LOUISIANA TECH UNIVERSITY
COLLEGE OF ENGINEERING & SCIENCE

First-Year Projects Showcase: Engineering

Welcome to the Spring 2025 First-Year Projects Showcase. The products you see here are the culmination of a year-long, project-based learning experience where the Arduino microcontroller is used for sensing and control applications. Each student participant owns and maintains their own equipment, providing a mechanism for boosting hands-on learning for large numbers of students; our hope is that this project-based approach will make our students more competent, confident and innovative. Feel free to browse the "smart products" that have been conceived, designed, and prototyped by our students.

Expo Schedule:

3:00 – 4:15 Students set up their projects
4:00 – 4:20 Judges meeting IESB 318
4:20 – 4:30 Welcome and Opening Remarks
4:30 – 5:15 Official judging of assigned teams (13 minutes per team, 2 minutes transition time)
5:15 – 6:00 Open judging (all judges circulate to observe all projects)
6:00 – 7:00 **Open House - Visitors* (non-judges) are invited to view the projects**
Judges meet in IESB 318 to select winners
7:00 – 7:15 Presentation of awards
7:15 – 7:45 Clean Up

**Visitors are asked to wait in the IESB Project Based Learning Office lobby (IESB 136) during the official and open judging.*

Judges:

The Living *with* the Lab team would like to give a special thanks to all the judges who volunteered their time to review the projects. The judges will evaluate three teams each for 13 minutes each with a 2 minute transition time between each judging session. Tentative Judging teams are:

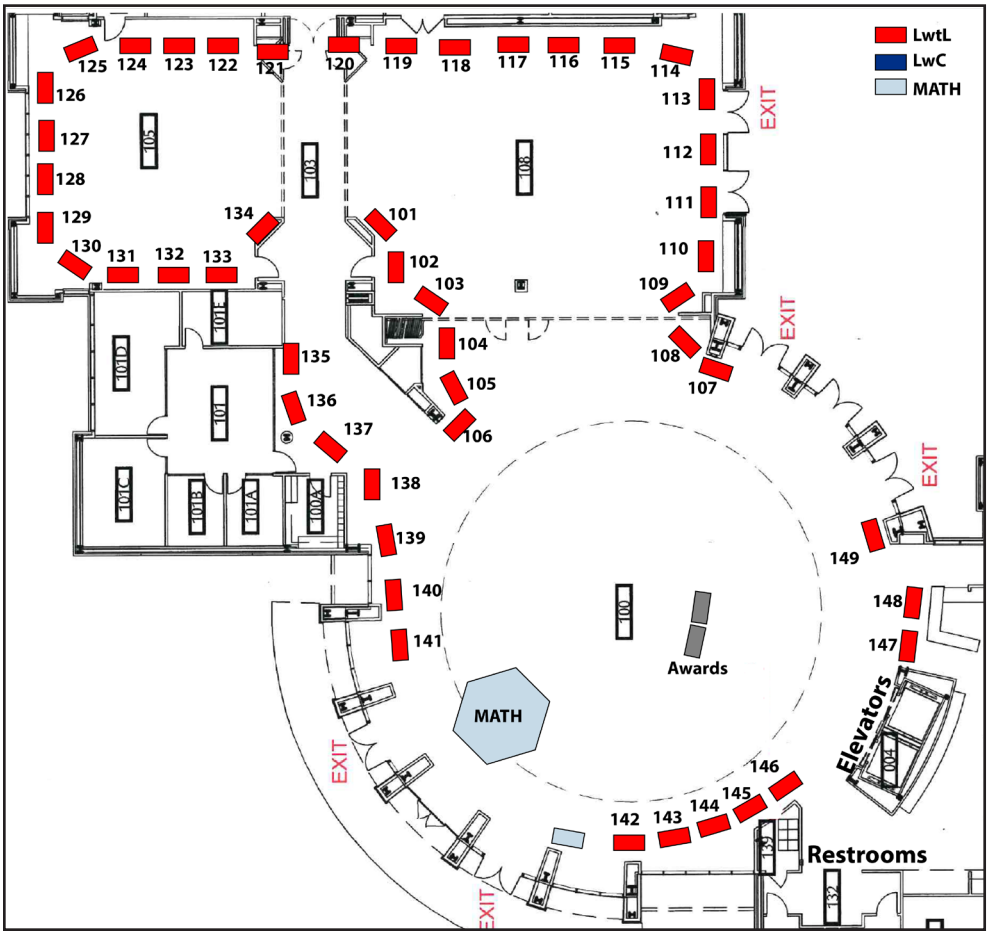
Judge Team	Judge ID		
	1	2	3
AA	A. Stroud	A. Sutherland	R. Dupree
BB	K. Crittenden	K. Wyatt	T. Lazaroe
CC	Z. Little	L. Little	A. Fraiwan
DD	M. Smith	C. Lemoine	T. Barnett
EE	T. Jones	G. Otwell	C. Deal
FF	D. Nolan	J. Carter	M. Nolan
GG	Z. Yell	B. Routon	C. Spinazzola
HH	K. Reed	C. Young	J. Boyett
II	J. Serio	A. Gardner	L. Zack
JJ	J. Wilkerson	S. Wilkerson	C. Wilkerson
KK	V. Krishna	S. Chappidi	M. Morse
LL	S. Mickens	J. Covington	M. Benjamin

Judge Team	Judge ID		
	1	2	3
MM	A. Lackman	K. Dupree	S. Peveto
NN	K. Ring	J. Queen	B. Lowe
OO	N. Maxey	L. Allen	J. Lotz
PP	D. Mire	M. Kim	L. Reis
QQ	J. Moore	K. Opel	K. McDaniel
RR	M. Rahman	S. Richard	K. Stake
SS	L. Wang	H. Thomas	S. McCaa
TT	D. Corbett	V. Corbett	M. Rose
UU	D. Cruse	M. Howard	S. Blazek
VV	B. Hollins	L. Cole	C. Edwards
WW	L. Ward	J. Cortez	N. Biggs

Special Thank Yous!

A special thanks is given to Will Long, Ashley Osborne, Casey Kidd, the Project-Based Learning Office student workers and staff, Kelsey Wong, the COES Undergraduate Studies Office, and many others who helped to make this event possible.

Location of Projects:



First Floor LWTL Projects 101 - 149
MATH Project

Living with the Lab (LWTL):
Projects 101-153 & 201-227

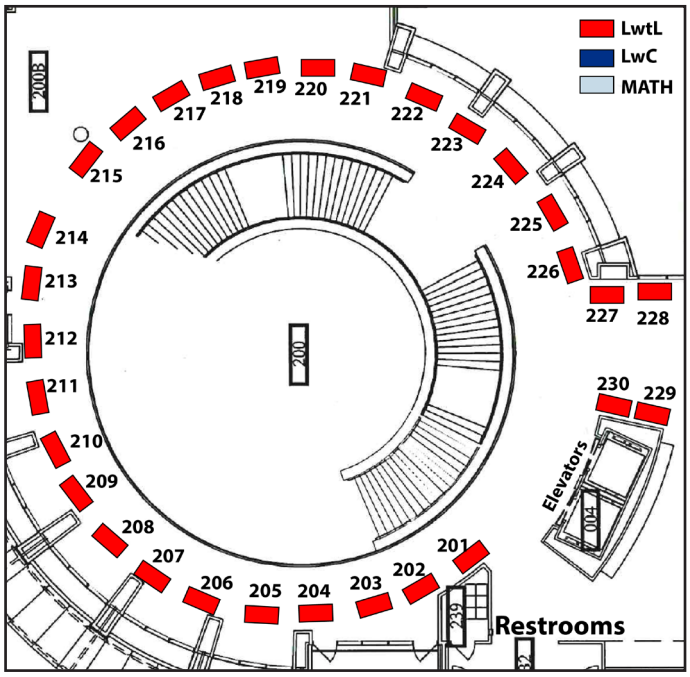
Projects created by first-year engineering students in the Living with the Lab engineering and engineering technology curriculum (ENGR 122, HNRS 122, ENGR 189B, & ENGT 122).

Living with Cyber (LWC):
Projects 228-233 & 301-331

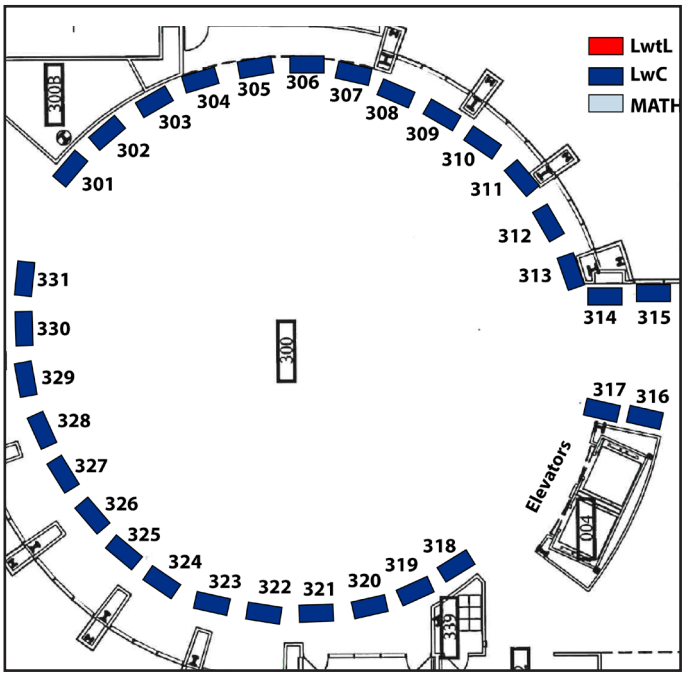
Projects created by computer science and cyber engineering students in the Living with Cyber curriculum (CSC 132 & CYEN 132).

MATH:

Mathematical Art Installation



Second Floor LWTL Projects 201-230



Third Floor LWC Projects 301-331

List of Projects:

Table	Project Name	Course & Instructor	Judge Team	Time
101	P.I.V.T.	ENGR 122 003 - Niemirowski	AA	4:30
102	Automatic Boat Valve	ENGR 122 001 - Easley	AA	4:45
103	Green Guardian	ENGR 122 001 - Easley	AA	5:00
104	Smart Cooler	ENGR 122 001 - Easley	BB	4:30
105	Automatic Ammonia Tester	ENGR 122 001 - Easley	BB	4:45
106	The Auto-Roll	ENGR 122 001 - Easley	BB	5:00
107	Pill Guard	ENGR 122 001 - Easley	CC	4:30
108	Aud-Cam	ENGR 122 001 - Easley	CC	4:45
109	Tech Vest	ENGR 122 001 - Easley	CC	5:00
110	Smarter Mailbox	ENGR 122 002 - Niemirowski	DD	4:30
111	AirRack	ENGR 122 002 - Niemirowski	DD	4:45
112	Stovetop Safeguard	ENGR 122 002 - Niemirowski	DD	5:00
113	Smart Plant Shader	ENGR 122 002 - Niemirowski	EE	4:30
114	WaterWise Bathtub	ENGR 122 002 - Niemirowski	EE	4:45
115	You've got crabs	ENGR 122 002 - Niemirowski	EE	5:00
116	Automatic Shoe Cleaner	ENGR 122 002 - Niemirowski	FF	4:30
117	The Safe Chow Pet Feeder	ENGR 122 002 - Niemirowski	FF	4:45
118	Mirror Mirror	HNRS 122 H02 - Swanbom	FF	5:00
119	Jumpstart Alarm	ENGR 122 002 - Niemirowski	GG	4:30
120	Plug-N-Geaux	ENGR 122 002 - Niemirowski	GG	4:45
121	Smart Toolbox	ENGR 122 003 - Niemirowski	GG	5:00
122	Side Wipes	ENGR 122 003 - Niemirowski	HH	4:30
123	Simon Says Alarm Clock	ENGR 122 003 - Niemirowski	HH	4:45
124	Flippin Gutters	ENGR 122 003 - Niemirowski	HH	5:00
125	H2Oasis	ENGR 122 003 - Niemirowski	II	4:30
126	Leak Logic	ENGR 122 004 - Niemirowski	II	4:45
127	Flip-It	ENGR 122 003 - Niemirowski	II	5:00
128	Smart Parking	ENGR 122 003 - Niemirowski	JJ	4:30
129	SEA-Hat	ENGR 122 004 - Niemirowski	JJ	4:45
130	Quick Park (QP)	ENGR 122 004 - Niemirowski	JJ	5:00
131	Smart Holder	ENGR 122 004 - Niemirowski	KK	4:30
132	Study Space	ENGR 122 004 - Niemirowski	KK	4:45
133	Blu-BBQ	ENGR 122 003 - Niemirowski	KK	5:00
134	Javelin Trainer	HNRS 122 H03 - Theodos	LL	4:30
135	Cam-Buddy 9001	ENGR 122 006 - Cruse	LL	4:45
136	Target Acquired	ENGR 122 006 - Cruse	LL	5:00
137	Airport Rover	ENGR 122 006 - Cruse	MM	4:30
138	W.I.P.E.D.	ENGR 122 006 - Cruse	MM	4:45
139	The Knockout	ENGR 122 006 - Cruse	MM	5:00
140	BlindGuard	ENGR 122 006 - Cruse	NN	4:30
141	The Smart Headband	ENGR 122 006 - Cruse	NN	4:45

