Grove Kit

Sensors
Light level
Sound level
Potentiometer
Moisture

Devices
Buzzer
LEDs
Fan motor
Vibrator
Servo motor

All the above sensors provided work with Mr Bit.
The kit serves well most of the Mr Bit 'Experiments'. The only activities that cannot be done are those using the temperature sensor.

With the Mr Bit 'Projects', they use external switches and buttons quite a lot. So, to make all the Mr Bit activities realisable, I recommend that the kit might be augmented with:
Temperature sensor
Push button
Toggle switch
Magnet activated switch (if possible)

In my tests, programming an LED to flash on and off, I succeed in controlling an LED connected to pins 01, 02, 03, 13, 15. I don't succeed in controlling pins 06, 07, 08, 09, 19, 20.

Looking at the pin allocations on the Interface board, I notice it uses P6, P7 and P9 which we avoided because these pins double with the LED matrix address lines. If you use them, you cannot simultaneously send images or text to the LEDs independently. However we can make those pins available for a dedicated Grove option in the 'Board' list. For such an option we can add to the program a custom graphic design of the board layout in the 'Connections' view. To show images of the Grove board in the Scene window, this is very easy without altering the program.

Most of the connecting sockets are mounted perpendicularly from the device as illustraed by the green LED in the attached picture. This configuration is awkward for mounting the LED on to the Mr Bit 2D cardboard models; from the back of the board one wants to push the LED through a hole in the cardboard so that it shows at the front. To achieve this, the parallel version of socket for the white LED is more convenient.

Explorer lessons with Mr Bit

The following pages illustrate solutions to the challenges using the Mr Bit programming method. Mr Bit programs are much less complicated than MakeCode blocks.

