



NDSU Student Technology Fee Action Plan

Request for Scope Change

Please email this request prior to implementing the requested change, to CeCe Rohwedder at cece.rohwedder@ndsu.edu

TITLE OF PROJECT Campus Makerspace-Phase 1		
Project TFAC Number:#1801		
Project Fund Number: 19594		
Total Technology Fee Award: \$13,578.84		
Remaining Balance in Award Fund: \$13,113.46		
Project Director Adam Elznic: Emerging Technologies Service Coordinator	Campus Address: Dept. 2080 1201 Albrecht Blvd. Fargo, ND 58102 Phone: 701-231-97 46 E-mail:adam.elznic@ndsu.edu	
Name (Type or Print)	Signature	Date
Project Director Adam Elznic		8-20-18
Unit Head Dean-Joe Moczniak		8-21-18

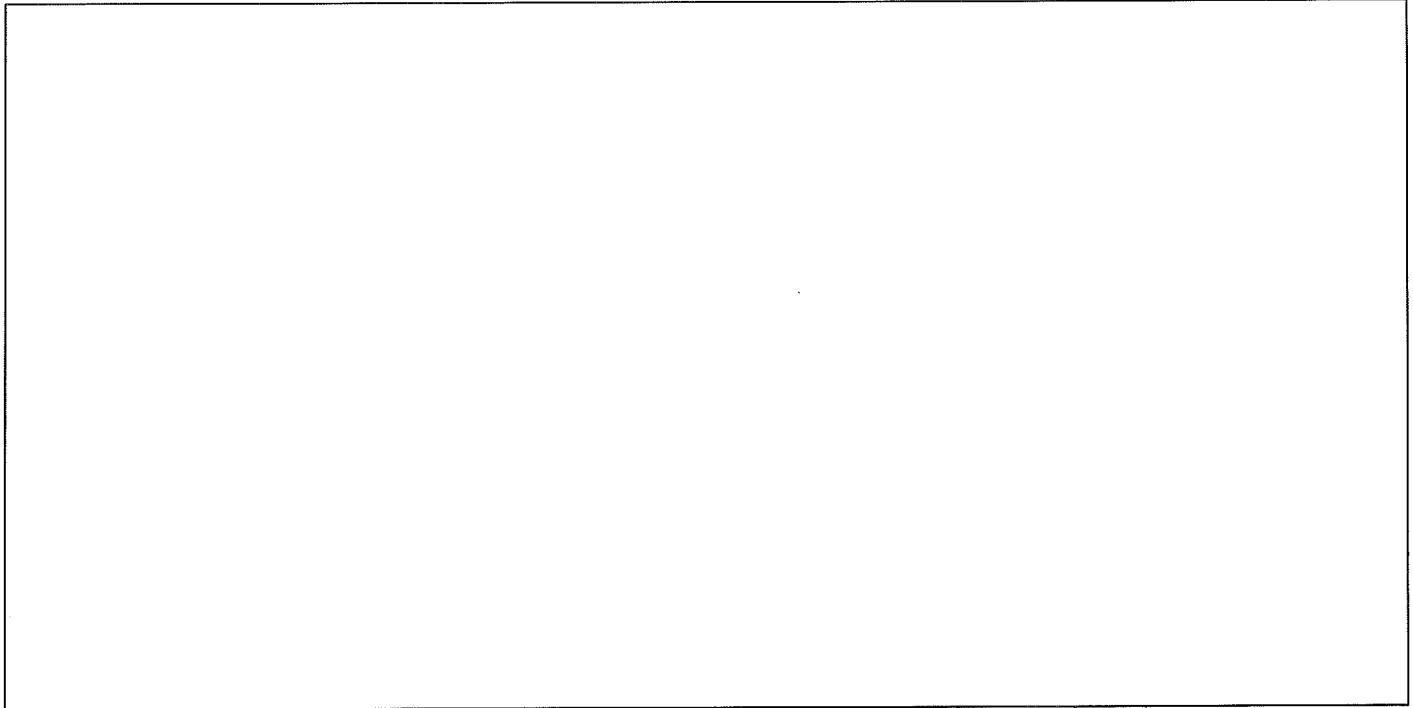
Description of Requested Scope Change:

Attached is the following: A TFAC Grant Breakdown of request for scope change, the original TFAC budget request with strike-through indicating items we wish to no longer purchase, and an updated TFAC budget request with items requested for purchase instead.

The request for scope change is a result of the elimination of the Metal Mill, Lathe, Drill Press, and supporting tooling. These items presented a safety concern to the incumbent Emerging Technologies Service Coordinator. The funds dedicated to their purchase could instead be redirected and support a safer alternative and allow for the purchase of fundamental equipment to support the space in all phases of development.

The funds for the Metal Mill, Lathe, and Drill Press have been redirected into a safer, more economical cnc desktop mini mill. This mini mill fits better into a curriculum and environment in the lab area. The Nomad 883 is an enclosed unit, designed for this environment, and whisper quiet. It also has a more student friendly interface design that is more conducive to the teaching processes. Drawing on previous experience, I had safety concerns about having a metal mill and lathe in the space and felt that the technical know-how and up keep was beyond the average user of the space.

From there, we've redirected the funds from specialized tooling that would have supported the Mill, Lathe, and Drill Press, to more common tools that the student could use to make projects in the space. General tools like drills, clamps, and Dremel tools will be purchased instead, giving students more options in self-directed projects. Items like vises, work benches and work tables are included as fixtures to the space.



Approved Denied

Date 8/24/18

By Marc Wallman VPIT
Name & title


Signature

Scope Change Breakdown

Submitted is an explanation of various changes requested to the TFAC Grant. After a change in Project Director, the initial budget was examined and changed to better suit the needs of the students and space. The changes have been broken down by these categories: Equipment, Tooling, Fundamental Purchases, and Safety Equipment. A budget by subcategory is located on the last page of this report.

The TFAC budget change request comes from the result of eliminating the Metal Mill, Lathe, and Drill Press due to safety concerns. A more economical cnc desktop mini-mill has been proposed due to its safety, design, and student friendly interface. Redirected funds for the mill, lathe, drill press, and supporting tooling was significant and if redirected, would allow for the purchase of more common tools that will support the space in all phases of development. We feel these are fundamental to the growth and support of the space.

These purchases were made by the preceding emerging technologies coordinator and would fall under the category of fundamental purchases as they support the space. They are highlighted here to show difference in total budget moving forward.