Table	Project Name	Course & Instructor	Judge Team	Time
141	The Smart Headband	ENGR 122 006 - Cruse	NN	4:45
142	Air Dryer	ENGR 122 006 - Cruse	NN	5:00
143	Personal Modular Security System	ENGR 122 005 - Easley	OO	4:30
144	Laundry Sentry	ENGR 122 004 - Niemirowski	OO	4:45
145	Auto-Sudz	ENGR 122 005 - Easley	OO	5:00
146	BBKO Attachment	ENGR 122 005 - Easley	PP	4:30
147	Picture Perfect	ENGR 122 004 - Niemirowski	PP	4:45
148	Buck Buffet	ENGR 122 002 - Niemirowski	PP	5:00
149	The Final Sheet	ENGR 122 005 - Easley	QQ	4:30
201	IronMail	ENGR 122 005 - Easley	QQ	4:45
202	The Auto-Deodorizer	ENGR 122 005 - Easley	QQ	5:00
203	The Scare-Can™	ENGR 122 005 - Easley	RR	4:30
204	Line Leader	ENGR 122 005 - Easley	RR	4:45
205	Techie Protectie	ENGT 122 001 - Hall	RR	5:00
206	back.beat	ENGT 122 001 - Hall	SS	4:30
207	AutoAntler Feeder	ENGT 122 001 - Hall	SS	4:45
208	Smart Stove 2.0	ENGT 122 001 - Hall	SS	5:00
209	Garden Assistant	ENGT 122 001 - Hall	TT	4:30
210	Meat Maestro	ENGT 122 001 - Hall	TT	4:45
211	Grow Grid	ENGT 122 001 - Hall	TT	5:00
212	Reel Weather	ENGR 122 003 - Niemirowski	QQ	4:30
213	BotanIQ	HNRS 122 H01 - Young	QQ	4:45
214	Raily Safe Rails	HNRS 122 H01 - Young	QQ	5:00
215	HydroLock Dog Door	HNRS 122 H01 - Young	RR	4:30
216	Weather Wardrobe	HNRS 122 H01 - Young	RR	4:45
217	Paw Pulse 2025	HNRS 122 H01 - Young	RR	5:00
218	Fire Alarm Clock	HNRS 122 H01 - Young	SS	4:30
219	Iris Smarthouse	HNRS 122 H01 - Young	SS	4:45
220	The Miss Stirrer	HNRS 122 H02 - Swanbom	SS	5:00
221	Face-Tracking Monitor	HNRS 122 H02 - Swanbom	TT	4:30
222	ColorPal	HNRS 122 H02 - Swanbom	TT	4:45
223	Spicy sorter	HNRS 122 H02 - Swanbom	TT	5:00
224	Senses Lamp	HNRS 122 H02 - Swanbom	UU	4:30
225	Gridiron Guardian	HNRS 122 H02 - Swanbom	UU	4:45
226	Loaf-Lab	HNRS 122 H02 - Swanbom	UU	5:00
227	CloseSure	HNRS 122 H03 - Theodos	VV	4:30
228	The Attendance Scanner	HNRS 122 H03 - Theodos	VV	4:45
229	Smart Bottle Kit	HNRS 122 H03 - Theodos	WW	4:30
230	Fold-o-Matic	HNRS 122 H03 - Theodos	WW	4:45

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Eligible Project LWTL Awards:

Overall Winner Awards

Top three projects that the most impressive and embody aspects of all the category Awards.

1st place Overall

2nd place Overall

3rd place Overall

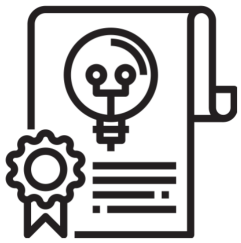
Category Awards

Maker's

Best constructed prototype

DaVinci

Most creative/out of the box thinking



Patent Pending

Novel but practical idea

Can-Do

Difficult project that actually works

Shoot to the Moon

Tough project, but may not function completely

Backed by Business:

We are thrilled to welcome students from the College of Business (COB) to this year's First-Year Projects Showcase! In a new and exciting collaboration with the Center for Entrepreneurship and Innovation, the Backed by Business competition highlights projects with real-world potential beyond the lab.

Engineering teams were selected for this opportunity were chosen not just for technical excellence, but for business viability. You'll find these standout teams marked with light blue banners at their tables. COB students will be walking around to see which teams they want to invest in using their "Business Bucks."

We're excited to build bridges between innovation and entrepreneurship and can't wait to see what sparks from these new connections. Welcome, College of Business — we're glad you're here!

BACKED BY BUSINESS

COES FIRST-YEAR PROJECTS SHOWCASE

101. P.I.V.T. (Personal Improvement Vibrating Trainer) ENGR 122 003 - Niemirowski

Adrian Anderson, Will Granger, Jake Morvant, Darryl Hoychick

When working out in the gym, beginners, intermediates, and even professionals can struggle to maintain proper form. This can lead to inefficient muscle growth and an overall threat to safety. P.I.V.T. (Position Improvement Vibrating Trainer) aims to provide gym-goers with a cheaper and more technical approach to personal training during specific workouts. P.I.V.T. is a pair of compression armbands with detachable sensors and wiring, placed within 3D printed casings to allow for the armbands to be machine washed. P.I.V.T. utilizes two Arduino Nanos, two flex sensors, two accelerometers, two vibrating motors, one transmitter, one receiver, and one Bluetooth sensor. The flex sensors are used to determine the number of repetitions which will be sent via Bluetooth to the dabble app. Alongside this, P.I.V.T. features accelerometers that detect the speed of repetitions and makes sure that the user's arms in the correct position during workouts. If the user has faults in their form, onboard vibrating motors alert the user to fix them. To minimize wiring on the body, the left armband has a transmitter, and the right armband has a receiver and Bluetooth sensor. The data is sent from the left arm to the right arm and then to the user's phone using Bluetooth.

Sensors & Devices: Two Arduino Nanos, Two Flex Sensors (Adafruit short flex sensor), One RF transmitter / receiver pair (Parallax 433 MHz RF Transceiver Package), Two vibrating motors, Two Accelerometers (MPU 6050), One Bluetooth Sensor (HC-05)

102. Automatic Boat Valve ENGR 122 001 - Easley

Gavin Gill, Landon Smith, Sean Johnson, James Predtechenskis

Our project design is an Automatic Boat Valve. One problem that most boaters can relate to is forgetting to put the plug in the bottom of the boat. Most of the time, especially with a smaller boat, you can notice water filling up within a minute and can put the plug in before anything happens. If it is a larger boat, however, it can be hard to tell when water is rushing in. This can prove to be a safety hazard, especially with bigger boats that go offshore. They may go out from the boat ramp before they realize that they forgot the plug. If it is a big boat, it can be hard to put the plug in, and they could get stranded. This is where our Automatic Boat Valve will come in handy. Our device will use an electronic ball valve that is connected to a water sensor. When the sensor detects a change in resistance (when water touches the sensor) it will tell the valve to close, sealing off the drain hole. There will be another sensor that detects the level, and when the water reaches a certain setpoint, it will turn on a bilge pump that will start draining the water. The valve will also be able to be controlled using your phone, using blue tooth.

Sensors & Devices: Rain Sensor Module, Water Detection Module, Electronic Ball Valve, Blue tooth Module, Motor Driver, 12V to 9V Power Converter, Bilge Pump, 12V Battery, Arduino, Bilge Pump,

103. Green Guardian ENGR 122 001 - Easley

Madelyn Scroggs, Lana Evans, Erin Cooper, Ethan Payment

The problem we are trying to solve is cell damage within plants from an abundance of high UV rays. The Green Guardian is a smart shade made to protect plants from sun no matter where they are planted.The Green Guardian runs off a 12V battery that powers a gear motor that is connected to a motor driver to control the speed and direction of the smart shade. The motor driver is controlled by two main sensors: the UV sensor and the rain sensor. These sensors help regulate when the shade should rotate to protect the plant. If the UV sensor detects a UV higher than eight, the shade will rotate to cover the plant. However, if the UV sensor detects a UV less than eight, it will rotate back, so the plant will receive enough sunlight, and will not receive any harmful UV sunlight that will cause it to wither. The rain sensor trumps the UV sensor. If the rain sensor detects rain, it will remain open, so the plant can receive water in order to grow. The components will be in a waterproof box that will protect the components and circuitry. These components will allow the Green Guardian efficiently keep plants safe from harmful UV lights.

Sensors & Devices: One Arduino, one breadboard, 1 gear motor, 1 motor driver, 1 rain sensor, one UV sensor, one 12V battery, one solar panel

104. Smart Cooler ENGR 122 001 - Easley

Jude Otwell, Garrett Walker, Braydon Darbonne, Tyler Pardue

Our project is an ice chest that can heat and cool with a button on your phone. Taking away the need for ice makes keeping drinks cold or food warm simple. This is done by installing a dual Peltier cooling system into the side of an Igloo ice chest. The Peltier system can cool to low temperatures, and when the polarity is reversed, it can heat to relatively high temperatures. A 12V battery powers the Peltier module and its fans, and a motor driver is used to switch the system's polarity between heating and cooling. We used a Bluetooth sensor to control the Peltier system through an app on our phones. By pressing either up or down, you can decide if the ice chest heats or cools its contents. We used a highly accurate temperature sensor to detect the temperature inside the ice chest, which lets the rest of the system know when to start and stop heating or cooling. Instead of buying ice to pour into your Igloo, which will melt and make it much heavier, the Smart Cooler is a lighter, cleaner, and more convenient option. Just put in your favorite drinks or snacks to keep them at the perfect temperature.

Sensors & Devices: Arduino, temperature sensor, H-Bridge motor driver, 12V battery, Bluetooth sensor, Peltier cooling system

105. Automatic Ammonia Tester ENGR 122 001 - Easley

Baylee LeBlanc, Asante Riser, Emily Giacona, Ava Springer

Our project is designed to automate the process of testing ammonia levels in fish tanks. Water is pulled from a fish tank into the small testing chamber. Weight sensors will measure the amount of water in order to prevent spillage. From there, the testing liquid is deposited via burettes for each bottle. Vibration motors are used to mix the solution to a uniform consistency with a set timer. Then, a color sensor will measure the red, green, and blue value of the solution and compare it to a color chart that depicts the amount of ammonia in parts-per-million. These results will be sent to your phone via Bluetooth. After the results of the test are recorded, a pinched tube set to the bottom of the chamber will be unpinched, and the water will be siphoned out into a dirty water reservoir. This will be accomplished with a mechanism similar to the Pythagorean cup or a toilet. When the water is filled above the upper curve of a pipe, the water will create a siphon that drains the entirety of the reservoir. As a means of routine maintenance, the machine will also have a tank of clean water to help keep tests accurate.

Sensors & Devices: Bluetooth sensor, Weight Sensor, RGB sensor

106. The Auto-Roll ENGR 122 001 - Easley

Jacob Lewis, Carter Croom, Joseph Lemoine, Brett Dozier

The Auto-Roll is one of the most innovative engineering projects designed to streamline and modernize the use of toilet paper by automating the dispensing, folding, and cutting process. This device caters to users seeking convenience, efficiency, and more cleanliness in their everyday routines. The Auto-Roll operates using an Arduino embedded with advanced sensors and mechanical components. It begins by dispensing a precise length of toilet paper, ensuring optimal use while minimizing waste. The folding mechanism delicately arranges the toilet paper into neat layers. Finally, the cutting system accurately severs the portion of paper, ensuring a clean edge every time. Powered by both electrical and mechanical elements, the Auto-Roll is built to be intuitive and user-friendly. Its design prioritizes hygiene, featuring touchless controls that reduce contact and contamination risks. The project emphasizes sustainable usage, as the automated system minimizes paper waste compared to manual handling. The Auto-Roll's compact size and sleek design make it adaptable for installation in bathrooms of varying sizes and styles. With its combination of functionality, sustainability, and technological innovation, the Auto-Roll is poised to redefine conventional bathroom practices. It stands as a testament to engineering ingenuity, offering a seamless blend of practicality and sophistication for modern households.

Sensors & Devices: One Arduino, 1 IR light and IR Sensor, 1 6 AA Battery Holder with a barrel jack, 3 N2 Motors

107. Pill Guard ENGR 122 001 - Easley

Conner Smith, Fouad Oladejo, Omair Gorikhan, Seth Sharp

Our group is working to solve the problem of medication mismanagement among elderly individuals. Many seniors struggle with remembering to take their medication on time or accidentally take extra doses, which can lead to serious health issues. The Pill Guard involves Arduino microcontrollers, weight sensors under pill compartments, and simple output devices like buzzers, LEDs, or LCD displays to alert users. Constraints include making the device easy to use, reliable, affordable, and suitable for users who may have limited mobility, vision, or hearing.

Sensors & Devices: One arduino, One breadboard, two hall affect sensors, two load cells, one LCD screen, two load cell amplifiers

108. Aud-Cam ENGR 122 001 - Easley

Derek Nguyen, Jesus Sierra, Cason Smith, Kiet Tran

Our audio camera project wants to help blind and visually impaired people feel safer. We use AI and text-to-speech to read words and signs to the user. This helps them understand what them is around. It gives them a little help to "see" while they move in the real world. Our goal is to make a better life and connect more people together. Our device utilizes serial communication between an Arduino Nano and a Raspberry Pi, The Arduino handles power management and physical inputs (this allows the system to be quick and responsive), it then relays the appropriate commands to a Raspberry Pi which then takes a picture using a camera module and sends the photo to a remote AI server endpoint. This returns a wav file describing the photo in detail. This file is then played through a speaker run from an amplifier. It then saves the file to be played back at any time. The entire device is powered by two rechargeable lithium-ion 18650 batteries. The controls on the back of the device facilitate playback of previous audio files and allow the user to change the length of descriptions returned. This helps the blind user to get a better understanding of their surroundings and appreciate visual aspects in their day to day life.