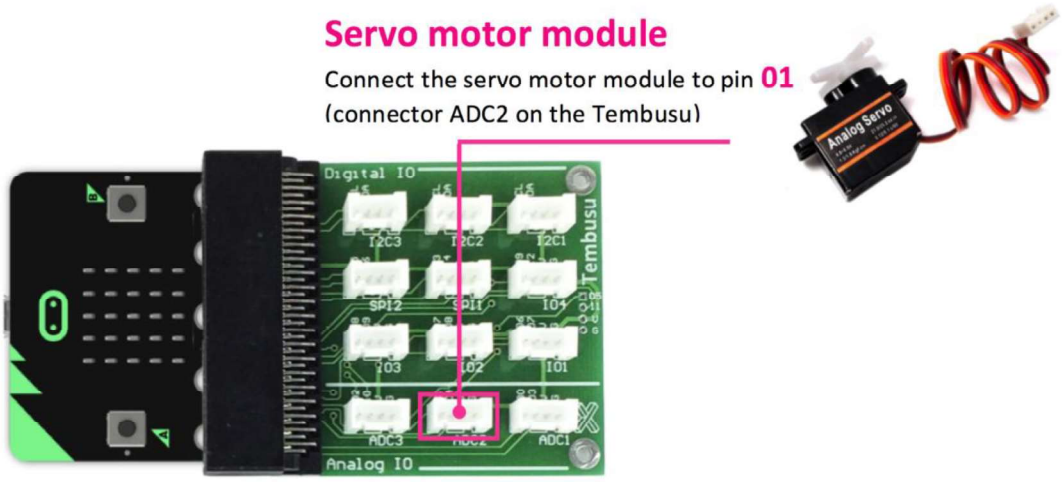
TEMPTURN OF EVENTS

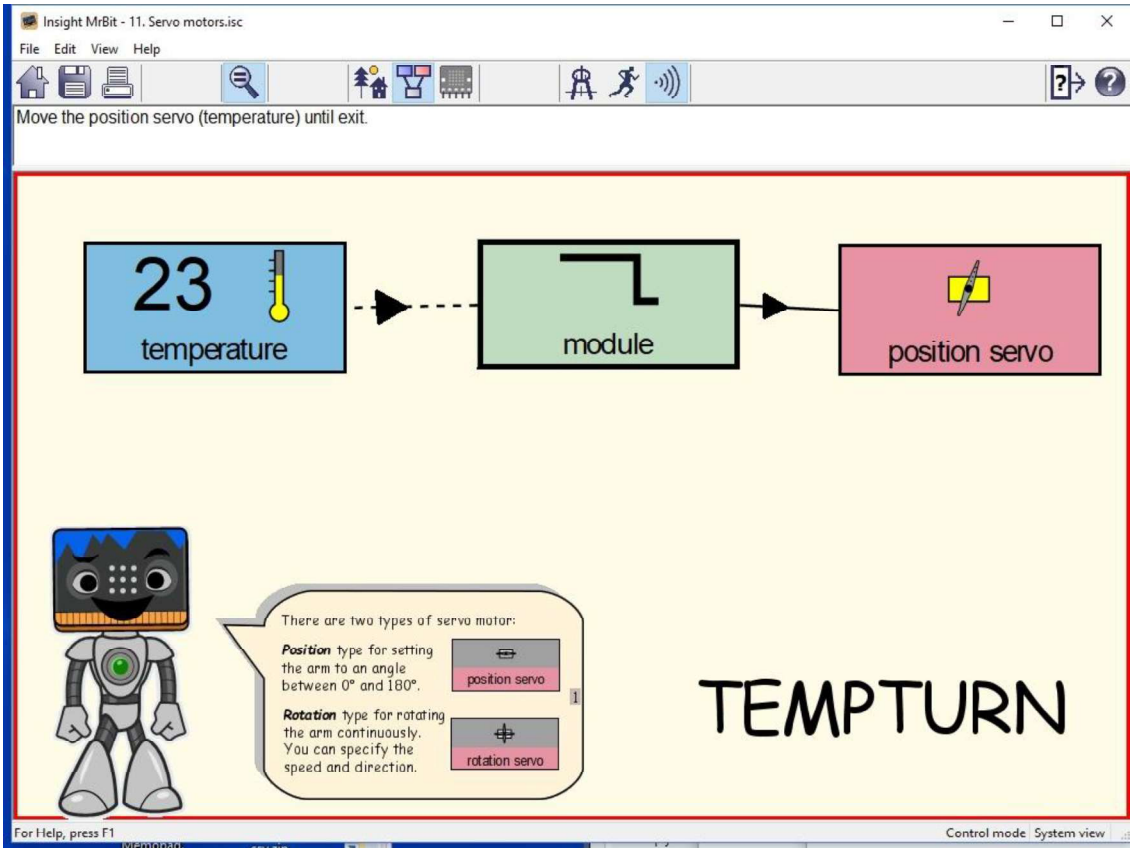
CHALLENGE

Build your very own physical gauge (complete with arrows and dashboards) using the servo module.

WHAT WILL HAPPEN?

The servo motor will rotate according to the input temperature levels. Using the map function, the range of integer values for the temperature will be scaled proportionately to match the rotation of the servo motor.