PREVIOUS PURCHASES			
Stanley Mechanical Set	1	\$69.99	\$69.99
16oz Rubber Mallet	1	\$2.99	\$2.99
12' Stanley Tape Measure	3	\$4.19	\$12.57
Center Punch	2	\$4.99	\$9.98
16oz Double Face Mallet	1	\$5.49	\$5.49
16oz Curved Claw Hammer	1	\$3.98	\$3.98
3pc Locking Pliers Set	1	\$11.98	\$11.98
3pc Adj. Wrench Set	1	\$12.99	\$12.99
12pc Punch and Chisel Set	1	\$29.96	\$29.96
3pc Groove Joint Pliers	1	\$10.99	\$10.99
11pc Metric Wrench Set	1	\$14.99	\$14.99
11pc SAE Wrench Set	1	\$14.99	\$14.99
20pc Pro Screwdriver Set	1	\$11.49	\$11.49
4 Drawer Chet	1	\$119.00	\$119.00
27" 4 Drawer Cabinet	1	\$124.00	\$124.00
6" Pliers Set	1	\$9.99	\$9.99
		Total	\$465.38
Original TFAC Grant Request			\$13,578.84
Remaining Balance			\$13,113.46

Scope Change Breakdown

EQUIPMENT

Currently, the space offers Additive Manufacturing by use of 3D Printers. A reductive process, like a mini-mill, has been requested to balance curriculum and teach the fundamentals of Subtractive Manufacturing.

Due to the intense nature of training, maintenance, and safety concerns over the Mill, Lathe, and Drill press, we've opted for a desktop mini-mill. The unit selected is a Nomad 883 desktop Mini-Mill. It was designed for this environment, has a student friendly interface, 54 decibel operating level, and fully enclosed operation area with safety shut down switches to prevent accidents.

The vexEDR was left off in this phase of execution due to space concern and niche application.

Previous Requested Items	Qty.	Cost	Ext. Cost
Radial Drill Press	1	\$384.00	\$384.00
Lathe w/ DRO	1	\$1,684.00	\$1,684.00
Lathe Stand	1	\$384.00	\$384.00
Mill/Drill DRO	1	\$1,959.00	\$1,959.00
vexEDR (robot)	2	\$539.99	\$1,079.98
		Total	\$5,490.98

REPLACEMENT (Subtractive Manufacturing)			
Nomad 883 Desktop Mini Mill	2	\$2,499.00	\$4,998.00
		Total	\$4,998.00

Tooling

The elimination of the Mill, Lathe, and Drill Press meant specialized tooling required to support the machines was dropped and redirected to purchase tooling to support the Nomad 883.

Previous Requested Item	Qty.	Cost	Ext. Cost
R-8 Collet Set	1	\$83.95	\$83.95
Clamp Kit - 7/16 T-Slot	1	\$48.95	\$48.95
Quick Vise	1	\$68.95	\$68.95
End Mills	1	\$52.95	\$52.95
Cutting Oil	2	\$26.80	\$53.60
Carbide Tool Bit	1	\$51.95	\$51.95
Oil-Machine Lube	2	\$14.95	\$29.90
Drill Bit 115pc Set	1	\$68.50	\$68.50
Turning Bore Holder	1	\$29.95	\$29.95

Scope Change Breakdown

Parting Tool	1	\$64.95	\$64.95
Carbide Insert	2	\$15.95	\$31.90
Quick Change Tool	1	\$295.00	\$295.00
Insert Boreing Bar	1	\$94.95	\$94.95
Carbide Insert	1	\$43.95	\$43.95
Indexible Carbide Set	1	\$91.95	\$91.95
Inserts	1	\$45.95	\$45.95
		Total	\$1,157.35

REPLACEMENT (Subtractive Tooling)			
Low Pro Vise	2	\$120.00	\$240.00
Nomad Flip Jig	2	\$120.00	\$240.00
#102 .125 flat cutter	4	\$30.00	\$120.00
#101 .125 Ball End Cutter	4	\$30.00	\$120.00
#112 .0625 Flat Cutter	4	\$30.00	\$120.00
#111 .0625 Ball End Cutter	4	\$30.00	\$120.00
		Total	\$960.00

A Cricut Maker Vinyl cutter was requested previously, but a change to the quantity is requested. The remainder of the money will go towards supporting materials and consumables left out of the previous budget. These are crucial to support the operation of the machine.

Previous Requested Item			
Cricut Maker Vinyl Cutter	2	\$450.00	\$900.00
		Total	\$900.00

REPLACEMENT (VINYL CUTTER)			
Cricut Maker Vinyl Cutter	1	\$399.99	\$399.99
Knife Blade Drive Housing	2	\$39.99	\$79.98
Scoring Wheel Combo Pack	2	\$49.99	\$99.98
Standard Grip Cutting Mat 12x12 3pc	3	\$16.99	\$50.97
Strong Grip Cutting Mat 12x12 3pc	3	\$16.99	\$50.97
Light Grip Cutting Mat 12x12 3 pc	2	\$16.99	\$33.98
Light Grip Cutting Mat 12x24 3 pc	2	\$32.99	\$65.98
Strong Grip Cutting Mat 12x24 3pc	2	\$32.99	\$65.98
Standard Grip Cutting Mat 12x24 3pc	2	\$32.99	\$65.98
		Total	\$913.81

Scope Change Breakdown

Fundamental Purchases

The most successful implementation of sewing machines in makerspaces generally happens after the space has become well established and can support the need. At this time, we feel it best that money be directed to foundational and fundamental purchases for the space.

Previous Requested Items	Qty.	Cost	Ext. Cost
Brother Sewing Machine	1	\$100.00	\$100.00
Brother 1034D	1	\$175.97	\$175.97
Brother Embroidery	1	\$570.00	\$570.00
Scissors	2	\$9.99	\$19.98
Cloth Ruler	1	\$7.99	\$7.99
Acrylic Ruler	3	\$14.49	\$43.47
seam ripper	3	\$4.64	\$13.92
Seam Roller	1	\$18.99	\$18.99
Rotary Cutter	2	\$10.99	\$21.98
		Total	\$972.30

REPLACEMENT (Fundamental Equipment)

Black & Decker Cordless Drill/Impact driver Combo	3	\$99.99	\$299.97
Black & Decker Jigsaw	1	\$39.97	\$39.97
5Gal Buckethead Shop Vac	1	\$21.97	\$21.97
3000 Series 1.2 amp Dremel	2	\$49.00	\$98.00
Rigid brand 14 gal Wet/Dry Vac	1	\$139.99	\$139.99
		Total	\$599.90

Arduinos and Raspberry Pi's are fundamental learning tools in makerspaces. They are microcontrollers used to build small computers or drive "homebrew" machines. Documentation of vendor or price has not been found for previous submission. The change requested is the addition of Raspi and a more cost-friendly generic Arduino.

