Materials and Prototyping Guideline

Prototyping is mandatory for this competition, and competitors will be provided with the necessary materials and machinery to create an early stage proof-of-concept.

BME Innovation Space

The BME Innovation Space is a new facility located in the basement of the BME Department Building (Denney Research Center - DRB) that will be operated throughout the duration of the competition by members of the Make-A-Thon Committee. Competitors are expected to respect the rules of the Innovation Space, clean up after themselves, and be courteous to other teams sharing the space. Prior to using the equipment, competitors are expected to be familiar with the Standard Operating Procedures (different hours of operation - see Make-A-Thon schedule) and must sign a liability waiver available at the Innovation Space.

The following equipment is available for use in prototyping (complete list on last page):
- Ultimaker 2+/3/5 3D Printer
- Prusa Mk3S Printer
- Common hand tools, drills
- Soldering

The complete list of machinery in the innovation space can be found here. However, only the hand tools are available for direct use by the competitors. To use any other machinery, request assistance from Arjun Karnwal (akarnwal@usc.edu), Matt Blanco (mrblanco@usc.edu), or Myilan Muruganujan (myilanmu@usc.edu), who will supervise prototyping in the BME Innovation Space.

3D Printers

USC's 3D4E has generously offered competitors the use of their 3D printers! Three Prusa MK3S printers will be set up in the fabricating space (along with 4 Ultimaker Printers in the DRB Innovation Space) for use by any team. The printers are equipped with 1.75mm PLA filament. The build volume for the Prusa Printers are 230 x

190 x 190 mm (Length x Width x Height) with a 0.4 mm nozzle and lowest resolution of 0.05 mm. All parts to be printed should take these parameters into consideration.

Use of the 3D printers will be from 11 am on Saturday, February 1st, until 2 PM on Sunday, February 2nd. Please **present your sliced model (using one of the slicer softwares above) to a materials committee member** (Matt Blanco, Mylilan Muruganujan, Arjun Karnwal, Nicholas Dorgan, Anthony Mouchawar, or Emre Aricioglu) who will approve your print and sign you up for a time slot via this [spreadsheet](#). Teams may only be signed up to use one printer at a time, and each print may take a maximum of **3 hours** (excluding overnight prints). The Committee members will decide which printer to use based on your slice file. To use the printers overnight, you must have your print approved by a materials member (see list above) **by 10:30pm PST**. All **overnight prints will begin at 11pm**. Printers will be accessible on a **first come, first serve** basis (applies to overnight prints as well).

Associated Software

It is highly recommended to prepare your print using slicer software before coming to the DRB Innovation Space in order to save time throughout the event. See below for links to download the slicers for the available printers during the competition:

- [Prusa Slicer](#) (For Prusa printers)
- [Cura](#) (For Ultimaker printers)

Materials

Each team participating in the Make-A-Thon will have access to the following items for fabrication. Teams are expected to share the provided material with other teams and are allowed to use common materials found in the Innovation Space.

You will be allowed to request items from Home Depot, but these must be approved by a committee member by 1:00pm on Saturday, February 1. Contact your committee member for more information on this.

NO OUTSIDE TOOLS OR MATERIALS MAY BE USED TO FABRICATE THE DEVICE - DOING SO WILL RESULT IN DISQUALIFICATION.

Materials Checklist

Arduino Unos	Accelerometers	Rubber bands
Springs (variable resistances)	Flex (stretch) sensors	Resistance exercise bands
Acrylic	Solenoids	Epoxy
Velcro	Servo motor / stepper / DC	Nylon line
Wood	Zip ties	Resistors
Magnets	Distance sensors	Wire strippers
PVC pipes	Light sensors	Rotary encoders
Vibration motor	Pressure sensors	Switches
Female to male wires	Extra wires for Arduinos	Ball bearings
Header pin set	Duct tape	Power strips
Calipers	Acrylic adhesive	Foam
Rulers	Fishing wire	Lanyards
Electrical tape	Yarn	Cotton fabric
USB drives	Solder	Sewing kit
Aluminum wire	X-acto knives	Cotton fluff
Popsicle sticks	Wood screws, nuts, washers & bolts	Piezo buzzers
Button	Wrist and Knee Braces (Limited)	Speakers
LEDs	Mice	Screwdriver set
Keyboards	EMG Wiring and electrodes	Controllers
Extra button and joysticks	Elbow brace	Wrist braces/splints

Mouth guards	Shoulder brace	Flexible wire
Phone cases	Individual keyboard keys	Neck brace/sleeve
Breadboards	Ultrasonic Sensors	Temp Sensor
Gloves (fingerless, yarn, leather?)	Flex sensor	3d printing spool
Trimpot	Accelerator supplement	Heart rate sensor
5 V relays	Seven segment displays (4 digit)	Remote controllers
IR Receivers	Power module	Fans
Proto boards	Push switch	Twine
Stepper motor drivers	Metal plates	Markers
Plastic sheet	9V Battery	Glue
Hot glue	Stretch sensor	LCD Screen