THIRST REMINDER

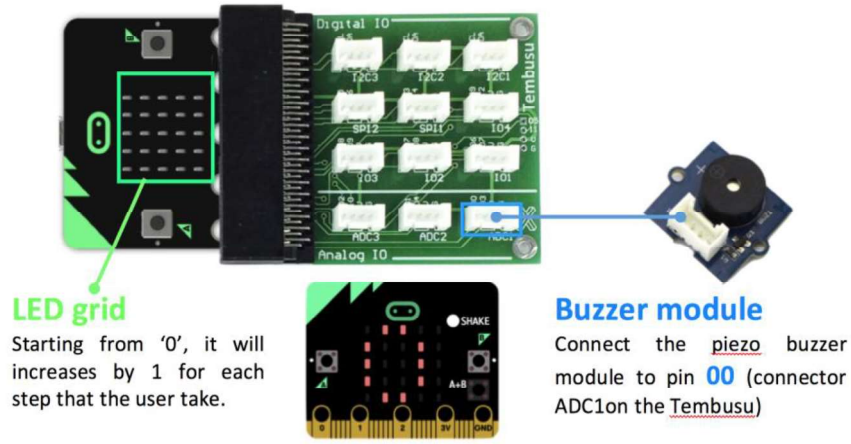
CHALLENGE

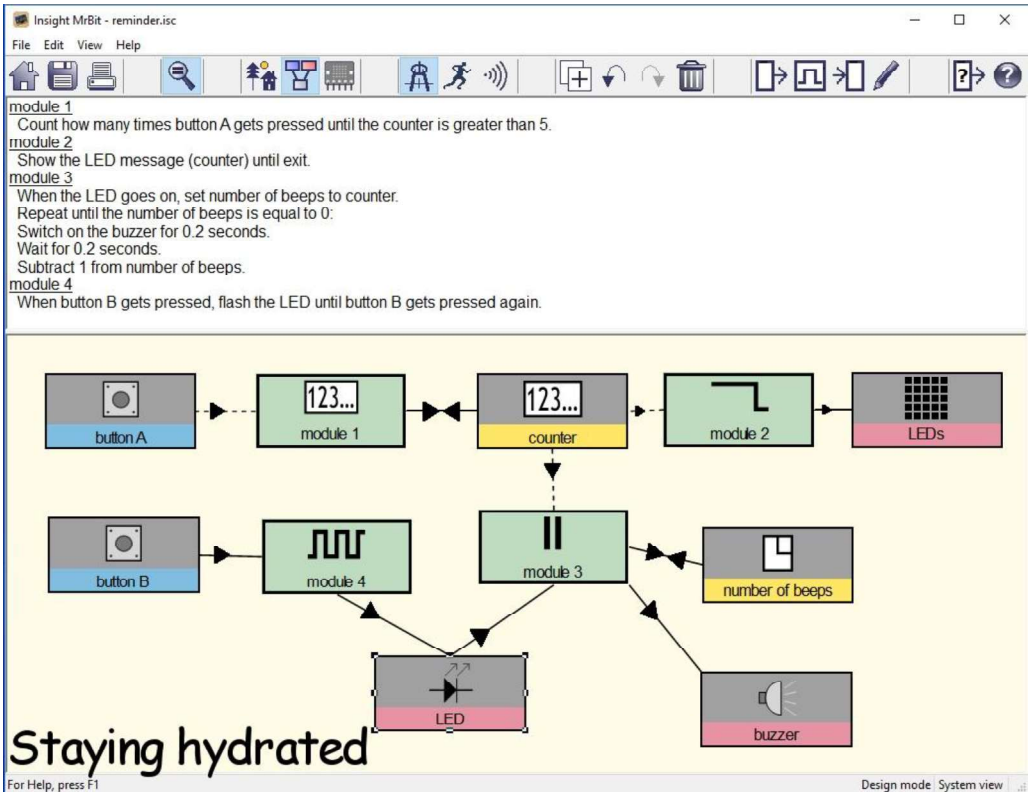
Most of us tend to be forgetful of doing important tasks necessary for our livelihood… even simple things like taking a break or drinking water.

What if there is a way for us to be alerted to do the necessary?

WHAT WILL HAPPEN?

Use button A to select the number of reminders. Once you have selected, press button B to confirm your selection. At this point, if you wish you cancel your previous selection, press B. However, if you wish to continue, Press A and the Micro:bit will play a tone at the right intervals to remind you