Previous Requested Items	Qty.	Cost	Ext. Cost
Arduino Starter Kit	2	\$87.90	\$175.80
		Total	\$175.80

REPLACEMENT (Micro Controllers)

Raspi 3 Starter Kit	5	\$84.95	\$424.75
Adafruit Metro MO Express	3	\$24.95	\$74.85
		Total	\$499.60

Scope Change Breakdown

The request for the following items will support the makerspace and allow students to complete projects. These are common tools and work surfaces that every space relies on to complete projects. These tools can be used for years and when expansion occur they will readily fit into the plan and space.

REQUESTED PURCHASES (Foundation Equipment)			
Fiskars Self-healing cutting mat 24x36	3	\$29.97	\$89.91
Stanley 10-175G HI-Viz Utility Knife	4	\$2.88	\$11.52
Tool Shop Titanium Twist Drill Bit 160 Piece SKU: 242356	1	\$29.99	\$29.99
Stanley 12 High Tension Hacksaw sku2375761	1	\$14.99	\$14.99
Menards DDM422 Compact Digital Multi-Meter	1	\$16.49	\$16.49
Bondhus Torx folding hex key Sku#2446928	1	\$9.99	\$9.99
Tool Shop Soldering Iron holders sku 2431164	2	\$4.99	\$9.98
Menards 5 Gallon BucketSKU: 6482910	1	\$2.89	\$2.89
ebonder Dual Temperature 40-Watt Glue GunSKU: 2317	4	\$9.48	\$37.92
DataShark Wire Stripper AWG 30-20	2	\$12.86	\$25.72
Dremel Rotary Tool Accessory Kit	1	\$34.97	\$34.97
Insulated Silicone Rework Mat	2	\$9.95	\$19.90
Adafruit Helping Third Hand Magnifier	3	\$6.00	\$18.00
Super Wide Steel Dust Pan item #67068	2	\$8.39	\$16.78
7in Bench Brush item #1072	2	\$1.99	\$3.98
Neoteck DTI digital Dial Indicator	1	\$23.95	\$23.95
Fan Fume Absorber Benchtop 115v K416-ND	2	\$102.21	\$204.42
6 pc Precision Screwdriver Set	2	\$3.99	\$7.98
Mini Pick and Hook Set	1	\$1.99	\$1.99
Dremel Multi-Visé	1	\$29.97	\$29.97
Masterforce 5" Multi-Purpose Vise M 65154 sku 243149	1	\$69.99	\$69.99
Tool Shop 60 Piece Tap & Die Set m. 2438495 sku 243849	1	\$36.99	\$36.99
Irwin Quick Grip 8 pack # 4935502	2	\$29.98	\$59.96
18 in Quick Release Bar Clamp #96211	4	\$4.99	\$19.96
24in Quick Release Bar Clamp #96213	4	\$5.99	\$23.96
2 In Steel Spring Clamp #39529	6	\$1.99	\$11.94
3 in Steel Spring Clamp #39530	6	\$2.99	\$17.94
6 In Industrial C-Clamp item #62139	2	\$5.99	\$11.98
4 in Industrial C-Clamp item #37848	4	\$3.99	\$15.96
2 in Industrial C-Clamp item #37844	4	\$2.19	\$8.76
pegboard 50pc kit item 67581	1	\$6.99	\$6.99
800 lb Capacity 2-in-1 convertible Cart	1	\$89.98	\$89.98
Seville Classics UltraHD Lighted Work Center	2	\$248.90	\$497.80
Seville Classics UltraHD Work Table	2	\$199.00	\$398.00
Horizontal Paper Cutter - 24" h-149	1	\$36.00	\$36.00
Fiskars Scissors	3	\$14.00	\$42.00
		Total	\$1,959.55

Scope Change Breakdown

Consumables are items that are provided by the space for staff and students. These have a short life span but are requested to help maintain the facility and provide uncommon materials for students. Some of these items are requested to support tools previously mentioned.

Consumable Resources			
Adtech 50 pack 4in hot glue sticks	3	\$5.97	\$17.91
Masterforce Utility Knife Blade Dispenser 110 pk	1	\$8.00	\$8.00
6 pc detail & stripping Brush Set sku 5627305 m. 4170	2	\$5.99	\$11.98
36 pc 1/2 in Horsehair Bristle Acid Shop Brushes	4	\$2.49	\$9.96
Braid Rosin Gold .050x10" PN# EB1088-ND	3	\$6.05	\$18.15
Magnet Roud NDFEB Axial PN# 469-1004-ND	100	\$0.21	\$21.00
Magnet Round NDFEB Axial PN 469-1002-ND	50	\$0.66	\$33.00
Filter Repl For SA-9 Series Fume Hood 3 Pc K419-ND	5	\$19.49	\$97.45
Premium F/F Jumper Wires 40x3"	1	\$3.95	\$3.95
Kraft Paper Roll S-3575	1	\$29.00	\$29.00
PCB COPPER CLAD 6X81/16 2 Side 473-1006-ND	5	\$8.93	\$44.65
Total			\$295.05

Safety Equipment

After meeting with Bret Mayo, Associate Director of Enviromnetal Health and Safety, we took into his considerations for the space and implemented them into the plan. We have budgeted for safety equipment that will cover the current space, and also continue to protect the students during expansion and other phases of the plans. These are fundamental to providing a safe working environment and protecting the student population using the space.

SAFETY EQUIPMENT			
Justrite 4 Gal Flammable Cab	1	\$392.00	\$392.00
Bradley Eye Wash Station 7 Gal UNSPSC	1	\$331.00	\$331.00
Eye Wash Preservative UNSPSC	1	\$9.90	\$9.90
Badger Fire Extinguisher 5.5lbs UNSPSC	2	\$66.25	\$132.50
Body Fluid Cleanup Kit, Box	3	\$32.84	\$98.52
Blade Disposal Container sku h-839	3	\$15.00	\$45.00
Industrial Vinyl Safety Tape 3in 36yards S-659	1	\$12.10	\$12.10
Storex Plastic Wall File	2	\$7.99	\$15.98
Eyewash Station Waste Container, Yellow	1	\$401.50	\$401.50
Total			\$1,438.50

Scope Change Breakdown

These are budgets that will be used to pay for services like marketing and maintenance installation. The last line item is a Components Budget that will be used for a library of "shields" to use for the Arduino and Raspi. Since student interest varies and new shields are developed constantly, having a budget to acquire them as the space develops will be helpful to staying current with technological trends.

