

- 2025 Oct 17

Last week we started our debut for this project, and started thinking of ideas for the science fair. We started out thinking about the Mandela Effect however it did not work out, due to the fact that we would need a large amount of people. Then we thought of catching hit & runs from bicycle accidents, but that didn't work out either. But now we are doing a project about gathering data from other provinces to see which province has spent the most amount of money per student on public schools, and how much percent are there, and we are also seeing which provinces percent of students participated in science fair in general.

- 2025 Oct 18

Today we are researching the bicycle project because we recently found that it is possible to do it again. We will be focusing on the bicycle project more due to being the main goal project now. These are also the list of items that we need in order to make the sensor to indicate the ink spray to activate.

Arduino Uno rev3 = \$25 - \$45 Usb 2.0 cable type a/b = \$5 - \$10

Bread board = \$8 - \$10 Jumper wires = \$4 - \$12 Vibration sensor = \$10 - \$20

Motor with two arms = \$6 - \$15 Wires = \$1 - \$4

- 2025 Oct 19

Today we received an arduino board plus a MPU6050 and a servo motor. We worked on a simple project just to understand the fundamentals, then we started working on how to make the MPU6050 display the accelerometer values of the axes XYZ. Tomorrow we are going to work on signaling the MPU6050.

- 2025 Oct 20

Today we started out with making a LED that signals when the XYZ accelerometers values change above or below a certain amount, the LED will light up depending on the sensitivity, which we can alter. Then we changed the code and altered the wiring to fit three, one for a “low” sensitivity which is 1 gravity force, another for a “medium” sensitivity which is 3 gravity force, and the last for a “hard” sensitivity which is 5 gravity force. The reason we made three LEDs is to determine a gravity force in order to choose if it was a car crash into the bicycle. Then we did 2 tests outside with a bicycle to see if 1 of the 2 tests will affect the LEDs. When the end the first test one of the cables disconnected so it gave no results, then the second test gave nothing because none of the LEDs lit up, however all the cables were fine.

- 2025 Oct 21

MATERIALS:

Arduino Mega Elegoo, Bread Board, 4 Jumper Wires, 11 Bread Board Wires, 9 Volt Heavy Duty Battery, Bubble Wrap, MPU6050, 1 Red LED, 1 Yellow LED, 1 Green LED, 3 220 Ohms Ω Resistors, 1 Snap on Connector Clip, USB 2.0 A/B, Computer, Duffle Bag and 1 Case.

PROCEDURE:

1- Preparing the Arduino:

- Take out the Arduino then connect the USB 2.0 A/B to the Arduino and the USB part to the computer then add the code.
- Then connect 4 Bread Board Wires to a Bread Board in the i lane.
- Connect 1 Male Jumper Wires behind each Bread Board Wire.
- After, connect the Female Jumper Wire to the MPU6050.
- Now to set up the MPU see the following image.
- Then set up the LEDs with the following image.
- Make the case by adding Bubble Wrap to the bottom of the case then carefully put the Arduino and Bread Board and the MPU6050 inside.
- Then test the LEDs, if it blinks then it's working.

2 - Doing the Tests

- Take the Case to somewhere that is exactly 3 meters high.
- With a Duffle Bag, have someone hold it and stand still.
- Turn on the Arduino then close the Case. (Website the Case has to have the Arduino, the Bread Board with the wires all connected and the MPU6050)

- At the top of the 373 centimeter height, let go of the Case, aim for the duffle bag but do not throw, it will interfere with the results.
- Take the Case and see if any of the LEDs lit up (Green = 1 Gravity Force, Yellow = 3 Gravity Force, Red = 5 Gravity Force)

BACKOUND RESEARCH

- HIT AND RUN CATCHER

No one has ever made a hit and run catcher.

- HOW AN ARDUINO WORKS

How an Arduino works is because there is a microcontroller which is the brain of the whole Arduino. There's also pins in order to connect to the Arduino, and there is a USB port to connect the code from the computer. The Arduino can handle a max of 6- 20 Volts, and has 256kb of memory.

- AMOUNT OF HIT AND RUN DEATHS

When Calgary in the year 2020 has had 199 deaths of hit and run and around 6 confirmed incidents in 2025. It is unfortunately easy to hit a cyclist due to their small size and hard to see height, that's why we need to be more careful out on the streets.(Sources: CTV News, Bike Calgary and Global News)

- HOW DOES A SERVO MOTOR WORK

How a servo motor works is because there are 3 main components: a DC motor, a potentiometer and a gear box. When assembled the DC motor is connected to a

gear then a potentiometer is constantly checking to see what speed it's at and what pulses are being sent out, and thanks to the Arduino sending the pulses, the potentiometer translate them to the DC motor and the Servo goes to that angle.

- **WHAT ORGANIZATIONS ARE TRYING TO STOP HIT AND RUN**
There are currently some organisations to help the victims of hit and runs like Help HART (Hit And Run Tragedies) and the Traffic Injury Research Foundation (TIRF). They provide help by helping public awareness, Law enforcement help teach others and more.

- 2025 Oct 22

Today we managed to connect a servo to the arduino and also the code works. Also when the LEDs light up, the servo goes 180° thus pulling a string that We attached to the end of the servo and to the end of the trigger of a spray bottle. However there was a problem, the servo would need a place to stay fixed on, in order to pull the spray bottle trigger properly, so with the help of my dad, he helped me make a model that after we printed. After two versions, we finally made the servo holder.