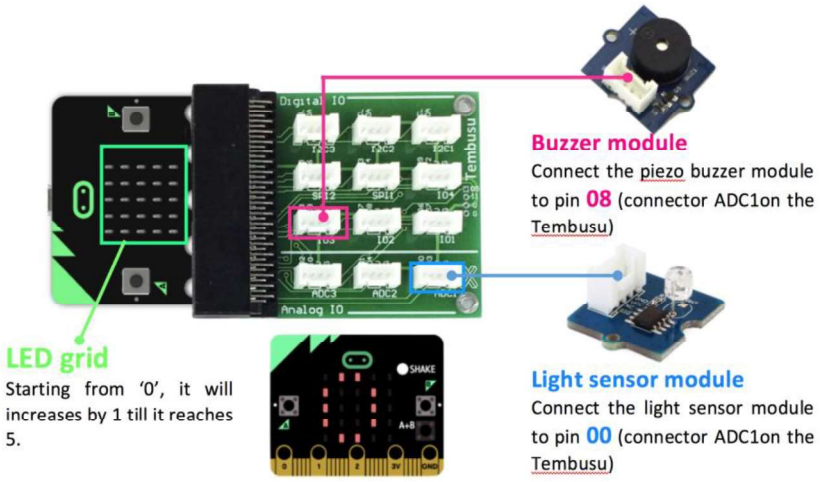
PAPER BALL GAME

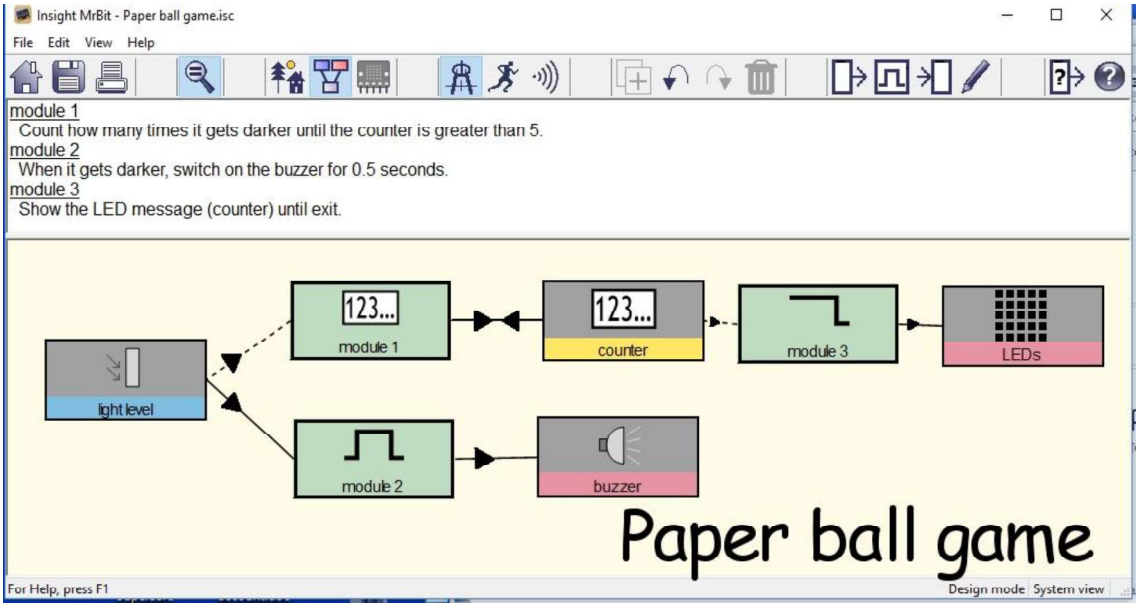
CHALLENGE

Make throwing fun! Build your very own electronic game. Players will try to land a wastepaper into a cup or container

WHAT WILL HAPPEN?

The light sensor is to be embedded into the base of the cup or container. Each time a paper ball lands inside, the sensor will be covered and the LED grid will display a score increment. The first to reach 5 points wins. The buzzer is used to provide additional indication each time someone scores.