BUDGETS			
Marketing Material Budget	1	\$1,000.00	\$1,000.00
Maintenance Installation Budget	1	\$199.00	\$199.00
Raspi/Arduino Shield Component Budget	1	\$250.00	\$250.00
		Total	\$1,449.00

The Following is a breakdown of cost totals for each subcategory and how they would be applied to the over all remaining budget of the TFAC Grant

Scope Change Request Totals by Subcategory	
Remaining Balance of TFAC Grant	\$13,113.46
Subtractive Mfg. Budget	-\$4,998.00
Subtractive Mfg. Tooling Budget	-\$960.00
Adjusted Vinyl Cutter Budget	-\$913.81
Fundamental Equipment Budget	-\$599.99
Micro Controller Budget	-\$499.60
Fundamental Tool Request	-\$1,959.55
Consumable Resources Request	-\$295.05
Safety Equipment Budget	-\$1,438.50
Supporting Service Budgets	-\$1,449.00
Remaining Total	-\$0.04

NDSU Student Technology Fee Action Plan Request

VI. Budget *— previous*

(double-click on the form to begin entering data)

1.	NDSU ORGANIZATION OR UNIT Library
2.	PROJECT DIRECTOR(S) (Must be NDSU faculty or staff) Jacob Clark - Emerging Tech Svs. Coordinator

3.	SALARIES AND WAGES		
	Personnel description	Number employed	Number of months
	A. Staff		
	B. Graduate students		
	C. Undergraduate students		
4.	TOTAL SALARIES AND WAGES		\$0.00
5.	FRINGE BENEFITS		\$0.00
6.	TOTAL SALARY, WAGES AND BENEFITS		\$0.00

7. EQUIPMENT				
Cat.	Item	Qty	Cost/ea	Ex
1	Radial Drill Press	4	\$ 384.00	
	Lathe w/ DRO	4	\$ 1,684.00	
	Lathe Stand	4	\$ 384.00	
	Mill/Drill DRO	4	\$ 1,959.00	
2	Brother Sewing Machine	4	\$ 100.00	
	Brother 1034D	4	\$ 175.97	
	Brother Embroidery	1	\$ 570.00	
	Cricut Maker	2- Now 1x	\$ 450.00	
3	Soldering Iron	3	\$ 28.88	
	Filter/Fan	3	\$ 30.95	
	Helping Hand	3	\$ 20.00	
	Breadboard	2	\$ 11.86	
	Breadboard Kit	2	\$ 18.27	
	Arduino Starter Kit	2	\$ 87.90	
	AVexEDR	2	\$ 539.99	
4	Computers	2	\$ -	
5	3D Printers	11	\$ -	
6	3D Scanning	2	\$ -	
7	3D Pen	4	\$ -	

8. MATERIALS AND SUPPLIES				
Cat.	Item	Qty	Cost/ea	Ex
1	R-8 Collet Set	1	\$ 83.95	
	Clamp Kit - 7/16 Slot	1	\$ 48.95	
	Quick Vise	4	\$ 68.95	

	End Mills	1	\$	52.95	\$	52.95
	Oil Cutting	3	\$	26.80	\$	80.40
	Carbide Tool Bit	1	\$	51.95	\$	51.95
	Oil Machine Lube	2	\$	14.95	\$	29.90
	Drill bit 115pc Set	1	\$	68.50	\$	68.50
	Tool Chest (Purchased 3/22/18)	1	\$	248.00	\$	248.00
	Rubber Mallet(Purchased 3/22/18)	1	\$	2.99	\$	2.99
	Claw Hammer(Purchased 3/22/18)	1	\$	3.98	\$	3.98
	Reg Mallet(Purchased 3/22/18)	1	\$	5.49	\$	5.49
	Vise Grip Set(Purchased 3/22/18)	1	\$	12.99	\$	12.99
	Plyer Set - 3pc(Purchased 3/22/18)	1	\$	9.99	\$	9.99
	Channel Locks(Purchased 3/22/18)	1	\$	10.99	\$	10.99
	Wrench Set - Standard(Purchased 3/22/18)	1	\$	14.99	\$	14.99
	Wrench Set - Metric(Purchased 3/22/18)	1	\$	14.99	\$	14.99
	Crescent Wrench Set 3pc(Purchased 3/22/18)	1	\$	24.99	\$	24.99
	Center Punch(Purchased 3/22/18)	5	\$	4.99	\$	24.95
	Metal Punch Set	1	\$	29.96	\$	29.96
	FatMax Screwdriver Set(Purchased 3/22/18)	1	\$	34.99	\$	34.99
	Hex Key Set 3pc(Purchased 3/22/18)	1	\$	18.00	\$	18.00
	Tape Measure(Purchased 3/22/18)	3	\$	4.82	\$	14.46
	Socket Set(Purchased 3/22/18)	1	\$	84.99	\$	84.99
	Eyewash Station	1	\$	345.00	\$	345.00
	Turning/Bore Holder	1	\$	29.95	\$	29.95
	Turning Holder	1	\$	25.95	\$	25.95
	Parting Tool	1	\$	64.95	\$	64.95
	Carbidede Insert	2	\$	15.95	\$	31.90
	Quick-Change Tool	1	\$	295.00	\$	295.00
	Insert Boring Bar	1	\$	94.95	\$	94.95
	Carbide Inserts	1	\$	43.95	\$	43.95
	Indexable Carbide Set	1	\$	91.95	\$	91.95
	Inserts	1	\$	45.95	\$	45.95
2	Scissors(fabric shears)-	2	\$	9.99	\$	19.98
	Tape Measure	1	\$	7.99	\$	7.99
	Acrylic Ruler	3	\$	14.49	\$	43.47
	Seam Ripper	3	\$	4.64	\$	13.92
	Calipers	2	\$	-	\$	

Sound Proofing Mats	1	\$	2,000.00	\$	2,000.00
Shop Vacuum	1	\$	139.00	\$	139.00
Floor Mats	1	\$	200.00	\$	200.00
Marketing Pieces	1	\$	1,000.00	\$	1,000.00
3D Printer Materials	80	\$	-	\$	

9.1 TOTAL TECHNOLOGY FEE REQUEST					\$13,578.841
10. IMATCH (Describe in Match Section)			1\$		21,496.831
11. TOTAL PROJECT EXPENDITURE					\$35,075.671

NDSU Student Technology Fee Action Plan Request

VI. Budget — *Current as of 8/24/18*

(double-click on the form to begin entering data)

1.	NDSU ORGANIZATION OR UNIT Library
2.	PROJECT DIRECTOR(S) Adam Elznic-Emerging Technologies Service Coordinator

3.	SALARIES AND WAGES		
	Personnel description	Number employed	Number of months
	A. Staff		
	B. Graduate students		
	C. Undergraduate students		
4.	TOTAL SALARIES AND WAGES		\$0.00
5.	FRINGE BENEFITS		\$0.00
6.	TOTAL SALARY, WAGES AND BENEFITS		\$0.00