Sensors & Devices: Arduino Nano, Raspberry Pi, Rotary Encoder, 5 Buttons, WaveShare Camera Module, Speaker, Amp, 2 18650 Batteries, 2 Vibration Motors, TP4056 USB-C module.

109. Tech Vest ENGR 122 001 - Easley

Mia Leger, Caden Labat, Collin Achee, Veyha Tang

The Tech Vest is a water-resistant dog harness with GPS capabilities, live camera feed, and communication features using a piezospeaker over Bluetooth. The harness is designed for dog handlers in the Search and Rescue field or for hunting applications. Dogs can be separated from their human operators, increasing the dangers and risks the dog may encounter and hindering the communication abilities as more distance is gained. In search and rescue applications, it is often the case that the Canine operator will have to go through tight-fitting spaces that their human operators are unable to follow, creating an environment in which the handler has to wait for feedback from the dog. In an environment where every second counts, live camera feed allows for quick feedback of what the rescue canine sees. Once the search priority has been found, GPS coordinates can be sent to the handler's phone, allowing for resources to be immediately and effectively allocated. If the handler needs to communicate with the canine to either stay in a specific area or return to the handler, functions on the phone can be sent to the vest to play tones associated with certain commands, mitigating the delay. When every second matters, reducing the time both increases the success rate of a search and rescue and decreases the risks of errors that accumulate over time.

Sensors & Devices: 1 Arduino Uno, 1 GPS (Adafruit Ultimate Breakout 66 channel w/10), 1 GPS antenna (Bingfu), 1 piezo speaker, 1 Bluetooth module (HC-05), 1 Adafruit OV7670 Camera

110. Smarter Mailbox ENGR 122 002 - Niemirowski

Dillon Cardwell, Grace Clay, Jadon Newton

Our project is a smart mailbox designed to enhance the way users interact with their incoming mail. Modern mailboxes often leave users unaware of when mail has arrived, leading to mail sitting in the mailbox longer than needed and unnecessary trips. Our smart mailbox has a built in force and ping sensor connected to a bluetooth module that sends real time notifications to the homeowners phone. It also comes with an auto locking door that will be controllable through the bluetooth app. The door locks through a solenoid located at the front of the mailbox attached to the wall. The solenoid will extend acting as a bolt lock. This locking mechanism will auto lock after mail has been detected by the system of sensors. In the case that the lock did not properly activate the system will notify the user that the mailbox has been left open for a certain amount of time. The mailbox will also have a slit for mail to be placed through if the lock is still activated. Allowing all mail to be delivered and providing extra safety. The sensors will be placed in the back of the mailbox mounted to a back wall. Then there will be a cover up wall that is magnetically attached to the back wall for easy access.

Sensors & Devices: One Arduino, One Ping sensor, One 12V battery pack, One Force Sensor, One solenoid, One Bluetooth HC-05

111. AirRack ENGR 122 002 - Niemirowski

Sophia Eldredge, Morgan Simmons, Riley Oakley

AirRack is an innovative, automated dish drying rack designed to enhance kitchen hygiene and convenience by simplifying the dish-drying process. The system is equipped with a pressure sensor that activates the device once the container's cover is closed shut. Upon activation, a combination of the fan and heaters collaborate to circulate hot, dry air around the dishes, helping to accelerate the originally prolonged drying process. The device continuously monitors its internal conditions using a humidity and temperature sensor. As the drying process progresses, the sensor detects the moisture level in the air. Once the humidity drops below the predetermined set value, indicating that the dishes are dry, the system automatically shuts off. An LED indicator then lights up to notify the user that the drying cycle is complete. To verify hygiene and prevent potential mold growth from repeated use, AirRack also incorporates a dust sensor that detects the particles in the air that could signal the possible formation of mold. An LED indicator will be activated if the device senses potential mold growth conditions. This ensures that the drying environment remains clean and safe over time and use. With its easy use and intelligent sensing capabilities, AirRack offers a modern, efficient, and hygienic solution for drying dishes in a college dorm or apartment.

Sensors & Devices: One Arduino, One Temperature/Humidity Sensor, One Dust Sensor, One Flexiforce Sensor, One Fan, 2 Heating Elements, Three LED Lights

112. Stovetop Safeguard ENGR 122 002 - Niemirowski

Braydon Hardy, Hunter Rivet, Micah Kanju

The Stovetop Safeguard is a safety device designed to improve kitchen safety and help prevent house fires and other common cooking-related accidents. Kitchens are one of the most frequent sources of home fires, often caused by unattended cooking or accidentally leaving the stove on. The goal of the Stovetop Safeguard is to reduce these risks by providing a smart monitoring system that alerts users before a dangerous situation occurs. The system uses a Time-of-Flight (ToF) sensor to measure the distance of nearby objects, such as pots or pans. This helps determine whether a pan is properly placed on a stove burner. In addition, a long-range infrared (LRI) sensor is used to detect heat. If the stove is on and generating heat, the sensor will pick this up. The combination of these sensors allows the system to check if the stove is on without a pot or pan in place, something that could lead to a fire. An LED indicator shows when the system is active. If an object is detected, the LED will light up. A PIEZO speaker is also included and will emit a sound alert if the stove is too hot or if it's on with no cookware detected, letting the user know to take action.

Sensors & Devices: Time-of-Flight sensor, Long-range Infrared Sensor, LED, PIEZO Speaker, Arduino

113. Smart Plant Shader ENGR 122 002 - Niemirowski

Drew Sylve, Mason Shaw, Isaac Standley

This project is a smart plant shader designed to help plants gather their desired amount of sunlight. The project is built using a cloth, that would cover the plant from sunlight, that is held up by two separate aluminum rods on both sides of the plant attached to two separate stepper motors. The motors are used to turn the cloth covering the plant around when certain conditions are met from the sensors. The system uses a photoresistor ,attached on top of the cloth covering the plant, that detects sunlight and a light sensor, attached to the plant, to detect if the desired amount of sunlight the plant is getting is being maintained. If the photoresistor detects a moderate to heavy amount of sunlight and the light sensor detects a light value that is greater than its desired value, the motors will begin to turn, covering the plant with the attached cloth. If the photoresistor detects low sunlight, then the motors will move, uncovering the plant allowing it to get normal amounts of sunlight that it would get on cloudy days. The light value the light sensor uses to activate the system is determined by the plant the device is covering.

Sensors & Devices: One Arduino, One Adafruit Si1145 Digital UV Index/ IR / Light Sensor, One photoresistor, two nema 17 stepper motors,

114. WaterWise Bathtub ENGR 122 002 - Niemirowski

Anna Colvin, William Davis, William Wactor

Our project, The WaterWise Bathtub System, is an intelligent bath technology designed for modern, busy lives. The bathtub features a float sensor, to monitor the water level, and a solenoid valve to automatically turn off the water supply once the desired level is reached - preventing overflows and conserving water. The system also has an alarm which notifies users that their bath is ready for use. WaterWise offers an effective, energy-efficient, and simple-to-use solution to a hassle-free bath with no chance of spillage or water waste. Ideal for modern homes, senior facilities, and busy families, our product is compatible with most standard bathtubs and requires minimal maintenance. The system can be fine-tuned to different levels of water to accommodate different users. Our system also prevents unnecessary wastage of water, which will save our users money. Emphasizing safety, convenience, and sustainability, WaterWise transforms the way we manage one of the most basic yet essential parts of daily living.

Sensors & Devices: Arduino, W1209 Temperature Sensor, Piezo Speaker, Solenoid Water Valve, Float Sensor.

115. You’ve got crabs ENGR 122 002 - Niemirowski

Trey Simpson, Declan Pickenheim

“You’ve Got Crabs” uses a dual-sensor system to accurately detect when a crab enters. A pressure plate on the trap floor senses the weight of the crab. The trap also has a motion detector that confirms movement. When both of the sensors are triggered, it will light up an LED strip wrapped around a buoy. This LED strip will only light up if both sensors are trigged at the same time. Giving the trap a pressure and a movement sensor ensures that only crabs will be caught by the trap. Something swimming by will not trigger the trap because it will not touch the pressure plate. That is why “You’ve Got Crabs” uses a dual-sensor system to detect both motion and weight. The lit-up LED will signal that a crab was caught by the trap. By providing real-time visual confirmation, the “You’ve Got Crabs” system helps commercial and recreational crabbers optimize trap checks, reduce wasted hauls, and save on fuel and labor costs. “You’ve Got Crabs” makes every pull count because you always know when the trap is occupied. You’ve got crabs will reduce the number of empty traps that you pull up when trapping crabs. You’ve got crabs will be hopefully help out many crab fisherman.

Sensors & Devices: One arduino, one motion sensor, one pressure sensor

116. Automatic Shoe Cleaner ENGR 122 002 - Niemirowski

Rhett Dolan, AJ Young, Matthew Becker

Our engineering project is a Smart Automated Shoe Cleaner designed to promote cleanliness and reduce the spread of dirt within homes. This device utilizes a combination of sensors and actuators to automatically clean the soles of shoes before entry into indoor spaces. The system is activated using a force sensor that detects when a user steps onto the platform. Once triggered, a water pump sprays a controlled stream of water onto the shoe soles to loosen dirt and debris. Simultaneously, a stepper motor drives a set of rotating brushes that scrub the bottom of the shoes, effectively removing grime and mud. The use of a stepper motor allows precise control over the brush movement, ensuring thorough and even cleaning. The force sensor ensures energy efficiency and automation, as the system only operates when a person is detected, minimizing water and power usage. This touch-free, user-friendly device requires no manual operation, making it ideal for home entrances, offices, and other environments where maintaining a clean floor is essential. The primary goal of this project is to offer a convenient, hygienic, and automated solution for reducing indoor dirt. By addressing the often-overlooked issue of shoe-borne contaminants, our device encourages better hygiene practices and contributes to cleaner living and working spaces.

Sensors & Devices: One Arduino, one FSR Force senor, one 12V Pneumatic water pump, one NEMA 17 Stepper motor, one L298N DC Motor Driver, one RGB LED

117. The Safe Chow Pet Feeder ENGR 122 002 - Niemirowski

John Javellana, Ashley Imhoff, Cameron Grice

Safe Chow Pet Feeders are bringing innovation right to the collars of your pets. The Safe Chow Pet Feeder is an automatic pet feeder that, when approached by your animal, grants access to their food. This is allowed by an RFID tag and reader sensor that is connected to the tag placed on your pet's collar. The Safe Chow automatic feeder is designed to also allow the owner to be able to control the amount of food given and the times in which a pet is fed each day using an real time clock module. The module gives the time so the feeder knows when to give food to your pet. With the help of an IR sensor, Safe Chow Pet Feeders include a feature that can detect how much food is left in your container. When food gets below a certain point, a small LED light will be illuminated, signaling to the pet owner that it may be time to add food back into your Safe Chow feeder container. For our outdoor pet friends, weather proofing designs keep food protected from unwanted animals and the outdoor elements. Making sure our pets are fed and taken care of is our priority and with the help of the Safe Chow Pet Feeder, your pet is ensured to have their food managed and protected.

Sensors & Devices: RFID Tag and Reader, IR LED & Detector, a Servo, linear actuator, RTC clock module

118. Mirror Mirror HNRS 122 H02 - Swanbom

Dominic LeBoeuf, Evelyn Paolo, Ava Robert

Jobs, clubs, classes, meetings, pickups, events- All components to a hectic day. Often, one has to keep track of the weather, time, and the next thing on their list. What if, instead of the scramble and distraction of finding your phone for all this information, there was a mirror integrated with the essential data you needed to be the most efficient on these busy days? Enter Mirror Mirror, a magic mirror that makes getting ready more streamlined. Mirror Mirror displays time, weather, and your Google or Apple calendar. When not in use, Mirror Mirror acts as a normal mirror, but uses motion detection to turn on when a user is present, which also conserves power. If motion is detected, Mirror Mirror then uses facial recognition software to display user-specific information, allowing for multiple users on a single device, and ensuring that sensitive information is only displayed when necessary. Additionally, Mirror Mirror supplies information vital to preparing for the day, minus the distractions that come with other devices, and is never lost in the morning shuffle. All of the pertinent and useful information you need when preparing for the day is displayed on the very surface where you spend the majority of your time in the morning, ensuring that you can efficiently view your upcoming tasks without interrupting your routine.

Sensors & Devices: One Micro Power PIR Motion Detector IC(BISS0001), one Raspberry Pi 5, one Raspberry Pi Camera Module (V2-8), one 50" TV

119. Jumpstart Alarm ENGR 122 002 - Niemirowski

Chris Meziere, Xavier Session, Timothy Hudmon

Getting out of bed in the morning is easily one of the most common problems amongst people of all ages. Over the course of human history, there haven't been many innovations in the alarm industry. More often than not, the automatic reaction to hearing the alarm is to just hit the snooze button. There is no real motivation to get out of bed if you don't want to. That is where we come in with the "Jumpstart Alarm". This new idea that we came up with will make sure whether you want to or not, you will get out of the bed. Our system is a full room alarm system that will hook up to the lights, the bed, and the door. When the alarm goes off, there will be a countdown before the next stages engage. The alarm will sound, the lights will flash, and the bed will slowly turn until you fall out. The only way to shut it off is to walk past the sensor on the door, guaranteeing that you not only get out of bed, but also start getting ready for whatever the day has in store for you.

Sensors & Devices: IR sensor, Motor Driver, Linear actuator, LED, Piezo speaker

120. Plug-N-Geaux ENGR 122 002 - Niemirowski

Gordon Leaber, Isaac Marshal, Ethan McNeal

This project is designed to assist those who have hand mobility issues that prevent or hinder their ability manipulating a phone charger into the charging port. This device helps solving this problem by plugging in their phone for them so that they can get what they need to do.