After some tests it was clear that we also needed a pulley system, because the spray bottle trigger was surprisingly too hard for the servo.

- 2025 Oct 23

Today we mostly updated the background research and log book. Today we are preparing to conduct the test this weekend.

- 2025 Oct 26

Today we found a better bottle to improve on. We redesigned the servo holder and made holes on the design so the strings could pass through with ease. We also found that we didn't need to add a pulley to the bottle, that the string was finally strong enough to pull the spray bottle trigger. Today my mom found a spray bottle that we could use to just trigger the servos once to spray the water. Thanks to that, tomorrow we are going to print a file that we found on a 3d printing web site, so the servo can trigger the spray can.

- 2025 Oct 27

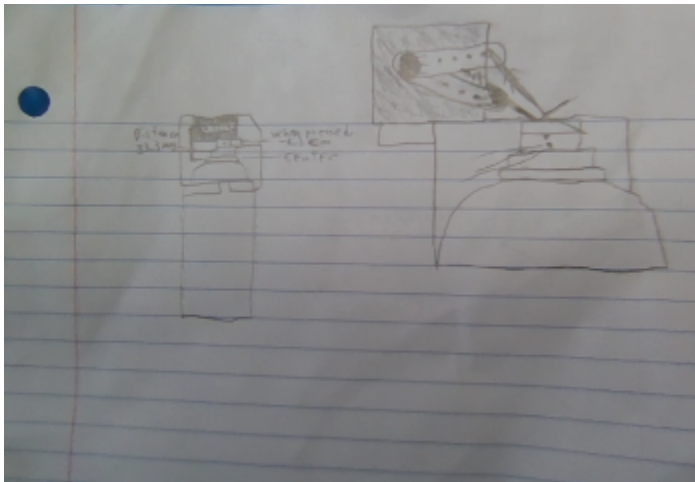
Today we added to the code, so when the accelerometer is triggered, the spray bottle trigger is pressed multiple times which means more water sprayed. Also We added a hole to the end of the spray bottle trigger in order to pass the nylon string to pull the trigger with the servo.

- 2025 Oct 28

Today we measured and found out that the range of the spray is only 24 cm and the spray needs to be longer in length and range. We're going to fix that today. Also today we started altering the code to be reformed for a spray can. After altering the code and debugging, due to a minor setback of an ax variable, We finally started testing the code and servo placement. We 3D printed a file and inserted it on the spray can. After finishing, we ran some tests which all failed. The servo is not apparently able to push the trigger which was a surprise.

- 2025 Nov 1

Today we improved the code and found that the servo cannot press the trigger of the spray can. Due to that we must find out another way to fix this issue.



SOURCES:

<https://www.youtube.com/watch?v=YIYEi0PgG1g>

- 2025 Nov 6

Today we mostly worked on making files and used a different way to push the trigger. Using this file plus a large amount of modifications, We managed to create a simpler, easier and a less complex. What happens is that, when the servo pulls the trigger, a part of the trigger is bent, similar to a hammer pulling a nail however in the opposite way. Today we also rewired the bread board system due to too many wires and confusion so with the help of my dad, we rewired the whole system making it easier to see which wire goes in which port. After some test with the trigger, it works! It has been confirmed after multiple tests.

- 2025 Nov 7

Today we mostly redid some tests and so far everything is up to date and working. Also we are starting to note down in a google doc my stuff to copy and paste into the forms for the science fair.

- 2025 Nov 10

We worked on my procedure and also we started doing some tests. Now that we have a box we can easily without breaking the wiring. We did around 10 tests to see if the led lights up. We fixed some wiring and made sure the code was right.

We have learned that the wires are disconnected after some tries so we are learning how to solder the wires to a different place to stay still and never disconnect.

- 2025 Dec 29

Today we worked on resoldering the wires to a soldering board, also we thought about ways to make our product better than a camera.

- 2026 Jan 7

Today I was working on the coding however due to wiring and/or code it isn't working. I tried debugging but still no answer.

- 2026 Jan 11

Today we worked together to start soldering and we also refined the code. However the soldering was not good, for a reason unknown, the soldering iron wasn't working properly and it took a long amount of time to solder many items. But nevertheless it was a productive day.

- 2026 Jan 17

Today I resoldered everything and gave a new diagram. Now the wiring is more proper. But I also discovered that the previous MPU6050 that we were using was

fried and was giving incorrect data, so I tested it and had it replaced with a new one which works.

- 2026 Jan 18

Today I lost the DC battery jack and I tried looking for it, but was unable to find it. Unfortunately we will have to buy a new one. But there are bright sides, I am currently updating the logbook and next Saturday Che will come and commence the testing and be able to finish this productive project soon.

- 2026 Feb 1

I mainly work on code, not much. We have to finish this project soon.

- 2026 Feb 7

We had a sleep over and we worked on the wires but it was causing a lot of malcontact and issues. We are close to finishing.

- 2026 Feb 21

We visited Lucas' house and we worked on the testing. We finished and found 0.9 was the best.

- 2026 Feb 22

I rewrote the code and now the correct best g is 2.0 gs . I fixed the procedure however there are only a few weeks until we must send results on the CYSF website.