7.	EQUIPMENT	\$6,497.49
Describe Equipment specifics in the Budget Justification section		

A	Nomad 883 Desktop Mini-Mill	2	\$2,499.00	\$4,998.00
B	Cricut Maker Vinyl Cutter	1	\$399.99	\$399.99
C	Black&Decker 20v Lithium Ion Cordless 3/8 Drill&Impact Driver	3	\$99.99	\$299.97
D	Black&Decker 5amp Corded Jig Saw	1	\$39.97	\$39.97
E	5 gal. 1.75 Peak HP Buckethead Vac	1	\$21.97	\$21.97
F	3000 Series 1.2 amp Dremel w/ 28 Accessories	2	\$49.00	\$98.00
G	Rigid 14 Gal. 6.0-Peak HP Wet Dry Vac	1	\$139.99	\$139.99
H	Raspi 3 Starter Kit	5	\$84.95	\$424.75
I	Adafruit Metro MO Express	3	\$24.95	\$74.85

8.	MATERIALS AND SUPPLIES	\$6,615.92
Describe Materials and Supplies specifics in the Budget Justification section		

J	Fiskars Self-healing cutting mat 24x36	3	\$29.97	\$89.91
K	Stanley 10-175G HI-Viz Utility Knife	4	\$2.88	\$11.52
K	Tool Shop Titanium Twist Drill Bit 160 Piece SKU: 2423567	1	\$29.99	\$29.99
M	Stanley 12 High Tension Hacksaw sku2375761	1	\$14.99	\$14.99
N	Menards DDM422 Compact Digital Multimeter	1	\$16.49	\$16.49
O	Bondhus Torx folding hex key Sku#2446928	1	\$9.99	\$9.99
P	Tool Shop Soldering Iron holders sku 2431164	2	\$4.99	\$9.98
Q	Menards 5 Gallon BucketSKU: 6482910	1	\$2.89	\$2.89
R	Surebonder Dual Temperature 40-Watt Glue GunSKU: 2317040	4	\$9.48	\$37.92
S	DataShark Wire Stripper AWG 30-20	2	\$12.86	\$25.72
T	Dremel Rotary Tool Accessory Kit	1	\$34.97	\$34.97
U	Insulated Silicone Rework Mat	2	\$9.95	\$19.90
V	Adafruit Helping Third Hand Magnifier	3	\$6.00	\$18.00

W Super Wide Steel Dust Pan item #67068	2	\$8.39	\$16.78
X 7in Bench Brush item #1072	2	\$1.99	\$3.98
Y Neoteck DTI digital Dial Indicator	1	\$23.95	\$23.95
Z Fan Fume Absorber Benchtop 115v K416-ND	2	\$102.21	\$204.42
AA 6 pc Precision Screwdriver Set	2	\$3.99	\$7.98
BB Mini Pick and Hook Set	1	\$1.99	\$1.99
CC Dremel Multi-Vise	1	\$29.97	\$29.97
DD Masterforce 5" Multi-Purpose Vise M 65154 sku 2431490	1	\$69.99	\$69.99
EE Tool Shop 60 Piece Tap & Die Set m. 2438495 sku 2438495	1	\$36.99	\$36.99
FF Irwin Quick Grip 8 pack # 4935502	2	\$29.98	\$59.96
GG 18 in Quick Release Bar Clamp #96211	4	\$4.99	\$19.96
HH 24in Quick Release Bar Clamp #96213	4	\$5.99	\$23.96
II 2 In Steel Spring Clamp #39529	6	\$1.99	\$11.94
JJ 3 in Steel Spring Clamp #39530	6	\$2.99	\$17.94
KK 6 In Industrial C-Clamp item #62139	2	\$5.99	\$11.98
LL 4 in Industrial C-Clamp item #37848	4	\$3.99	\$15.96
MM 2 in Industrial C-Clamp item #37844	4	\$2.19	\$8.76
NN pegboard 50pc kit item 67581	1	\$6.99	\$6.99
OO 800 lb Capacity 2-in-1 convertible Cart	1	\$89.98	\$89.98
PP Seville Classics UltraHD Lighted Work Center	2	\$248.90	\$497.80
QQ Horizontal Paper Cutter - 24" h-149	1	\$36.00	\$36.00
RR Fiskars Scissors	3	\$14.00	\$42.00
SS Low Pro Vise	2	\$120.00	\$240.00
TT Nomad Flip Jig	2	\$120.00	\$240.00
UU #102 .125 flat Cutter	4	\$30.00	\$120.00
VV #101 .125 Ball End Cutter	4	\$30.00	\$120.00
AAA #112 .0625 Flat Cutter	4	\$30.00	\$120.00
BBB #111 .0625 Ball End Cutter	4	\$30.00	\$120.00
CCC Cricut StandardGrip Cutting 12x12 3 Pack	3	\$16.99	\$50.97
DDD Cricut StrongGrip Cutting 12x12 3 Pack	3	\$16.99	\$50.97
EEE Cricut Lightgrip Cutting Mat 12X12 3 Pack	2	\$16.99	\$33.98
FFF Cricut Lightgrip Cutting Mat 12x24 3 Pack	2	\$32.99	\$65.98
GGG Cricut StrongGrip Cutting 12x24 3 Pack	2	\$32.99	\$65.98
HHH Cricut StandardGrip Cutting 12x24 3 Pack	2	\$32.99	\$65.98
III Cricut Knife Blade+Drive Housing	2	\$39.99	\$79.98
JJJ Cricut Scoring Wheel Combo Pack	2	\$49.99	\$99.98
KKK Adtech 50 pack 4in hot glue sticks	3	\$5.97	\$17.91
LLL Masterforce Utility Knife Blade Dispenser 11C	1	\$8.00	\$8.00
MMM 6 pc detail & stripping Brush Set sku 5627305	2	\$5.99	\$11.98
NNN 36 pc 1/2 in Horsehair Bristle Acid Shop Brush	4	\$2.49	\$9.96
OOO Braid Rosin Gold .050x10" PN# EB1088-ND	3	\$6.05	\$18.15
PPP Magnet Round NDFEB Axial PN# 469-1004-ND	100	\$0.21	\$21.00
QQQ Magnet Round NDFEB Axial PN 469-1002-ND	50	\$0.66	\$33.00
RRR Filter Repl For SA-9 Series Fume Hood 3 Pc K4	5	\$19.49	\$97.45
SSS Premium F/F Jumper Wires 40x3"	1	\$3.95	\$3.95
TTT Kraft Paper Roll S-3575	1	\$29.00	\$29.00
UUU PCB COPPER CLAD 6X81/16 2 Side 473-1006-I	5	\$8.93	\$44.65