Sensors & Devices: RFID Card Reader - Serial, Servo

121. Smart Toolbox ENGR 122 003 - Niemirowski

Morgan Evans, Elizabeth Arsenaux, Emma Waisner

The Smart Toolbox is designed to aid beginner and intermediate tool users by being able to track the inventory of your toolbox whether that be small parts like screws or larger tools like hammers and wrenches. Once a tool is picked up, users scan it to have a profile about the tool pulled up and marked as "in use". After the user is done with the tool, it is scanned back into the toolbox and marked as "replaced". We hope that our toolbox improves a user's experience by promoting organization and reducing the over-consumption of smaller parts. We do this by using a weight sensor and a mathematical equation to calculate approximately how many of a certain product there are in the toolbox. By using an RFID scanner in conjunction with a small LCD screen, the toolbox knows exactly which tool you have chosen and can show what the tool is commonly used for. The idea came to the group because we all have had an instance where we have lost a tool that we needed for that day, or we have rummaged through our engineering bag only to not have our tool in there. We hope that the Smart Toolbox can increase a user's confidence in their ability to complete any home project their heart desires.

Sensors & Devices: Two Arduinos, Adafruit Wingshield, Adafruit LCD Screen, 2 Wishiot Weight Sensors, HiLetGo RFID RC522

122. Side Wipes ENGR 122 003 - Niemirowski

Preston Ayerdis, Colin Bass, Reece Knight

Our project is the Side Wiper, a simple and effective solution for keeping side mirrors clear in all weather conditions. It works similarly to the windshield wipers already found on cars but is specifically designed for side mirrors, where visibility is often compromised by rain, snow, or dirt. The operation is easy: by pressing a button, a DC motor is activated. This motor powers a water pump, which pulls liquid from a reservoir and pushes it through clear tubing directly into the wiper mechanism. The water is sprayed across the mirror surface, helping to loosen and wash away debris. When the user releases the button, the pump immediately stops. After spraying the mirror, a separate switch can be flipped to activate a servo motor. This servo rotates back and forth, moving the attached wiper blade across the mirror surface. The wiper continues to operate, clearing off water and debris, until the switch is turned off. This two-step process — spray first, then wipe — ensures that side mirrors stay clean and clear without the driver needing to manually intervene. The Side Wiper is easy to use, reliable, and adds an extra level of safety and convenience for drivers in any weather.

Sensors & Devices: One Arduino, One DC motor, Servo Motor, one switch, water pump, clear tubing, one button.

123. Simon Says Alarm Clock ENGR 122 003 - Niemirowski

Wyatt Dishong, Aubin Neal, Romi Adhikari

Our project is an alarm clock that requires you to repeat a sequence of blinking LEDs by pressing corresponding buttons. Some sensors that we are utilizing for this project are a piezo speaker to make the alarm sound, buttons to show there is an input for the pattern, LEDs to display that pattern, a Raspberry Pi 400 to display the time and code our clock, and a precision real-time clock module so we can set the alarms accurately. We have a base that the buttons and LEDs can fit into for ease of access, organization, and so that we don't have wires jumbled everywhere while trying to complete the task. Whenever the piezo speaker is set to go off, it can't be turned off until the brain-stimulating task is completed correctly. Hopefully, it leaves the user more awake, and alert compared to a regular alarm clock you could just snooze. Our project is a simple yet effective alternative to help try and solve a common problem of oversleeping. It is inexpensive to construct, doesn't require an intensive understanding of circuitry or coding, and is a fun DIY project. It relies on simple inputs and outputs to accomplish a fun, brain-stimulating task that helps increase wakefulness.

Sensors & Devices: Raspberry Pi 400, four LEDs, four buttons, Piezo speaker, precision real time clock module

124. Flippin Gutters ENGR 122 003 - Niemirowski

Trevor Dobbs, Solomon Pace, Logan Mayeux

The "Flippin Gutters" project is a system designed for homes and businesses with gutters to help prevent clogs and aid in their maintenance. The aim of the project is to implement a system at the downspout of the gutter that will automatically detect and free the gutter of debris. Using a pressure sensor, the system will detect when leaves and debris have gathered over the downspout; that sensor will then activate a flipping mesh that is placed right above that down-spout. This flipping mesh will rid the gutter of debris clearing the way. With this system, gutters will stay clear, allowing for home/business owners to have one less worry–that of their gutters. The risk of climbing ladders to clean gutters and the amount of maintenance will be much lower than your average gutter system. People without the ability to clean their gutters will save money as they will not have to hire people to clean gutters, and will only have to worry about maintenance if there is a problem with the system. Gutter systems across the country constantly face the problem of clogging;"Flippin Gutters" is the solution.

Sensors & Devices: One Arduino, one RF transmitter/receiver pair, one pressure sensor, one motor driver, 2 gearhead motors

125. H2Oasis ENGR 122 003 - Niemirowski

Graham Hanes, Brandt Settoon, Nathaniel Vise

This project focuses on developing an automated case that measures soil moisture levels and provides red and blue wavelength light to optimize plant health. The system is designed for home gardeners, research applications, and those looking to get into plant growing. Inside the compact case, soil moisture sensors are implanted into the soil to continuously collect data. When the soil moisture falls below a defined threshold, the system will automatically initiate a watering system using water pumps and a built-in external resevoir of water to deliver the appropriate amount of water without human intervention. An Arduino uno processes real-time sensor readings, displays current soil conditions onto a small LCD screen, and initiates pump activation. Users can customize moisture thresholds depending on the plants specific needs. The system also controls the timing of the plant lamp system to ensure that plants recieve an adequate amount of light throughout the day. The case is designed for easy access to plants and to water resevoir to allow for easy switching of plants or access to anything inside should the need arise. By measuring and maintaining optimal soil moisure and light levels, this project aims to reduce plant stress, provide a consistent environment for the plant to grow, conserve water and promote healthy growth.

Sensors & Devices: Arduino, Soil Moisure Sensor, Water Pump, LCD screen, Plant Light Strip

126. Leak Logic ENGR 122 004 - Niemirowski

Benjamin West, Jonah Babin, Bo Sessions

We are developing an automatic shutoff valve system designed to prevent water damage caused by burst pipes. The system integrates a pressure sensor and a flow rate sensor to monitor the water supply. The pressure sensor detects sudden drops in pressure, which are common indicators of a burst pipe, while the flow rate sensor measures the volume of water passing through the pipe and can detect abnormal flow rates. By analyzing data from both sensors, our system can distinguish between normal water usage and in the event a pipe bursts. When a potential burst is detected, shown by a large drop in pressure and a high flow rate, the system triggers a solenoid valve to close. This valve instantly closes, stopping the flow of water through the pipe and minimizing water loss and property damage. The solenoid valve is electrically operated and controlled by a relay that continuously receives data from the sensors. A Bluetooth sensor is used to allow for the user to control the solenoid valve. An LCD screen is also used to notify them if the valve is closed. Our design emphasizes reliability, rapid response, and ease of integration into residential or commercial plumbing systems. The goal is to create a smart, automatic safety valve that helps prevent damage from unexpected pipe failures.

Sensors & Devices: One Arduino, 1/4'' Pressure Transducer Sensor, 1/2'' 12V Solenoid Valve, Bluetooth sensor, 1/2'' Flow Hall Sensor (a water RPM sensor), 2x16 Serial LCD screen

127. Flip-It ENGR 122 003 - Niemirowski

Daniel Johnston, Troy Griffin, Anoj Bartaula

This project is a new "twist" on the well-known game Bop-It. Most Bop-It games and devices have simple inputs and challenges that require only simple movements of the fingers. This team has attempted to create a device that forces a higher level of interaction from the player, resulting in greater engagement from those who play. This has been accomplished with the addition of the Flip-It function. In addition to the classic Bop-It, Twist-It, and Pull-It functions, a fourth challenge has been added, requiring the player to flip the entire device at least 180 degrees. The Flip-It function is made possible with the addition of an accelerometer. While 220 Push Button Switches will be used for the Pull-It and Flip-It functions, the 120 Push Button Switch will be used for the Bop-It function, given the rigidity of the 120 Button. With such a compact container for this handheld device, specific electronic components, such as a text-to-speech module and speaker, could not be utilized. Instead, this team has made use of the piezospeaker, which will cue functions, the success of a function, and the failure of a function. While this team has done its best to make the frequencies for each function easily discernible, it is happy to add yet another challenge to a game made for younger individuals.

Sensors & Devices: Piezospeaker, 3 220 Push Button Switches, 120 Push Button Switch, Arduino Nano ESP32, Accelerometer, 9V Battery Pack

128. Smart Parking ENGR 122 003 - Niemirowski

Andrew Abshire, Cameron Nevels, Everett Pertle

Our project involves allowing drivers to see if a parking garage floor is full or not. An LCD screen will be placed at the entrance of our model. This screen displays the number of spots available on the parking garage floor, and it displays how many cars are driving around on the parking garage floor. An IR transmitter/ receiver pair will be placed at the entrance of the model, and it will detect if a car has entered the parking garage. When a car enters the parking garage floor, the screen will display that a car is driving around in the parking garage. An IR transmitter/ receiver pair is placed at each spot, and a green LED is also placed at each spot. The LED lights up whenever the spot is available. Once a car parks, the screen will display that a car has parked. Once a car leaves the spot, the screen will display that there is a car driving around on the parking garage floor. When a car finally leaves the parking garage floor, the screen will display that a car has left the parking garage. This design is limited to only four spots due to hardware constraints, but more could easily be added if a larger Arduino was used.

Sensors & Devices: One arduino, four green LEDs, six IR transmitter/reciever pairs, one 2x16 Serial LCD - backlit

129. SEA(Safety Enhanced Automatic)-Hat ENGR 122 004 - Niemirowski

Kaci Thibodeaux, William Lowe, Christopher Allen

The SEA Hat is designed to improve construction worker safety, comfort, and visibility on the jobsite. With the help of an automatic light, a gas detection sensor and alert, and a temperature probe designed to warn the user of imminent high body temperature, this device will allow the wearer to have more peace of mind in the workplace. This project was designed for the construction field with OSHA safety standards in mind and will allow the wearer to focus more on the task at hand, while letting safety become an automated feature of the hat. By alerting to dangerous conditions, we can stop accidents before they happen as part of process safety management, and create a safer workplace for everyone.

Sensors & Devices: Nano Arduino, Photocell, LED, Waterproof Digital Thermometer, Piezo-speaker, Switch, MQ-2 Combustible Gas Sensor

130. Quick Park (QP) ENGR 122 004 - Niemirowski

Thomas Mcknight, Augustine Van Haute, Alexander Klucznik

We have designed a product that will making finding parking on an easier task. It is a Parking system that is used to help people in finding available parking. This allows for less time driving around and wasting gas idling around the parking lot. the main component in this devise is a camera that has machine learning implemented into it. It is able to detect when a car is driving into the parking lot or the car is driving out of the parking lot, depending on which way the car is coming from. Depending on which way the camera senses the car coming from it will either add or subtract from the total parking lots available in the parking lot. There is an LCD screen that displays the number of spots that are available in the parking lot. Also, in our devise there in a photo resister that senses if it is nighttime and will turn on a light so the Camra will still be able to pick up and senses cars in the dark.

Sensors & Devices: HUSKYLENS, 4x20 Serial LCD Backlit, Photo Resister, one Arduino

131. Smart Holder ENGR 122 004 - Niemirowski

Drake Suire, Manisha Dhital, Eric Plauche

This project uses a system of voltage and amperage sensors paired with motor drivers to automatically tighten and restrain any item to a surface. This could be as simple as holding an electrical extension in place or as complex as a storage system for items that would be damaged elsewhere. On the display panel, press a button to start the motors tightening. They will automatically stop when the system reads that an item is in danger of damaging the surface behind it. To loosen the restraints, simply press the other button on the display panel until the item can be retrieved. This has uncountable uses for storage, cleanliness, and even possibility for aerospace implementation. Some of these uses could include holding bags in place during flight, securing items to walls or ceiling, and restraining items for observation, study, or function. This specific prototype was handmade using extruded aluminum, Arduino, two hall effect sensors, gear motors, motor drivers, and 3D printed mounts. Given the chance to follow the design to a final product, further innovations include a system to expand and retract the frame, larger models of the VTH system utilizing pressure sensors, and a complete remake of the current prototype to use more cost effective and sturdier materials, and an added charging system and battery pack.

Sensors & Devices: Arduino, motor driver, and hall effect sensors, 2 gear motors

132. Study Space ENGR 122 004 - Niemirowski

Brendan Kenney, Sarah Margavio, Hunter Kendrick

Study Space is our solution to the ongoing issue of students being unaware of study room availability in the IESB. By installing occupancy sensors in each study room, we can provide real-time data on whether a room is occupied or vacant. This information will be displayed through a simple, user-friendly platform accessible via LCD screens within the building. Students will be able to check the availability of study rooms instantly, saving time and reducing frustration from searching for an open space. Throughout the IESB, many students, including ourselves, have had to settle for studying in various locations due to the fact of full capacitated study rooms. With Study Space, the flow of students within the IESB will become more organized, preventing unnecessary crowding and allowing for better use of the available resources. Additionally, the system will collect anonymous usage data over time, helping administrators understand peak usage periods and optimize room management strategies. Occupancy sensors offer a low-maintenance, highly accurate solution that seamlessly fits into the existing infrastructure. By increasing transparency and providing easy access to real-time information, Study Space ensures that students have a smoother and more efficient study experience while maximizing the utility of the IESB's study spaces.