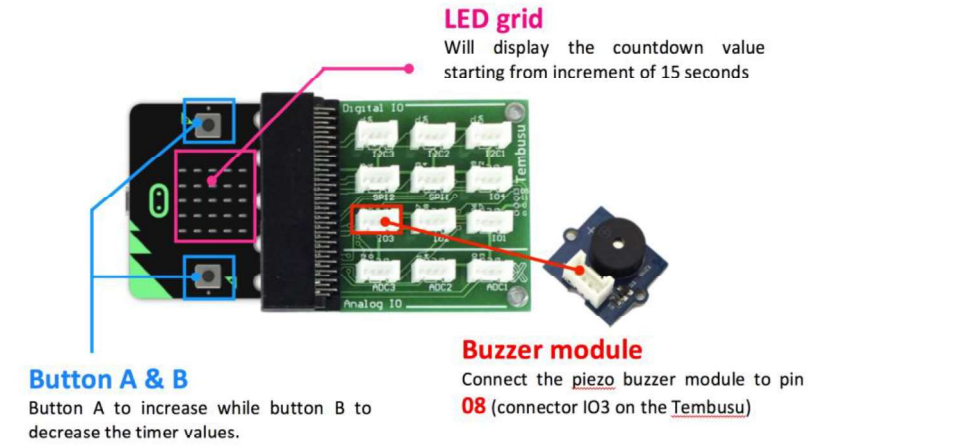
COUNTDOWN TIMER

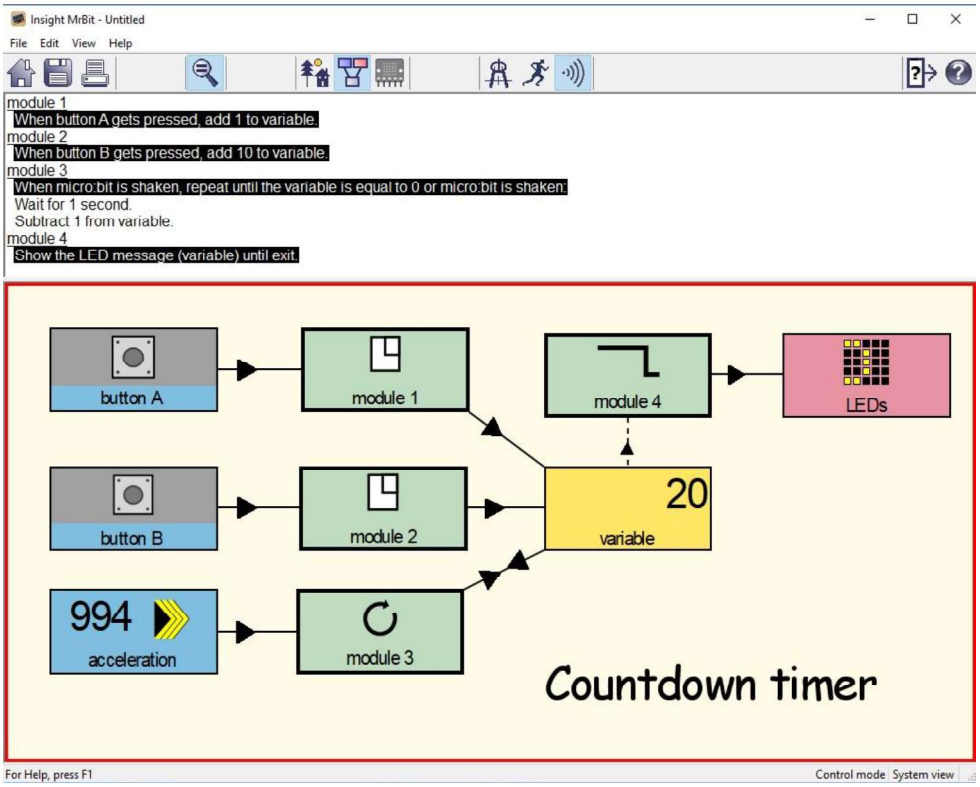
CHALLENGE

Timers are essential items that are useful to help us keep to specific pockets of time especially when we need to cook or doing something within a time limit. We can buy countdown timers off the shelf or we can build our own personalized version.

WHAT WILL HAPPEN?

Press the button A and B on the micro:bit to choose the number of seconds the timer would count down to. To begin, shake the Tembusu board to start the timer. Once the timer reaches 0, the buzzer will sound off until the timer is reset again.