VVV	Justrite 4 Gal Flammable Cab	1	\$392.00	\$392.00
WWW	Bradley Eye Wash Station 7 Gal UNSPSC	1	\$331.00	\$331.00
XXX	Eye Wash Preservative UNSPSC	1	\$9.90	\$9.90
YYY	Badger Fire Extinguisher 5.5lbs UNSPSC	2	\$66.25	\$132.50
ZZZ	Body Fluid Cleanup Kit, Box	3	\$32.84	\$98.52
AAAA	Blade Disposal Container sku h-839	3	\$15.00	\$45.00
BBBB	Industrial Vinyl Safety Tape 3in 36yards S-659	1	\$12.10	\$12.10
CCCC	Storex Plastic Wall File	2	\$7.99	\$15.98
DDDD	Eyewash Station Waste Container, Yellow	1	\$401.50	\$401.50
EEEE	Seville Classics UltraGraphite Workbench	2	\$199.00	\$398.00
FFFF	Marketing Material Budget	1	\$1,000.00	\$1,000.00
GGG	Maintenance Installation Budget	1	\$199.00	\$199.00
HHH	Raspi/Arduno Shield Component Budget	1	\$250.00	\$250.00

9	Total Technology Fee Request			\$13,113.41
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10	Match Describe In Match Section			\$21,496.83
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NDSU Student Technology Fee Action Plan Request

VII. Budget Justification

Describe how you arrived at the budget totals in Section VI, Budget.

You are expected to follow all applicable university policies and procedures regarding salary expenditures.

You are expected to follow the state-approved purchasing guidelines when purchasing materials and supplies.

- **Equipment:** List name, estimated cost and quantity of each item and explain why it is important to the project. Include installation and maintenance costs in your estimates.
 - a) **Nomad 883 Desktop Mini-Mill-2x-\$2,4999.00-** This small, desktop CNC machine was selected due to the student friendly interface design, safety features, manufacturing abilities, and quiet operations. Students will be able to create projects through a reductive process by cutting into various materials like plastic, wood, pcb board (to create custom circuits), and some soft metals. This machine will allow us to balance between additive manufacturing, and reductive manufacturing processes, giving students an understanding of both. **Install:** 120v outlet already present **Maintenance:** Yearly Inspection for wear, quarterly clean and Lubrication of moving parts.
 - b) **Cricut Maker Vinyl Cutter-1x-399.99-** The Cricut Maker is a smart cutting machine that can cut a multitude of different materials. This is a good alternative to a laser engraver. Student/faculty will be able to cut custom patterns out of many materials for the use of their projects. **Install:** 120v outlet already present. **Maintenance:** Replace blades/cutting wheels and periodic software updates
 - c) **Black and Decker 20v Lithium Ion Cordless 3/8 drills & Impact Driver-3x-\$99.99:** These tools will allow students to drill and drive fasteners for their projects. They are fundamental to a makerspace and are helpful in assembly and disassembly of projects. **Install:** 120v already in place for battery charger **Maintenance:** Yearly Inspection for safety wear and tear.
 - d) **Black and Decker 5amp Corded Jig Saw-1x-\$39.97-**This tool will allow students to cut material down to size for the appropriate process or machine. It was selected due to its ease of use and economy. **Install:** 120v outlet already present **Maintenance:** Yearly inspection for safety/ wear and tear.
 - e) **5 gal 1.75 Peak HP Buckethead Vacuum-1x-\$21.97-** This low power vacuum was selected to aid in the maintenance of machines. This low volume vac will help clear "chips" from the Nomad 883 and Makerbot 3D Printers. Debris build up in moving parts is often a culprit in machine failure. This will allow staff and students to clear away by-product of the processes and preserve the machines they use. **Install:**120v outlet already present **Maintenance:** Replacement or washing of filter when needed, Yearly inspection for wear and tear.
 - f) **3000 Series 1.2 amp Dremel w/ 28 Accessories-2x-49.00-**These are small rotatory tools that are used to cut, grind, polish, and shape materials. Many other makerspaces utilize these tools and have found importance in offering these tools to patrons due to their versatility. **Install:** 120v outlet already present **Maintenance:** Yearly inspection for safety/ wear and tear.
 - g) **Rigid 14 Gal. 6.0-Peak HP Wet/Dry Vac-1x-139.99-** A general shop vacuum is requested to help keep the space clean and clear of debris and maintain the appearance of the facility. **Install:** 120v outlet already present **Maintenance:** Periodic Filter Changes, Yearly inspection for safety/ wear and tear.
 - h) **Raspi 3 Starter Kit-5x-84.95-** A raspberry Pi 3 is a powerful micro controller that can be used to build various mini-computers or computer controlled components. Students will be able to prototype and build projects based off their own interests and develop products solving niche problems. They are a popular mainstay of the maker community, and students can learn important skills like coding and prototyping through self-directed learning and community collaboration. **Install:** none **Maintenance:** none

- i) **Adafruit Metro MO Express-3x-\$24.95-** This is also another powerful microcontroller that students could program for specific tasks. It is a variant of the popular Arduino controller board and has many uses in the community. They too can be customized for application and interest. "Shields" can be ordered which are components like "motor controllers" or sensors that make this a powerful tool. Students of any major could find a use for this micro-controller and with the rise of use in agriculture and science based research it will a good addition to the space. . **Install:** none **Maintenance:** none

Materials and Supplies: List name, estimated cost and quantity for each non-equipment items and explain why it is important to the project.