Sensors & Devices: HC-SR04 Ultrasonic Module, Arduino Uno, LCD Screen, LEDs

133. Blu-BBQ ENGR 122 003 - Niemirowski

Evan Ezell, Stephen Maldonado, Aidan Romero

This project connects a George Foreman to an IoT relay module controlled by an Arduino Uno, creating a smart grilling system. The setup uses an HC-05 Bluetooth module, a button, and a LED indicator. When the user presses the button, the Ardiuno activates the IoT relay to power the grill and beings a preheating timer. During this phase, the system sends a "Preheat Complete" notification to the user's smartphone once the grill is ready. The Arduino continues to track the cooking time after the food is placed. Midway through the grilling session, it sends a notification saying the food is almost done. When the preset grilling time expires, the Arduino automatically cuts off the power through the IoT relay to prevent overcooking. At the same time, the onboard LED turns on for a visual conformation that the process is complete. This smart grill system makes it easier and safer to manage cooking times and reduces the risk of burning food. The bluetooth communication ensures that the user can receive real-time updates on their phone without needing to stay close to the grill. This project combines basic IoT control, Arduino programming, and Bluetooth messaging into a home application, making it easier for all levels of BBQ'ers.

Sensors & Devices: 1 HC-05 Bluetooth Module, 1 Button, 1 LED, 2 resistors, 1 IoT relay.

134. Javelin Trainer HNRS 122 H03 - Theodos

Cole Magee, Chaz Backhaus, Ethan Courter, Zachary Drake

Throwing a javelin is all about technique, precision, and timing. One of the keys to becoming a successful javelin thrower is releasing the javelin at the ideal angle of 32° in order to maximize your horizontal distance. However, it is nearly impossible to accurately tell what angle that you are throwing it at upon release. We devised a product called the Javelin Trainer, that can be attached onto any javelin in order to measure the angle at which it is thrown, allowing novice and pro javelin throwers alike to hone in on their skills. The angle is read using the Arduino Nano BLE Rev Sense 2's built in IMU system, powered by a Duracell 9V battery. Our components are mounted on a 1.7 inch diameter 3D printed cylinder fixed to the javelin via an adjustable hose clamp. Our product also has Bluetooth capabilities, allowing the measurement to be read remotely from any electronic device that supports Bluetooth Low Energy. The Arduino will also use the angle of launch for any given throw in order to let the user know how much they need to tilt the javelin up or down in order to reach the ideal throwing angle of 32°. The Javelin Trainer is an innovative product that takes the guess work out of training.

Sensors & Devices: Arduino Nano BLE Rev Sense 2, IMU System (accelerometer/gyroscope), u-blox NINA-B306 module (bluetooth module)

135. Cam-Buddy 9001 ENGR 122 006 - Cruse

Connor C. Cook, Connor J. Cook, Cage Carr

Our project is a semi-autonomous physical words to digital format, and calendar integration tool. You take a picture of your written media with the device. Then the arduino, in conjunction with the raspberry pi, will compute what the words are supposed to be. And then sends it to the calendar and/or notes app for documentation for easier use. We plan to use an app that has a connected mobile and desktop version, so that the project only has to communicate with one or the other in order for it to be on both of your systems. From there it will be easily accessible from the phone, which will be on the user at all times.

Sensors & Devices: Raspberry Pi 5, Arduino, Breadboard, Camera, Switch, LED, Piezospeaker

136. Target Acquired ENGR 122 006 - Cruse

Grant Gill, Gabriel Middleton, Canaan Viator, Cohen Lawless

The project our group decided to make is an automatic toy turret designed to bring child-like fun to slightly older children and even adults. The toy gun senses an object, tracks said object, and rotates the gun on its frame to aim in the direction of the target, and then fires. It uses a Pixy2 camera sensor to detect and track the object, then a stepper motor mounted to the base rotates the gun, where it then decides whether or not to fire. The main challenges were not necessarily getting individual parts and sensors to function but getting them to integrate with each other. For example, the Pixy cam needed to track the specified object, while the stepper motor used the tracking information to move the base in the direction of the target. Then once the target is within the correct range, the gun motors must turn on and a solenoid pulls the trigger to fire. Additionally, part of this integration involves coding the right conditions for the gun to operate smoothly, such as when to turn on the gun motors and how many times it will fire at the target. Although not an easy task to pull off, the reason we chose this as our project is because we feel that many people could benefit from more fun in their daily lives, whether they are at home or in their work environment. The automatic tracking and firing abilities make this device great for pranks and general entertainment. We hope our automatic turret brings joy and excitement to those who use it.

Sensors & Devices: One Arduino, One solenoid, One Capacitar, One A4988 Motor Driver, One Relay, One Pixy2 Cam, One Transistor

137. Airport Rover ENGR 122 006 - Cruse

Joseph Gulledge, Mario Collins, Ethan Paredes

Team Rover's Airport Rover, is a fully designed Carry-On Suitcase made with a true aluminum skeleton. This skeleton has an outer and inner shell of surrounding cotton ball layer topped with a polycarbonate layer. Our polycarbonate fabric is great for coloring and the color we settled on was silver because it's good for hiding dirt. The rover has a bottom box for all the electric components (arduino, motors, breadboard, etc) to safely sit in. The top box, which is longer than the bottom, is where the consumer will store their goods in the inside and on the outside of the top box lies a ping sensor which allows the suitcase to avoid obstacles, follow the owner's phone (auto-follow feature through a Bluetooth module), and display GPS tracking for whenever luggage gets misplaced. The two boxes are connected with two hinges in the back with one lock in the front to prevent theft of any kind. Moreover, the Airport Rover has tracks for wheels which run on two motors at the bottom which allows for greater traction and a greater ability to distribute the weight of the aluminum. Finally, the rover is fully aluminum which is naturally resistant to water, making our design entirely waterproof.

Sensors & Devices: Arduino and Ping sensor

138. W.I.P.E.D. ENGR 122 006 - Cruse

Roman Ray, Joel Anthony, Gabe Majors

Team Wiped has developed an automatic windshield thawing system. This device contains a MOSFET and a wire to connect it to our heating tube. This system also contains a Thermistor. The device uses the Thermistor to detect whether or not there is a drop in temperature around the system. If the thermistor detects a drop in temperature below 50 degrees Fahrenheit the system will send out a command. This command will tell the system to send electricity through the tubing that will be secured to the windshield. The electrical current will run through a semi resistant material. This will cause the tubing to heat. This heat will then travel through the tubing's cover into the windshield. This will in turn heat the windshield up. This will prevent any water from sticking and or freezing onto the windshield. The idea is that the system will run overnight to prevent ice buildup and enable users to immediately drive their vehicles without waiting for their windshields to defrost. We are also hoping to implement a solar energy system so that the device would be more energy efficient and eco friendly. The code will be very similar to the convection oven system that we made in ENGR-121.

Sensors & Devices: MOSFET, Thermistor

139. The Knockout ENGR 122 006 - Cruse

Beau Harmon, Ceionna Greene, Olivia Frazier

This project is specifically designed to help individuals improve the strength and effectiveness of their punch. Whether you're a beginner or an experienced martial artist, understanding and measuring the quality of your punch is crucial for progress. To achieve this, we have developed a system that utilizes two main components: a sensor-equipped glove and a responsive punching pad. The glove is fitted with a speed sensor that accurately measures the velocity of your punch. As you throw a punch, the sensor captures data in real-time, allowing you to analyze how fast your hand is moving during the strike. This is important because speed plays a key role in the power and impact of a punch. In addition to the glove, we also use a specially designed punching pad that measures the force of your punch upon impact. The pad is built with sensors that calculate the amount of pressure or force delivered when you hit it. This provides valuable feedback on how powerful your punch is and helps you focus on improving strength, technique, and precision. By combining speed and force measurements, this project gives you detailed insights into your performance and helps track your progress over time, ultimately enhancing your punching ability.

Sensors & Devices: 4 50Kg load cell sensors, 1 HXP117 amplifier, 1 accelerometer, 1 button, 2 arduinos Uno, 1 battery pack

140. BlindGuard: Blind Spot Detection System for Motorcycles ENGR 122 006 - Cruse

Luke Richardson, William Deere, Hannah McQuiddy

This project is a blind spot detection system designed specifically for motorcyclists, aiming to improve rider safety and situational awareness. The system uses five ultrasonic PING))) sensors mounted under the tail of the motorcycle to monitor blind spots and rear traffic. These sensors are positioned to cover the Left, Bottom Left, Center, Bottom Right, and Right zones behind the rider. Each sensor is linked to one of three indicator LEDs mounted above the motorcycle's gauges and labeled L (Left), C (Center), and R (Right). When a sensor detects an object within a predefined range, it activates the corresponding LED to alert the rider. For example, objects detected by the Left or Bottom Left sensors will light up the L LED, signaling a potential hazard in the left blind spot. The Center LED is triggered by the Center sensor, indicating a vehicle directly behind. Similarly, the Right or Bottom Right sensors trigger the R LED for right-side blind spots. This system provides real-time visual feedback to the rider without requiring them to look away from the road. It's simple design, using low-cost components and intuitive LED alerts, offers an effective way to increase awareness of nearby vehicles and reduce the risk of collisions during lane changes or turns.

Sensors & Devices: Arduino UNO, 5 Parallax Ultrasonic Ping Sensors, 3 LED Metal Waterproof Indicator Light, 5 Volt Battery Pack, Breadboard

141. The Smart Headband ENGR 122 006 - Cruse

Cassidy Fixico, Carmen McGlasson, Shreya Subedi, Sneha Poudel

For this project we are going to transform your typical headband into a comfortable, adjustable and smart headband. Our smart headband will connect to a device that displays the temperature and heart rate. The material chosen is dry fit, sweat resistant and flexible so it can fit any shape or size head. To achieve this, we have replaced the Arduino that we worked with in class, to a Raspberry Pico Arduino. This is a microcontroller that will connect all of our sensors and the power source together. The power source is a 3.7V Lithium battery that has been wired to a TP4056 lithium battery charging port, giving the lifespan of the battery over 2 years long. The sensors that we have incorporated are Bluetooth, Heart Rate and Temperature. The Bluetooth sensor has been coded to connect to a wireless device. The Heart Rate and Temperature sensors will be displayed on the serial monitor. We have also added a touch button, that will allow you to be able to tap this and the headband will turn on and off. To respond to some counterarguments, we have made this product fully removable so the fabric can be washed and every component has been sized down, to fit and accommodate for the application.

Sensors & Devices: Heart Rate Sensor(MAX30102), Bluetooth(ZS-040), Temperature sensor(MLX90614), Touch sensor(TTP2), Raspberry Pico Arduino, 3.7V Lithium Battery, Lithium battery charging port(TP4056)

142. Air Dryer ENGR 122 006 - Cruse

Jake Deal, Trey Morton, Vanle Dang

Our project is a smart, energy-efficient clothes drying stand designed to accelerate the traditional air-drying process while recording moisture levels in real time. The structure features a two-legged frame built from durable PVC piping, connected across the top. Two fans are mounted underneath the top pipe, blowing air downward to promote faster evaporation of moisture from hanging clothes. Two integrated moisture sensors are suspended near the drying zone and can be clipped to the hanging clothes. These sensors continuously measure the dampness of the clothes and relay the data to an Arduino microcontroller. Based on the readings, the fans will automatically activate or deactivate, maximizing efficiency and conserving energy. An RGB LED is included to indicate drying status. The LED transitions from blue to red, blue representing wet clothes and red indicating dryness—offering a clear and intuitive visual cue. All electronic components are powered and controlled by the Arduino, allowing for a simple, compact, and cost-effective system. This design is especially useful for small living spaces or situations with limited access to outdoor drying, such as during poor weather. By combining targeted airflow and intelligent moisture sensing, our drying stand offers a modern alternative to traditional methods, reducing drying time without the high energy demands or fabric wear associated with electric dryers.

Sensors & Devices: RGB LED, two fans, two soil moisture sensors

143. Personal Modular Security System ENGR 122 005 - Easley

Garrett Hooker, Harrison Berger, Jacob Jones

The Personal Modular Security System is a device designed to protect personal property. The device is intended to be easy to attach to any container or box and provide notice to the owner, when that object is tampered with. The device is armed with various sensors to detect not only when the object is moved but, also movement in front of the object. This system is to allow for the object to be able to detect when a container is opened or closed, whichever is the normal state, and when someone attempts to move the object. This is achieved through the use of an accelerometer to detect movement, and a ping sensor to notice changes in front of the device. When these sensors are set off a loud noise is played to deter a thief and alert the owner. Lastly the device has two buttons to enable and disable the system, with one button turning it on, while the other must be held down for an exact time known only to the owner to disable the alarm. The device is attached to any object or container with adhesive velcro patches to allow for it to be moved and relocated easily.

Sensors & Devices: One Arduino, three piezospeakers, one MPU-6050 accelerometer and gyroscope, one PING))) ultrasonic distance sensor, one HC-05 Bluetooth Module.

144. Laundry Sentry ENGR 122 004 - Niemirowski

Urhirhi Adegor, Lwini Bembele, Joseph Hurlston

Laundry Sentry is a portable smart sensor designed to assist users of shared and public laundry environments such as college dorms, apartments and laundromats. Users are notified when their laundry cycles are completed and alerted if someone tampers with their laundry mid-cycle. The device is compact and easy to attach to the doors of laundry machines using magnets. Laundry Sentry detects laundry machine movement through an MPU6050 Accelerometer and Gyro. The device sends the user a Bluetooth message to their smartphone through the Dabble app when their load of laundry is complete using a HC-05 Bluetooth module. Laundry Sentry also has a secondary feature that is designed to detect sudden jolts of movement that might indicate someone is tampering with their laundry. The purpose of the Laundry Sentry device is to reduce forgotten laundry, minimize machine downtime and improve user accountability while also streamlining the shared laundry experience. By helping users retrieve their laundry promptly the device promotes a smoother and more respectful experience for all. No longer will you forget your laundry and rush to get it, only to find it sprawled across a counter. No longer will others have to remove your laundry just to use the machine. Everyone's time is valuable, let's not waste anyone's.

