle)

Electrical Hardware and Circuits:

Type: Arduino Pro Mini, Stepper controllers x 2, voltage step down module, capacitors, resistors, wiring

Software and Programming:

Platform: Arduino

Language: C++



List of Labeled Components

Stepper motors: St

servo motor:

Lead screw:

Carriage:

Software and Programming Online Resources

Software and Programming Online Resources

APIs

Libraries

Other Reference Material

Build Instructions

Subassembly #

Subassembly :



Step #

Instructional Step /

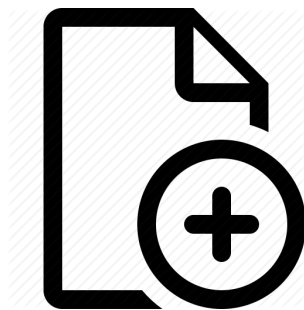
Tools and Machines Required for this Step

Name of Tool/Machine

Materials and Parts Required for this Step

Name of Material/Part	Quantity

Supplementary Files Used for Subassembly





Instructions

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▼ Step #

Instructional Step /

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Instructions

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∨ Subassembly #

Subassembly :



∨ Step #

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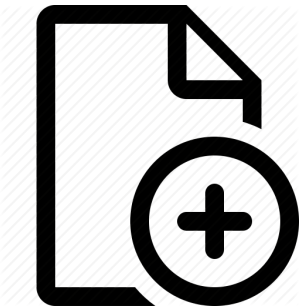
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Instructions

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