- j) **Fiskars Self-healing cutting mat 24x36-3x-\$29.97 ea-** These mats will be put in place to protect the tabletops and surfaces from scratches and deep gouges produced by utility blades and cutting processes. They will also aid in keeping projects from slipping and give a work environment to students.
- k) **Stanley Utility Knife-4x-\$2.88/ea:** These are standard utility knives that are used for cutting material and commonly use to complete projects.
- l) **Titanium Twist Ddrill Bit 160 Bit-1x-\$29.99-** This is a kit of commonly used drill bits in bulk. As bits begin to show wear and tear, or need sharpening, a new one can be replaced by staff. This gives us a long term supply of commonly used drill bits at an economical rate.
- m) **Stanley High Tension Hacksaw-1x-\$14.99-** This is a common tool in the makerspace and allows students to quickly cut common materials like wood, metals, plastics.
- n) **Compact Digital Multimeter-1x-\$16.49-** This tool is an instrument designed to measure electric current, voltage, and usually resistance, typically over several ranges of value. It will aid students who are working on custom circuits and electronics.
- o) **Torx Folding Hex Key-1x-\$9.99-** This tool will help in the installation and removal of Torx fasteners which are common in 3D printers and various components in the space.
- p) **Soldering Iron Holders-2x-\$4.99/ea-** This sturdy soldering iron stand is for safe holding of hot, soldering irons. It is a necessity for comfortable soldering. It also helps to protect against accidental contact with the iron. It is lightweight and offers high temperature resistance. This one even includes a sponge for cleaning the tip.
- q) **Menards 5 gallon bucket-1x-\$2.89-** This is an economical five gallon bucket that will support the Buckethead Vacuum cleaner listed in the equipment list. It will be use as the reservoir to the vacuum.
- r) **Hot Glue Gun 40-watt-4x-\$9.48-** Hot glue guns are used as an adhesive product to hold together prototypes or projects. They are useful to the space and the processes students will engage.
- s) **DataShark Wire Stripper AWG 30-20-2x-12.86-** These will help students strip wire leads and prepare them for use in projects.
- t) **Dremel Rotary Tool Accessory Kit-1x-\$34.97-** 162 accessories used to cut, sand, polish, grind, and clean. Includes bits, sanding bands, sanding discs, mandrels, and quick change tools. Will be used in support of the 3000 Dremel Tool.
- u) **Insulated Silicone Rework Mat-2x-\$9.95/ea-** This mat is 34 cm wide, 23 cm tall and 4mm thick molded silicone and equipped with grooves for placing solder paste, screws, headers, and pretty much any other small accessories.
- v) **Adafruit Helping Third Hand Magnifier-3x-\$6.00/ea-** This tool is good for holding small PCBs and wires for tinning or soldering to parts. Comes with a Magnifying glass to help see the project students are working on.
- w) **Steel Dust Pan-2x-\$8.39-** Used for clean up of surfaces and containment of debris in space.
- x) **7in Bench Brush-2x-\$1.99/ea-** - Used for clean up of surfaces and brush away debris in space.
- y) **Neoteck DTI Digital Dial Indicator-1x-\$23.95-** Used to help level the beds of 3D printers and takes measurement crucial for students projects.
- z) **Fan Fume Absorber Benchtop-2x-\$102.21/ea-** Aerodynamic hood design effectively draws solder fumes away from the work area. Carbon filters traps up to 80% of the flux fumes. Compact size and adjust able for convenient placement near work area. An inexpensive alternative to individual fume extraction.

- aa) **6pc Precision Screwdriver Set-2x @ \$3.99/ea**- Small screwdrivers that remove specialty screws and microscrews.
- bb) **Mini-Pick and Hook Set -1x-\$1.99-** Hook and pick set used to remove o-rings and material from hard to reach places. Help set and place components into small places.
- cc) **Dremel Multi-Vise-1x-\$29.97-** Vise designed to hold materials at various angles and used to secure material for cutting, grinding, polishing.
- dd) **5' Multi-purpose Vise0-1x - \$69.99-** Used to hold materials in place in a secure fashion for cutting, clamping, pressing.
- ee) **60pc Tap & Die Set-1x-\$36.99-** Taps and Dies are used to add thread features to materials like steel or plastic. This allows students to drill a hole, and use the taps and dies to make threaded inserts.
- ff) **Irwin Quick Grip 8 Pack-2x-29.98/ea-** This is a multi-pack a various clamps to be used in the space. They will be used to clamp together projects for glue-ups or to hold material in place.
- gg) **18 in Quick release bar clamp-4x-\$4.99/ea-** Clamps to aid in glue-ups and material holding.
- hh) **24 in Quick Release Bar Clamp-4x-\$5.99/ea-** Clamps to aid in glue-ups and material holding.
- ii) **2" Steel Spring Clamp-6x-\$1.99/ea-** Spring clamps to hold material together during glue-ups and to hold material in place.
- jj) **3" Steel Spring Clamp-6x-\$2.99/ea-** Spring clamps to hold material together during glue-ups and to hold material in place.
- kk) **6in Industrial C-Clamp-2x-\$5.99-**C style clamps used to hold material down or together for glue-ups or material handling.
- ll) **4in Industrial C-Clamp-4x-\$3.99-**C style clamps used to hold material down or together for glue-ups or material handling.
- mm) **2in Industrial C-Clamp-4x-\$2.19-**C style clamps used to hold material down or together for glue-ups or material handling.
- nn) **Pegboard 50pc kit-1x-\$6.99-**Pegboard inserts to be used with workstation pegboard and for holding tools up onto pegboard.
- oo) **800 .lbs capacity 2-in-1 convertible car-1x-89.98-** A hand truck/cart used for material handling applications and also moving machinery around when maintenance is needed.
- pp) **Seville Classics Lighted Work Center-2x-\$248.90-**These are work benches set up as stations for the new machinery purchased. They have a led lighted working surface, plug-ins and pegboard to support the machinery. They will house the machinery and the computers that support the machines.
- qq) **Horizontal Paper cutter-s1x-\$36.00-** This is a holder for a roll of paper that will be used to cover work areas to protect them from hot glue and adhesives when doing glue-ups.
- rr) **Fiskars Scissors-3x-\$14.00-** Scissors used to cut materials like cloth, papers, vinyl.
- ss) **Low Pro Vise-Nomad 883-2x-\$120.00/ea-** This is a vise that can be installed into the Nomad 883 to hold down the material being cut. It is crucial to reduce the movement and "chatter" the material and tool can experience when operating.
- tt) **Nomad 883 flip jig-2x-\$120.00/ea-** This is a jig specific to the Nomad 883. It is used to clamp down material during cutting, and allows the material to be flipped over to finish the cutting operation. The end result is a fully cut CNC product since the Nomad operates in a reductive process. This eliminates the guess work out of squaring up material and hoping that opposing cuts line up.
- uu) **#102 .125 flat Cutter-4x-\$30.00ea-** This is supporting tooling for the Nomad 883 mini-mill. It is a cutter used in the machining operation and is set up in a quick change collet.
- vv) **#101 .125 Ball end Cutter-4x-\$30.00ea-** This is supporting tooling for the Nomad 883 mini-mill. It is a cutter used in the machining operation and is set up in a quick change collet.
- AAA **#112 .0625 Flat Cutter-4x-\$30.00ea-** This is supporting tooling for the Nomad 883 mini-mill. It is a cutter used in the machining operation and is set up in a quick change collet.
- BBB **. #112 .0625 Ball End Cutter-4x-\$30.00ea-** This is supporting tooling for the Nomad 883 mini-mill. It is a cutter used in the machining operation and is set up in a quick change collet.
- CCC **Cricut Standard Grip Cutting 12x12 3pack-3X-\$16.99ea-** Cutting mat accessory for Cricut Maker. Holds material down to be cut by machine.
- DDD. **Cricut Strong Grip Cutting 12x12 3pack-2X-\$16.99ea-** Cutting mat accessory for Cricut Maker. Holds material down to be cut by machine.