Sensors & Devices: Arduino UNO, HC-05 Bluetooth Module, MPU 6050 Accelerometer and Gyro

145. Auto-Sudz ENGR 122 005 - Easley

Adyson Roberson, Kyler McNeely, Luke Robinson, Sampada Pokharel

Our project known as Auto-Sudz is designed to simplify and improve how people use laundry detergent, addressing common problems caused by improper usage. Many individuals tend to pour too much or too little detergent, which can result in detergent buildup, skin irritation, wasted products, and even damage to washing machines over time. Auto-Sudz solves these issues by offering an automatic dispensing system with three preset load sizes: small, medium, and large. Each preset delivers just the right amount of detergent based on the selected load, ensuring consistency and efficiency for every wash. A built-in weight sensor constantly monitors how much detergent remains in the reservoir. Based on the current weight and the selected load size, it calculates how many loads are left and displays this information on a clear LCD screen. When the detergent level drops below a certain point, the system alerts the user to refill it. Additionally, Auto-Sudz tracks and records how often each load size is used, offering insight into personal usage patterns. Whether used in households, shared laundry rooms, or laundromats, Auto-Sudz promote smarter detergent use. It reduces waste, saves money, and minimizes environmental impact. By combining convenience, precision, and sustainability, Auto-Sudz helps users take the guesswork out of laundry, one load at a time.

Sensors & Devices: One HX711 load cell, one Arduino Uno, one LCD display, three push buttons, one 5v relay module, one 12v dosing pump

146. BBKO Attachment ENGR 122 005 - Easley

Jesus Zuniga, Walter Moses, Makenna Malone, Aaron Inthavong

Our project is an automatic baby bouncer so that parents can buy it separately and attach it to a baby bouncer that they already bought. It uses a weight sensor to sense when a baby is placed into it and begins to lightly play white noises from a speaker and slowly bounce the baby using a motor and motor driver to put it to sleep for nap time so that parents can go about doing any necessary chores like cleaning or cooking. It will also have a time limit, so the baby doesn't sleep for too long and ruin the baby's sleep schedule and also that the parent doesn't forget about the baby. It will also be detachable and portable so that if a parent wants to play with the baby without it being automatic you can disconnect it and so you can take it with you if the parent needs to travel. With it being bought separate and detachable this should be cheaper and make it easier to use for the parents than the all in one counter parts.

Sensors & Devices: 24V DC Motor, Motor Controller, Speaker, Pressure Sensor

147. Picture Perfect ENGR 122 004 - Niemirowski

Micah Medicus, Declan Johnson Booth, Ian Arnold

Picture Perfect is a handheld straightening device meant for the straightening of tilted paintings, pictures, or any other framed decoration in one's household. To perform this action it uses a motor to turn a housing, one which houses our accelerometer, to straighten the frame as a whole. Sounds simple, but therein lies quite a few more devices and actions to be considered. For starters there's a switch for the user to click to say whether or not they want the device should be operating. Once the button is clicked, the Arduino Nano on the inside determines, via the accelerometer, whether or not the housing is already level and if not, on which side the housing is tilted. Using that information, it then turns the motor in the correct direction based on the scenario, courtesy of the motor driver, and continues to turn in that direction until the housing is perfectly level. Or near enough to it. Even that description is elementary at best. There are a great deal of smaller inner workings regarding both the code and the device itself. Inner workings that simply cannot be described in so few words. That being said, come and see what we've made.

Sensors & Devices: One Arduino Nano, one Motor Driver, two Switches, one Accelerometer, one Geartisan 12 Volt 100 RMP Gearhead Motor

148. Buck Buffet ENGR 122 002 - Niemirowski

Luke Zeringue, Luke Uberecken, Gavin Davis

The Buck Buffet is a deer feeder that will make sure all the deer around are well fed. Built with durability and smart sensors in mind, it uses IR sensors to detect if motion is near and dispenses feed when the deer approaches. No more only setting the feeder on a timer and hoping that deer are around when it goes off, or that it all gets eaten by other critters before the deer can reach it. When a deer approaches, it will get fed. It also has a door that can be opened and closed by Bluetooth from your phone, giving you full control of when you want to feed. It can also dispense feed through Bluetooth from your phone. To add an extra layer of protection, it can detect if it has been tipped over by a bear or any other animal and uses strong solenoids to lock to door in place so nothing can get in. Built for the tough outdoors, the Buck Buffet is fully weatherproof and can withstand anything that Mother Nature throws at it. Whether you're deep in the woods or along the edge of a field, the Buck Buffet ensures reliable feeding and protection season after season.

Sensors & Devices: Two Arduinos, two solenoids, motor driver, spin plate, IR sensor, Bluetooth module, servo

149. The Final Sheet ENGR 122 005 - Easley

Ashlynn Jones, Layla Navarre, James Hoyt, Will Snizik

This project was created to solve the common problem of toilet paper being out of stock in public restrooms. The project presents a simplistic design, while still having many functions and remaining low in cost. Our design includes two Arduinos that communicate through a radio transmitter and receiver. One Arduino is installed directly in the bathroom stall with a PING))) sensor viewing the top of the toilet paper roll. The other Arduino is located in a janitor's closet, back of house, or any other common area. The PING))) sensor measures the distance to the top of the toilet paper roll. This distance is communicated to the other board, which has a display screen read "replace" or "don't replace" and an LED light up depending on if the distance exceeds the set limit for the roll to be "full" or not. Additionally, the device in the bathroom stall features a bluetooth module and a push button. This button is used when the screen and LED go unnoticed, and the user is already in the stall. When the button is pressed, a piezo speaker sounds on the device that notifies the restocker/janitor. Also, the button sends a message to the terminal in the Dabble app, which reads "emergency" and the appropriate stall number. This design will make the lives of service workers and janitors easier, by alerting them in one central place when paper products are low. We also aim to reduce the likelihood of an embarrassing situation for the customer.

Sensors & Devices: Two Arduinos, two Xbee adapter boards, two Xbee Pro 60mW Wire Antenna-S1(transmitter and Receiver), one PING)) sensor, one 1602A generic screen display, one piezo speaker, one button, one HC-05 Bluetooth module

201. IronMail ENGR 122 005 - Easley

Tice Williams, Patrick Garret, Max DeBruhl

Let's face it. Traditional mailboxes haven't changed in decades. Everyone pictures the same thing. However, a flimsy metal box on a wooden post just isn't enough anymore. IronMail is the modern solution: a tough, sensor-driven mailbox that detects when mail is delivered and automatically locks it away in a secure compartment. No more worrying about thieves or suspicious neighbors. It's peace of mind and privacy, finally, built into your mailbox.

Sensors & Devices: Two IR sensors, Two IR LEDs, Motor Drive, Arduino, Breadboard, Buttons, DC Motor, Battery holder

202. The Auto-Deodorizer ENGR 122 005 - Easley

Rylee Honor, Noelle Wilkinson, Joey Zeringue

The Auto-Deodorizer is an innovative, gesture-activated deodorizing system designed to elevate hygiene and comfort in college restrooms. Created with the unique needs of university environments in mind, this compact device automatically dispenses a refreshing spritz of deodorant spray whenever motion is detected near the unit. At the heart of the system is a responsive gesture sensor that detects hand movement in real-time, paired with a solenoid mechanism that seamlessly activates the spray button. This touch-free experience promotes cleanliness while eliminating the awkwardness of bad restroom odors and awkward looks. The box containing our wiring and sensor set up, will be attached to our aluminum framing to help effectively slide the mechanism up and down to each individual's height. Designed by engineering students for the student community, this deodorizer is an affordable, energy-efficient solution that's easy to install and maintain. It is a low profile design that can blend into any given bathroom space while also incorporating an extra layer of consideration and convenience to the everyday college campus experience. With hygiene awareness more important than ever, the Auto-Deodorizer, offers a simple, smart enhancement device for shared spaces. Our project's goal is to make college life just a little fresher—one restroom at a time.

Sensors & Devices: One gesture sensor, one mini solenoid, one small button

203. The Scare-Can™ ENGR 122 005 - Easley

Ramon Eulate, Bailey Felder, Srijan Bohara, Ethan Benton

Our project is a secure trash can meant to ward off rodents and small animals that pilfer through trash. This project will benefit people who live in rural areas that experience this problem frequently. To make a secure trash can, our "Scare-Can™" will have sensors that detect the weight, movement, and angle/tilt of the trash can. When a sensor detects a great change in any of these three categories, an alarm system will play from speakers mounted on the side of the trash can to scare off any animals and alert the owner of activity. The "Scare-Can™" will also have a latch on the lid that only a human can open to prevent any animals from accessing the garbage inside. Lastly, there will be a power/control switch attached to the can that only a human can access. The switch allows the owner to turn the security system on and off at will in case they decide to relocate/use the trash can.

Sensors & Devices: Two Load Sensors (50k SEN-10245), Two Speakers (CQRobot 3Watt/4Ohm), One Accelerometer/ Gyroscope (MPU 6050), One Load Cell Amplifier (HX711), One Toggle Switch (SPC 21274)

204. Line Leader ENGR 122 005 - Easley

Claudia Becnel, Kori Corbin, Izabella Friday, Cameron Kostelak

The Line Leader is an advanced version of the walking stick. After a discussion with the director of the Louisiana Center for the Blind, a common problem with the walking stick is that it doesn't indicate whether a line has moved up. In line, a visually impaired person will not continuously move his/her stick back and forth to see if the line has moved up, especially in long amusement park lines; he/she will usually hold the walking stick up next to him/her vertically. Therefore, we decided to create a walking stick that vibrates to indicate if the line has moved forward; this makes the design more discrete, as well as accommodates those who are blind and deaf. A PING sensor will read the distance the stick is from the person ahead, and when the distance increases past a certain point, the motors will vibrate, signaling for the user to start moving the walking stick again. Included in the design, is an accelerometer that reads side-to-side movement; if he/she is to shift sideways, the vibrating motors will indicate to move back into his/her original position. The design is waterproof with a thin plastic wrap covering the ultrasonic sensor and wire loom protecting the wires and a plastic casing to protect the Arduino and circuit board.

Sensors & Devices: Arduino, Circuit board, PING sensor, Accelerometer, Three Vibrating Motors

205. Techie Protectie ENGT 122 001 - Hall

Ramya Adams, Brandon Henson, Hanna Ashcraft

Our project is a simple video game that involves protecting Techie the bulldog, our loved mascot and campus pet, from footballs that will be going towards him. The controls for the game will be an accelerometer that will move the shield/basket based on the tilt. We have implemented a scoring component with a scoreboard at the end to promote competitiveness among the onlookers. The people playing even have the chance to put a custom name in for their score, allowing for a sense of accomplishment when getting a high score. The game will be displayed via a small TV/monitor that is connected to a laptop, where the game is running. The accelerometer will be held in a small 3D printed box that communicates with the laptop wirelessly to allow mobility and easy transfer between players. We are also implementing a small button to allow the player to start the game themselves rather than relying on our own timing, which will be on the box that has the accelerometer. Techie Protectie will provide a good source of classic fun old and young alike.

Sensors & Devices: Raspberry Pi Pico WH, Accelerometer, Bluetooth module, pushbutton switch, LED lights

206. back.beat ENGT 122 001 - Hall

Landon Treadway, Steven Deville, Brock Dunn

"back.beat" is a standalone drum machine for musicians that want a variety of backing drum tracks to play along to. Whether it's just for practice, creative exploration, or even educational purposes, this drum machine can improve your playing experience without the need for any complex computer software. The machine is designed to be placed on the ground for hands-free controls via multiple footswitch and potentiometer controls. The switches are designed to toggle each control mode, change drum sounds between Hip-Hop and Rock styles, change time signatures, and set tempo with the "tap tempo" feature. There's even a "randomizer" feature for those that want to spice things up. Potentiometers allow for volume and manual tempo controls, while LEDs are used to indicate mode statuses and flash the current tempo at a constant rate. An LCD display indicates to the musician the current tempo, time signature, current beat in each measure, and selected drum sound. An Arduino Uno is used to control this project while a series of relays are used to trigger different drum sounds via an MP3 module. Each drum hit has its own MP3 track and is sequenced accordingly by the Arduino program's selection. With each of these devices working under the hood, all the musician needs to do is plug in the power supply and connect the board to their favorite speaker of choice and start creating.

Sensors & Devices: Arduino Uno, four SPST momentary footswitches, three DPDT latching footswitches, one 16x2 LCD display, three flush-mount LEDs, two 1-kohm potentiometers, one DY-HL30T MP3 module, six SPST relays, one voltage buck converter

207. AutoAntler Feeder ENGT 122 001 - Hall

Austin Babaz, Zackary Bryant

Our project is a trough styled deer feeder that has the ability to be remotely opened and closed on demand. Our feeder has a wooden frame, a tin roof, and an acrylic panel that acts as a door to open and close the trough. The door is moved by a stepper motor that has a hinge attached to the panel. The motor is coded to open the door when there is daylight and close the door once it gets dark. We used a photoresistor to detect these levels and send them to our Raspberry Pi that runs the motor. We also have made a web page that can control the door, so that if you see any unwanted animals eating out of the feeder you can close the door to prevent them from eating your corn. We also have a piezo speaker that can be controlled via the web page to play tones that will ward off the animals eating, so that smaller animals like squirrels and racoons do not get trapped in the feeder when it is closed. This project saves hunters from spending lots of money on corn, by preventing hogs and other nuisance animals from eating their corn. It also helps to pattern deer to eat more in daylight hours, instead of at night when they can't be hunted.

