

Problem A

Step Counter

Lily has been dealing with some stomach discomfort lately and has decided to seek medical advice. When the doctor diagnosed her with a fatty liver, she knew she needed a change and regular exercise was the key. So, she laced up her sneakers and hit the pavement, determined to jog her way to better health. However, after just two days, Lily's motivation plummeted. The repetitive routine left her feeling uninspired, her sneakers heavier with each step. But Lily refused to surrender to defeat. She had a new ally in her corner—a micro:bit. With a spark of ingenuity, Lily crafted a simple yet ingenious solution—a step counter powered by micro:bit. Setting a maximum step limit, Lily embarked on her daily jogs, her trusty micro:bit ticking away with each stride.

Input: Hold the micro:bit with your hand or tie it to your ankle. Then jog!

Expected Outcome: Once the counter reaches a set limit, for example, 20 steps, then it should play happy music.

Problem B

Water Quality

Lily's nightly ritual of keeping a glass of water by her bedside took an unexpected turn when she discovered its salty taste. Suspicion pointed directly at her mischievous younger brother. Determined to outsmart him, Lily's detective instincts kicked into high gear. Brainstorming with her teacher, Lily learned about the soil moisture sensor included in her smart home kit. Intrigued by the possibility, she hatched a plan to detect salt in her water without taking a sip. Can you also write a block code that can measure water purity using the soil moisture sensor of your smart home kit?

Hint: You can use an "analog read pin" to get readings from the soil moisture sensor. The typical value for this ranges between 50-800. You can test with regular tap water or mineral water.

Input: Tap water/mineral water and tap water/mineral water with salt!

Expected Outcome: By checking the conductivity of the water, the system should show a smile if the water is drinkable or a sad face if the water is not drinkable.

Problem C

Automatic Cleaner

Lily's cozy weekends with her cat, Billy, often turned chaotic with snacks and TV time. But Billy's mischievous antics left the room dusty, disrupting Lily's relaxation. Determined to enjoy her favorite movies without the added stress of cleaning, Lily sought a solution. Inspired by her teacher's mention of the cutebot and armed with her smart home kit, Lily embarked on a mission to transform her cutebot into an automatic cleaner. With precision and care, she programmed the cutebot to follow the line of the couch, navigating the room with ease as the servo motor rotated, cleaning up Billy's mess as it went. Thanks to her clever use of technology and her trusty smart home kit, Lily and Billy could enjoy their weekends together, basking in the joy of relaxation without the burden of cleaning up after mischief.

Hint: Connect the servo motor to pin P1 at the back of cutebot. You can add some cotton/tissue using string with the motor to mimic a broom/mop.

Expected Outcome: The cutebot should follow a black line and rotate the motor to mimic cleaning.

Problem D

Maintain a safe distance

In Lily's backyard, amidst the ongoing construction, lurked a hidden danger—a gaping hole that yawned in the corner. Fearing for the safety of her family and visitors, Lily embarked on a mission to safeguard her backyard sanctuary. Armed with her trusty micro:bits and a spark of ingenuity, she devised an automated system to warn of the looming danger. Placing one micro:bit as a beacon by the edge of the hole and outfitting each visitor with another, Lily's system harnessed the signal strength between the two devices to gauge proximity. As footsteps drew nearer, the signal surged, alerting the micro:bits to spring into action. With a flicker of LEDs, it displayed a bold cross, a universal symbol of caution, warning the approaching visitor of the peril ahead. But when the danger passed, and the signal waned, the signboard micro:bit switched gears, displaying a reassuring tick—a testament to the safety of the path.

Input: Keep one micro:bit at a fixed point and start moving another micro:bit closer to it.

Expected outcome: As soon as the micro:bits come closer, both micro:bits must display a cross sign and start warning sounds. Display a tick symbol and no sound when they are apart.