EEE. **Cricut Light Grip Cutting 12x12 3pack-2X-\$32.99ea**- Cutting mat accessory for Cricut Maker. Holds material down to be cut by machine.

FFF. **Cricut Light grip Cutting mat 12x24 3pack-2x-\$32.99ea**- Cutting mat accessory for Cricut Maker. Holds material down to be cut by machine.

GGG. **Cricut Strong grip Cutting mat 12x24 3pack-2x-\$32.99ea**- Cutting mat accessory for Cricut Maker. Holds material down to be cut by machine.

HHH. **Cricut Standard0 grip Cutting mat 12x24 3pack-2x-\$32.99ea**- Cutting mat accessory for Cricut Maker. Holds material down to be cut by machine.

III **Cricut Knife Blade+Drive Housing-2x-\$39.99ea**- Knife blade holder essential to the Cricut cutter. Allows various materials to be cut.

JJJ-**Cricut Scoring Wheel Combo Pack-2x-\$49.99**- Scoring wheel accessory that allows for the cutting of fabric based material. Comes with two wheel options that allow for different types of cutting and scoring methods.

KKK-**Adtech 50 pack 4in hot glue sticks-3-\$5.97**-Hot glue sticks to be used with hot glue gun. Aids in adhesion of project parts.

LLL-**Utility Knife Blade Dispenser 110-1x-\$8.00**- Large parcel of utility blades to be use in utility knives.

MMM-**6 pc detail and stripping Brush set-2x-\$5.99ea**-Set of different size brushes with different types of brush heads. Wire brushes are good for cleaning 3D Printer Extruders and also aid in cleanup of projects from glue and residues.

NNN-**36pc 1/2in horse hair Bristle Brush-4x-\$2.49ea**-General brushes that can be used to apply glues, solder paste, and also used for cleaning electronics.

OOO **Braid Rosin Gold-3x-\$6.05ea**- Strand of Rosin Core Cord that absorbs free flowing solder for de-soldering components used in projects.

PPP **Magnet Round NDFEB Axial-100x-\$0.21**-Strong Magnets used in 3D printing projects to form closing hinges, joints, or working components. Will use to show students manufacturing techniques to reduce amount of filament used.

QQQ **Magnet Round NDFEB Axial-50x-\$0.50**-Larger Strong Magnets used in 3D printing projects to form closing hinges, joints, or working components. Will use to show students manufacturing techniques to reduce amount of filament used.

RRR **Filter Replacement for SA-9 series Fume Hood-5x-\$19.49ea**- Replacement Carbon Filters for use with Fume Hoods to reduce fumes while light soldering.

SSS **Premium F/F Jumper Wires-1x-3.95**- packet of Female To Female jumper wires to use in Raspi Projects and Arduino builds. Important to have to allow shields to be attached between main board and shield component.

TTT **Kraft Paper Rioll-1x-\$29.00**- Paper roll used for projects and to protect table surfaces from adhesives and residue.

UUU. **PCB Copper Clad 6x8 1/16 2 sided board-5x-\$8.93ea**- A copper plated board that allows students to use Nomad 883 to cut custom circuitry.

VVV **Justrite 4 Gal Flammable Cab-1x-392.00- Safety Equipment**: Flame resistant cabinet used to lockup and store organic based solvents and chemicals. Will be placed away from working area but crucial for storage and safe keeping of materials. Preferred by Fire Depts as safety feature in event of fire.

WWW **Bradley Eye Wash Station 7 Gal-1x-\$331.00**- Safety Equipment Eye wash station incase patron gets chemical or irritant in eyes. Water runs from storage unit and allows eyes to be washed free of irritant. **Will be installed unobstructed and within 10 second walk of all machinery.**

XXX-**Eye Wash Preservative-1x-\$9.90**-Chemical added to water to allow for long storage period of 3 months. Will use to treat water for eye wash station and replacement of water source routinely.

YYY. **Badger Fire Extinguisher 5.5lbs-2x-66.25ea**- Safety Equipment Fire Extinguishers to be installed at both front and back of room in case of event of fire. **Will be installed by Maintenance and routinely inspected.**

ZZZ. **Body Fluid Clean Up Kit-3x-\$32.84-Safety Equipment**- A kit comprised of material to isolate and cleanup biohazard material from the result of an accident.

AAAA. **Blade Disposal Container-3x-\$15.00**- Containers designed to hold old and used sharp objects for safe disposal.

BBBB. **Industrial Vinyl Safety Tap 3in 36 yards-1x-12.10- Safety Equipment**- Vinyl tape to mark the safety equipment features and to tape off areas where no material or equipment can block access to safety equipment. Makes safety equipment more visible in event of fire or accident.

CCCC **Storex Plastic Wall File-2x-7.99ea**- File folder attached to the outside wall of lab area for Emergency Service Personnel that will hold information of the room layout, chemicals within area, MSDS sheets. *Will be installed by Maintenance.*

DDDD **Eyewash Station Waste Container, Yellow-1x-\$401.50-Safety Equipment**- Cart to hold the eyewash station at standard safety height. It is bright yellow to help patron using find the equipment if debris is in eye. Also captures water from the reservoir tank safely into enclosed unit. Also for easier maintenance and service of eyewash station.

EEEE **Seville UltraGraphite Workbench-2x-199.00ea**-Workbench to be installed in main room. On wheel to allow for different space configurations and adjustable working heights to accommodate patrons.

FFFF-**Marketing Material Budget-1x-\$1000**- This is a baseline marketing budget that would allow for the makerspace to be showcased cross campus through flyers, brochures, tours, etc.

GGGG-**Maintenance Installation Budget-1x-\$199.00**- Budget set up to pay Maintenance and Facilities for the installation of safety equipment as note above in proposal.

HHHH- **Raspi/Arduino shield and component Budget-1x-\$250.00**- Since student input and engagement into the Arduino and Raspi 3 is crucial, a small budget to afford various "shields" and "components" is requested to cover the costs. Since projects can vary from interest to interest, creating a library of "shields" is critical to the support of the technology. Oversight of feasibility and reuse will be practiced by the Emerging Technologies Service Coordinator Position and be reported to the TFAC committee.