Sensors & Devices: Piezospeaker, ZYLTECH gear-stepper motor, photoresistor, Raspberry Pi Pico WH, A4988 motor controller

208. Smart Stove 2.0 ENGT 122 001 - Hall

Franklin Ramos, Gavin Corbitt, Robert Fisher

The idea for this project is to create a safety system for cooking using a heat sensor to monitor cooking temperature and an ultrasonic sensor to detect whether or not someone is near an active stove. The moment a person moves away from the stove and doesn't come back within 15 minutes, an alert will be sent to the person's text message saying "Alert – You left the stove on." After that message is sent, but no one attends the stove after a certain period of time, an alarm will sound; the alarm will stop the moment a person returns. The loop will start all over again every time it detects an elevated stove temperature.

Sensors & Devices: Two 36-mm Internal Magnetic Speakers, two HiLetgo DHT11 digital temperature and humidity sensors, four 5-mm LED light diodes, one ultrasonic sensor, one Arduino Uno, one Raspberry Pi Pico WH, one battery pack

209. Garden Assistant ENGT 122 001 - Hall

Nathaniel Lilly, Trevor Martin, Blake Rabalais

Garden Assistant is a compact, solar-powered device designed to help gardeners and small-scale farmers maintain optimal growing conditions by providing real-time data about soil and environmental conditions. Equipped with a variety of sensors, it measures key parameters such as soil moisture, temperature, humidity, and light intensity. This information is displayed on a built-in LCD screen and can optionally be transmitted via Bluetooth or Wi-Fi to a smartphone app for remote monitoring. Powered by a small solar panel and rechargeable battery, the device operates autonomously in outdoor environments. The user inserts the probe into the soil near their plants, and the monitor begins collecting data at regular intervals. Based on this data, the device can alert the user if the soil is too dry, too cold, or lacking adequate sunlight—conditions that can impact plant health and yield. Garden Assistant is ideal for home gardeners, greenhouse operators, and hobbyists looking to improve their plant care routine. It encourages more informed watering and planting decisions, reducing waste and improving plant growth. Its simple interface and durable, weather-resistant design make it accessible for users of all ages and experience levels, turning any garden into a data-informed, thriving ecosystem.

Sensors & Devices: Raspberry Pi Pico WH, 5V solar panel, temperature probe, soil moisture sensor, buck converter, barometer

210. Meat Maestro ENGT 122 001 - Hall

Casen Willis, Gabriel Johnson

The Meat Maestro is a stand-alone grill monitoring system. It utilizes a Raspberry Pi Pico WH to remotely monitor up to three pieces of meat. It then takes this data and sends it to a website allowing users to remotely monitor temperatures from while away from the grill or stove. The Meat Maestro allows users to entertain their guests, take care of their children, and watch a game or movie without having to having to stand over their cooking.

Sensors & Devices: Raspberry Pi Pico WH, three temperature probes, three 3.5-mm ports

211. Grow Grid ENGT 122 001 - Hall

Brayden Pullig, Luke Guidry

The Grow Grid is a remote-controlled plant watering system that works off two Raspberry Pi's communicating with one another. One Pi controls the joystick that manipulates the placement of the watering nozzle and camera; the other Pi houses the code for the stepper motors, water pump, and the camera. Stepper motors are used with custom 3D printed gears and tracks that create a grid-based navigation system; this system allows for a wide range of precision motion, allowing the user to stop on a dime. Real-time visual feedback from the camera allows the user to see what they are doing while they are away. Grow Grid wouldn't be truly complete without the camera's feed being displayed to the user remotely – without it the user would have to be next to all their plants during watering. The wireless connection between the Pi's is responsible for the remote-control capabilities of the watering system. This communication was the most complex part of the entire project and is something we were never taught in the ENGT courses. Learning that the Pi's were able to do such a thing was completely new to both of us.

Sensors & Devices: Two Raspberry Pi Pico WH microcontrollers, one Arducam Mega 5MP SPI camera, four ESP32 limit switches

212. Reel Weather ENGR 122 003 - Niemirowski

Carter Townsend, Dustin Hooker, Edison Leblanc

Our project is a fishing weather station that tells you when it's an ideal time to go fishing. It uses three sensors: an anemometer to measure wind speed, a real-time clock module to track date and time, and a temperature and pressure sensor to monitor air temperature and barometric pressure. Using the data these sensors collect, our system determines whether the current conditions are favorable for fishing. Currently, the device checks conditions every few seconds and communicates results to a phone via Bluetooth. It is designed to be standalone, powered by an internal battery, and requires no external connections beyond the Bluetooth link. We are working on improving the system by averaging sensor data over time, which will reduce the impact of outlier readings and limit the frequency of alerts. Although we originally hoped to implement push notifications, this feature may not be completed due to limited time, knowledge, and resources. We had also planned to make the system weather-resistant but decided against it to better manage the project's scope. Overall, we are proud of the product we have developed and believe it effectively demonstrates the goals we set at the beginning of the project.

Sensors & Devices: One Arduino Uno, JBTek BMP180 Barometric Pressure, Temperature, and Altitude Sensor, SparkFun Real Time Clock Module, Adafruit Anemometer

213. BotanIQ HNRS 122 H01 - Young

Karson Henry, Julia Minvielle, Ava Williams

TDS, or Total Dissolved Solids, refers to inorganic and organic materials found in liquid, such as salts, metals, and minerals. In this context, we will be specifically referring to TDS levels in water. TDS levels significantly impact plant growth as different species of plants, as well as flowers, require varying amounts of nutrients in order to grow or be preserved. However, there is a lack of products to aid with monitoring TDS which inspired the creation of BotanIQ. BotanIQ recognizes that different plants and flowers need different TDS and temperature levels, so it allows you to create a custom setpoint for temperature and TDS with just the press of a button. With this setpoint in mind, BotanIQ utilizes an arduino connected with a TDS and temperature sensor in order to continuously monitor and alert when the levels of the water are not correct. An integrated LCD screen displays the current readings as well as the user-defined setpoints. Based on these readings, the user knows either to dilute their mixture with water or add more nutrients in the form of flower food or other additives. This device has commercial implications as it can be utilized in the floral industry in order to prolong flower shelf life by making sure the ratio of water to flower food is correct. However, BotanIQ can be just as useful to the average consumer who has houseplants or an at home garden.

Sensors & Devices: Arduino, TDS sensor (CQRobot: CQRSENTDS01), Serial Enabled 20x4 LCD (Sparkfun: LCD-09568), Thermistor, 4 Buttons, Two LEDs

214. Raily Safe Rails HNRS 122 H01 - Young

Samuel Stewart, Micah Cole, Isabella Ferguson

The sole purpose of our project is to impact the public health and safety of the subway station. In the Raily Safe Rail system we will use an Arduino as well as a breadboard to implement the IR sensor to simulate a sensor finding a train on the railway track. When this sensor finds the train, it will then deploy safety rails along the edge of the wall of the subway station. To do this we will use a custom linear actuator design as well as a custom rail design. We have built a gate in order for passengers to safely walk on and off the train and not risk a fall. To make this gate function, we are using a hinge design and combining it with the use of a DC motor. For both the rails and the gate, we are not worried about the speed at which they occur as it would be a hazard to public safety if it were to go too fast. As a team, we have prepared a backdrop along this prototype to simulate a subway experience. To power the train, we will just drive it manually as of now, but we had the idea of attacking a battery pack onto our train and maybe implementing a bluetooth sensor.

Sensors & Devices: IR sensors, IR light, linear actuators, DC motors, LED light

215. HydroLock Dog Door HNRS 122 H01 - Young

Kate Barron, Reese Bryant, Jacee Spillman, Caroline St. Romain

The HydroLock Dog Door is a pet door outfitted with a series of sensors and devices that allow it to sense when a dog is present outside the door, and if the dog is wet, the door locks automatically to keep the dog from coming inside, preventing the dog from getting water and wet dog smell all over the house. The door utilizes both an IR sensor and a pair of water sensors to determine if a wet dog is at the door, and the code then instructs a small Push-Pull Solenoid at the bottom corner to pop out and effectively lock the dog door shut from traffic coming inside the house. This doesn't lock dogs from exiting the house, as it's only a one way locking mechanism, keeping them from being locked indoors for long periods of time. There is also a small speaker and an LED that chime and blink respectively whenever the dog door is locked, in order to notify the dog owner. In addition, there's a manual button on the indoor side of the dog door that will reverse the position of the solenoid, so if it's locked pressing the button will unlock it, and vice versa, in the case that the owner needs to lock or unlock the dog door for any reason.

Sensors & Devices: Two Water Sensors, one Push-Pull Solenoid, one LED, one IR Sensor, one Button

216. Weather Wardrobe HNRS 122 H01 - Young

Cur'Dericka Rice, Aidan Davidson, Jason Nall

FORGET ABOUT GETTING DRESSED!! Weather Wardrobe is a smart closet solution designed to simplify your daily routine by selecting outfits based on real-time weather conditions when activated with a switch. By integrating a temperature and humidity sensor, Weather Wardrobe collects environmental data and sends it to an Arduino microcontroller, which processes the input to determine the most suitable clothing category. Once the outfit category is determined, the system activates a mechanical retrieval process. A stepper motor and two linear actuators work in sync to physically select and present the appropriate clothing item. The system setup includes two Arduino boards communicating via an RF transmitter and receiver pair to coordinate decisions and movement across modules. Dual motor drivers ensure smooth and accurate operation of all motorized components.Weather Wardrobe brings convenience, personalization, and automation together in an easy-to-use device. It removes the guesswork from dressing for the day, making it especially helpful for college students who don't always have time to look at the weather, or for people in regions with unpredictable climates. Whether you're rushing out the door or just want a smarter way to plan your look, Weather Wardrobe makes stylish, weather-appropriate outfit selection effortless and automatic. Helping you get those clothes on and out the door quicker.

Sensors & Devices: One NEMA 17 Stepper Motor, Two Arduinos, One RF transmitter/receiver pair, Two Linear Actuators, One DHT11 Temperature & Humidity Sensor, One switch, Two Motor Drivers,

217. Paw Pulse 2025 HNRS 122 H01 - Young

Madelyn Aubrey, Michael O'Brien, Jenna Cagle

This project is designed to provide dog owners with vital information about their dog's overall health and fitness. The purpose of this device is to track the number of steps on a regular walk as well as monitor the pet's heart rate. The device is easily attached to a harness that can be put on the pet at any time. This is attached by velcro for easy access and removal. A 9-volt battery is placed inside the device that can be easily changed when the lid is removed. The display connected to the lid allows for the pet owner to read the number of steps that a dog has taken when wearing the harness. The steps are calculated through an average movement of the pet in the horizontal and vertical direction. Furthermore, a heart rate sensor is embedded in the chest region of the harness to allow for the heart rate to be measured close to the dog's skin. A color changing light is also visible for the pet owner to know the range that their pet's heart rate is. A red light will appear when the heart rate is too low or too high, green for when it is in a healthy range, and fade to yellow when the heart rate is approaching an unstable/unhealthy range. This light is to ensure that there is a way for the pet owner to be alerted at the heart rate level.

Sensors & Devices: One Arduino, one RGB LED, one heart rate sensor module MAX3010, one 3-axis accelerometer, one LCD display (Sunfounder IIC/I2C/TWI 1602)

218. Fire Alarm Clock HNRS 122 H01 - Young

Braeden Stephens, Cayden Mckelvey, Alexander Cosky

The Fire Alarm Clock is the integration of an alarm clock and a fire detection alarm system. The purpose is to wake people up as normal or in the event of a fire to keep them and their possessions safe. It functions as a normal alarm clock with a 16x2 display, five button controls, an LED, and an alarm speaker. The display reads the time and date as well as the time when setting an alarm. The buttons are used to snooze the alarm, set an alarm, set the hour and minutes, and turn the clock on and off. Connected to the clock is a fire detection alarm system. The system sends information about room temperature and smoke to the clock with a thermistor and a photo interrupter. If the temperature of the room exceeds 90 degrees Fahrenheit, 100 degrees being the average temperature at the onset of a fire, the alarm will sound. Additionally, if the photo interrupter detects a break in its IR beam due to smoke, the alarm will sound. The normal alarm and the fire alarm will have different patterns and noises in order to distinguish danger from an everyday alarm. A red LED will also flash as a warning sign. A container with BBs that are shaken by vibrating motors will be placed near the pillow to aid in the waking of the user.

Sensors & Devices: Thermistor, photo interrupter, 16x2 serial LCD, 5 buttons, 2 vibrating motors, piezo speaker.

219. Iris Smarthouse HNRS 122 H01 - Young

Grayson Toney, William Navarre, Brealyn Lindsey

Our project is an intelligent lighting control system designed to maintain optimal light levels in productivity-focused environments such as offices and classrooms. The system continuously monitors and adjusts lighting conditions using a photoresistor to read ambient light levels and dynamically control both LED lighting and motorized blinds. When the room becomes too bright due to sunlight or other external factors, the blinds close to reduce natural light, and the LEDs dim further if needed; conversely, when the light level drops too low, the blinds open to let in more light, and the LEDs brighten as necessary. The blinds are controlled by two motors connected to a motor driver, allowing for precise adjustments. Additionally, the system features a manual mode activated by a potentiometer, enabling users to override automatic settings and adjust the lighting to their preference using a linear slider dial—ideal for presentations or specific activities that require non-standard lighting. An off switch is also included to disable the system entirely when the room is not in use, conserving energy. This project addresses the negative health impacts of poorly regulated lighting, such as eye strain and fatigue, and contributes to a more comfortable, productive environment by maintaining consistently balanced illumination throughout the day.

Sensors & Devices: arduino, two motors, motor driver, two photoresistors, 7 LEDs, potentiometer

220. The Miss Stirrer HNRS 122 H02 - Swanbom

Mason Jones, Tori Vascellaro, Cole Brown

A Drink preparation device that will help in both the domestic and commercial markets in both stirring/mixing ingredients as well as helping measure and weigh them out. This device is to help simplify the drink making process by cutting down on the number of utensils and measuring instruments used to make a drink while keeping it within its serving cup. The main idea driving the system designing is to get the best tool that a human can control with minimal knowledge and still get a perfect result. The main portion of this device is the stirring element that helps evenly stir any mixtures placed above it when the magnetic stirrer is placed within the drink. This element is to help provide consistent mixings as well as cut down on utensils used in stirring the drinks by hand. The next portion of the device is the measuring done by the force pads under the top of the device that allows accurate measuring of any added ingredients to the container used for the drink, allowing the trained use of hand measuring any added ingredients instead of dirtying measuring cups. The systems will be displayed/controlled in the third part of the project with the display screen up front that will allow for changing the units of measurement as well as a dial that will control the speed at which the magnetic stirrer spins at to give variable spinning for different drink orders.

Sensors & Devices: 9 Volt DC Motor, Two Pressure Pads, Arduino, 6 AA Battery Pack, LCD backlit 2x16 Screen, Potentiometer 100 ohm, 4 Springs

221. Face-Tracking Monitor HNRS 122 H02 - Swanbom

Cole Pellegrin, Coy Powell, Carter Landry

This project uses Python's OpenCV to track the faces of whoever is closest to a monitor or screen. The data from the webcam is sent through a Flask server that communicates with a Raspberry Pi. The Raspberry Pi will then use this logic obtained from the server to calculate the movement required for two separate NEMA 17 Stepper motors. The Flask server also hosts a Graphical User Interface for this project, allowing users to easily view and change settings for the motors' movement. A laptop is used to host the majority of the code for this project to maintain as much speed and optimization as possible, with the Raspberry Pi hosting solely the logic for controlling the motors. The physical build is easily scalable. The y-axis movement is achieved by turning fishing line around one of the stepper motors' drive shaft, and attaching each end of the center aluminum rod to said fishing line. This is done using a pulley system that is attached to the top of the frame for the project. The x-axis movement is achieved by attaching a rolling cart to the center rod, and rolling it left and right via the second stepper motor attached to a wheel on the cart. This project can be applied to many different fields, and is mainly viewed as an adaptable concept.

Sensors & Devices: Raspberry Pi, Two NEMA 17 Stepper Motors, 2 DRV8825 Stepper Motor Driver, 220 uF Electrolytic Capacitor, Webcam, 10.1 inch LCD Display, Laptop.

222. ColorPal HNRS 122 H02 - Swanbom

Austin Guillory, Aaron Allee

ColorPal is designed to empower visually impaired individuals with the ability to read colors instantly. Using color sensing technology, it helps users independently coordinate clothing and choose matching outfits. ColorPal features a high-precision RGB sensor that scans the color of any fabric or surface when placed nearby. The sensor analyzes reflected light to determine the color of the fabric or surface placed in front of it. Using programmed values for colors, based on the readings, it will output a singular color. The Text to Speech sensor will receive that color and translate it into an electronic sound pulse. That sound pulse will be delivered to the speaker which will output that color in audible sound. The back of the device can be opened up to replace the nine-volt battery that is used to power the device. The back is held on with magnets to help with convenience for the blind, so it is easier to replace battery. Users will be able to determine colors without visually being able to see. The history of colors is tracked on the serial monitor if hooked up to a computer. The simplicity of the product allows for cheap production costs and easier to put together.

Sensors & Devices: TCS3200 Color Sensor, Emic 2 Text-to-Speech, Speaker

223. Spicy sorter HNRS 122 H02 - Swanbom

Jeremy Rink, Roland Johnson, Isaac Gremillion

Our new product is an invention that will eliminate time and complexity in the kitchen. We have created an automatic spice carousel that holds 7 of your favorite spices. It automatically rotates to the spice that you want and measures it out in a half of teaspoon, a teaspoon, a half of tablespoon, and a tablespoon with a push of a button. It uses a stepper motor to rotate to 1 of the 7 positions, then once it arrives at the position it sends a signal to a solenoid to open a little door that will precisely dispense the amount of spice that correlates to the measurement you picked. This was achieved through multiple tests for the spice and their flowrate and tests for the time it takes for the rotation. We are very excited to showcase our new product so please come and visit us!

Sensors & Devices: Arduino, one 5v stepper motor, 11 buttons, one motor driver, one 12v solenoid, and one 12v 2A DC power supply

224. Senses Lamp HNRS 122 H02 - Swanbom

Jesse Llewellyn, Aiden Koon, Dikshant Lamsal

Our innovative alarm system is designed to deliver a more natural—and optionally, a more stimulating—wake-up experience to help users feel refreshed and energized at the start of their day. As the programmed wake-up time approaches, integrated LEDs gradually fade in, mimicking the rising sun and allowing the body to adjust naturally. Additionally, the alarm features an aromatherapy system capable of releasing scents, further enhancing the waking experience through sensory stimulation. Beyond its core functionality, the alarm offers a range of versatile features, including built-in Bluetooth speaker integration for music playback, temperature and humidity sensing for room monitoring, a USB port for convenient phone charging, and full Bluetooth connectivity for remote control via smartphone. Designed with user customization at its core, the system allows for adjustments to snooze durations, LED brightness levels and fading behaviors, as well as the selection or upload of personalized alarm sounds. Whether the user seeks a gentle, gradual wake-up or a more intense start to their morning, our alarm system provides the flexibility to tailor the experience to individual preferences. By combining thoughtful design with multi-sensory engagement, this product redefines the traditional alarm clock and offers a more personalized and health-conscious approach to beginning each day.

Sensors & Devices: Raspberry Pi Pico, 1602A LCD, DHT 11, RTC Module, USB C breakout board, WS22812B LEDS, Speaker

225. Gridiron Guardian HNRS 122 H02 - Swanbom

Luke Colwick, Harvey Gorecki

The Gridiron Guardian is a smart device that uses accelerometers to sense G-forces, which aid in the collection of data in the game of American Football. This data will be used to measure player health and collect performance data. The device will use this data for health and league rule regulations on the field, and player performance and medical research off the field. In the current way that the game is played, there are often discrepancies between whether players are entered into concussion protocol when it comes to the severity of a hit. This can impact rules as it can allow a player who really should not still be playing to continue to do so and affect the outcome of the game, and it can potentially lead to life-threatening injuries or alter player brain chemistry if they end up getting hit again after receiving a severe blow. The helmet will now be able to tell training and league staff that a player has reached a certain threshold and must be entered into the protocol, which will protect the player and the integrity of the game. Off the field, the player can review the data that the helmet receives and use it to better understand their health and to increase the longevity of their career. The player's data can also be used to help further medical research on concussions and learn how to better protect players in the future.

Sensors & Devices: esp32 chip, MPU 6050 Accelerometer, ADXL 375 +-200G Accelerometer

226. Loaf-Lab HNRS 122 H02 - Swanbom

Emma Garlington, Jacob Guidry, Spencer Bordelon

The Loaf-Lab is a product that was designed to allow people who live busy lives to still carry out their passions for sourdough bread making. Sourdough bread making is a very time-consuming hobby due to the attention that maintaining a sourdough starter requires. A sourdough starter is a living organism consisting of flour and water and it is required to make sourdough bread. This starter must be fed exact measurements of flour and water daily and also maintain a certain temperature to thrive. Our product was designed to take away the responsibility of maintaining a sourdough starter. The Loaf-Lab will dispense equal parts flour and water to the sourdough starter and mix it together daily. Motors will be implemented to dispense the flour and stir the starter. Before each feeding, half of the sourdough starter must be extracted to create room for more flour and water. Half of the starter is first discarded through an electronically controlled valve. We have also implemented a sensor that detects the CO2, temperature, and humidity of the container. Maintaining a temperature between 75 degrees and 82 degrees is optimal to the health of the sourdough starter. To ensure that the temperature is ideal, we have implemented a heating element to maintain temperature.

Sensors & Devices: ENS160+AHT21, Load Cell (10kg), HX711, Continuous rotation servo, 12V DC Motors (2), Water Pump, Solenoid valve

227. CloseSure HNRS 122 H03 - Theodos

Ben Eskew, Jack Sherman, Brantley Welch, Micah Drinkard

Our project aims to solve the problem of food spoiling due to the fridge being left open. After 5 minutes with the door open, it will carefully pull the door closed. Our design has little to no interference with the normal opening and closing of the fridge, so you can forget it's even there. The design utilizes a reed switch to detect if the door is closed, an IR temperature sensor to record and report max temperature detected, a clock module for timing, and a DC motor with a custom designed and printed disengaging spool for zero interference. The spool's design allows it to disengage mechanically from the motor when the motor is off. The spool itself it attached to a coiled torsion spring to keep slack out of the line when the fridge is opened or closed. The Reed switch is mounted on the edge of the fridge and the door to easily and accurately detect the presence of the door. The clock module is to keep time more accurately and easily. The entire spooling system was designed in SolidWorks and 3D printed. It incorporates ball bearings, linear springs, and torsional springs. All in all, our project is a simple, cheap design for an ongoing problem.

Sensors & Devices: IR temperature sensor, clock module, Arduinos, Reed magnetic switch, DC Motor

228. The Attendance Scanner HNRS 122 H03 - Theodos

Tran Le, Katherine Austin, Carlos Bombino, Lauren Harmon

The Attendance Scanner device is a modified RFID scanner, built to have students scan their ID cards in order to count their attendance in the class for that day. After a student has scanned their ID card, the device will assure that their card has been read due to a piezospeaker, giving them an audible indication, and a RGB LED, giving them a visual indication by glowing green. The device is also portable due to an attached battery pack and is able to turn off and on with the press of a momentary button. The information of the student's card being scanned will be stored and transferred via Arduino and Python coding into a CSV file and transferred into Canvas, allowing the teacher an efficient way to count attendance of their class. This benefits teachers by having the attendance information in one place where they simply have to upload the attendance information into Canvas, therefore saving class time for lecturing and teaching. Because regular LATech student ID cards are not compatible with our RFID scanner, we will be using cards that are compatible with the RFID scanner to demonstrate the same process a student would go through, if our device were to be implemented into regular use.

Sensors & Devices: 1 Arduino, 1 RGB LED, 1 RFID Scanner, 1 Piezospeaker, 1 momentary button, 1 Bluetooth sensor, 1 6-battery battery pack

229. Smart Bottle Kit HNRS 122 H03 - Theodos

Jason Mitchell, Nathan Duke, Matthew Grant, Krish Gurung

Our project is a water bottle lid that can fit on a variety of standard consumer water bottles that converts said water bottles into smart water bottles capable of linking up to an app and providing the data that the lid collects to the user. This includes water consumption, and the ability to track when the bottle is drunk from in order to provide hydration reminders either through an app or via the piezospeaker installed in the lid. The lid is primarily functioning off of an Arduino NANO, which on top of the standard capabilities of an arduino circuit board, also includes accelerometer, gyroscope, and bluetooth functionality. Having a gyroscope allows us to filter out erratic readings from when the bottle is tilted, and the bluetooth functionality allows us to connect wirelessly to the lid without increasing the profile of the system beyond reason, as the lid needs to remain relatively compact in order to avoid becoming unwieldy compared to the size of any given water bottle. The ability to attach to a variety of consumer water bottles is accomplished via the use of stretchy surgical tubing to form a tunnel between the lid and the water bottle and a hose clamp to secure the two together.

Sensors & Devices: Arduino NANO 33 REV2 accelerometer, Arduino NANO 33 REV2 gyroscope, Arduino NANO 33 REV2 Bluetooth, PING))) sensor, piezospeaker

Kevin Coke, Addie Brauer, Anthony Ubeda, Nathan Berthelot

This project, called the Fold-o-Matic, is a streamlined product designed to cut the time needed to fold laundry. The project features an IR Sensor and LED to sense when clothing has been placed on the base of the board, and with the press of a button from a keypad, the 4 Digital Servos will automatically fold the clothes in a predetermined way, making the process effortless and stress-free. The IR Sensor, located directly under the base of the board, can detect the clothing through the base of the board, which is made from an IR translucent plastic. This plastic is primarily made of polypropylene (PP) and acrylic, both of which are IR translucent plastics. The hinges along the folding parts are automated by the Digital Servos to fold in the Fold-o-Matic's predetermined folding pattern. The keypad is the controller of the product and determines the folding pattern you would want to use for your clothes. All that's left is the finished product: a perfectly folded shirt that took seconds and very little effort. The Fold-o-Matic is designed so that once the item is folded, even if the IR Sensor still detects that folded item, the motors won't activate again until a new piece of clothing is placed on the base of the board, is detected by the IR Sensor, and the keypad is used again.

Sensors & Devices: 1 Arduino, 1 IR Sensor and LED, 4 Digital Servo Motors, 1 Keypad (Maybe)