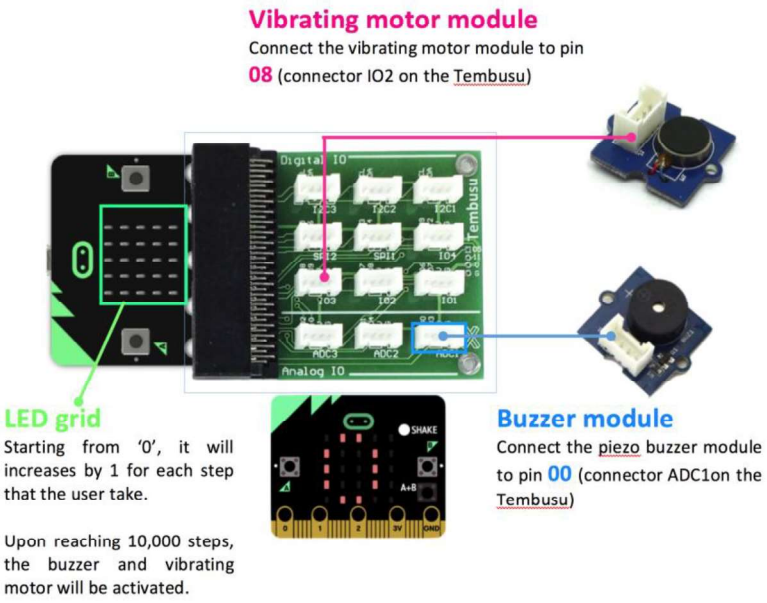


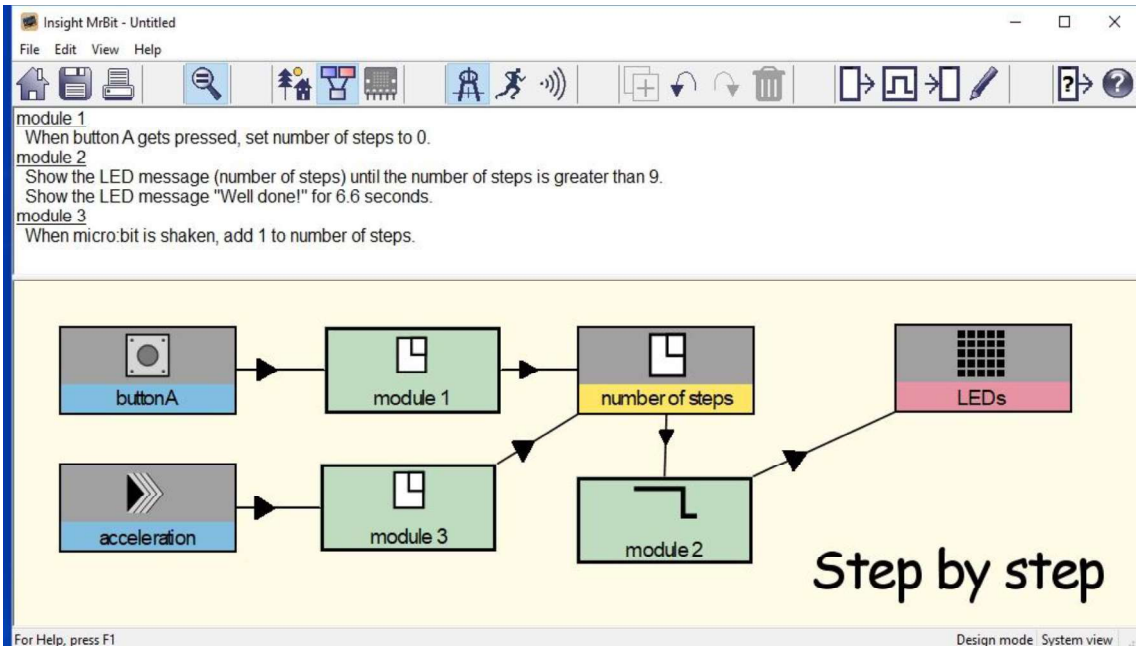


STEP BY STEP

CHALLENGE

The accelerator in the micro:bit can be used to detect the orientation of the micro:bit and any shake. In this challenge, we will build our very own pedometer (step counter) to record the number of steps you walk in a day. As it is recommended that one person should walk at 10000 steps a day. this gadget will alert the user once the 10000-th step is taken.





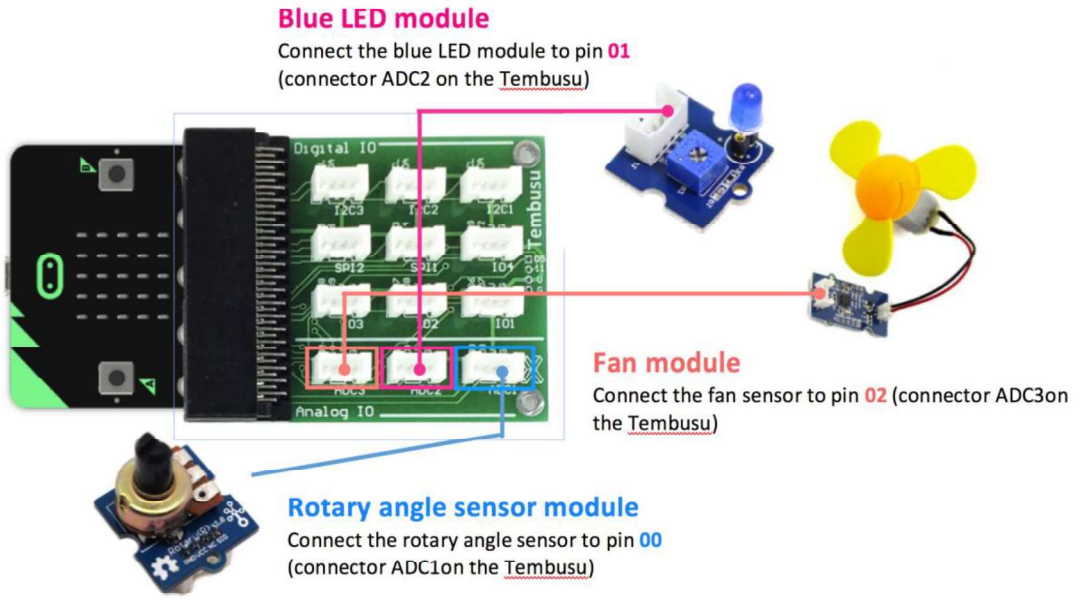
TONE DOWN

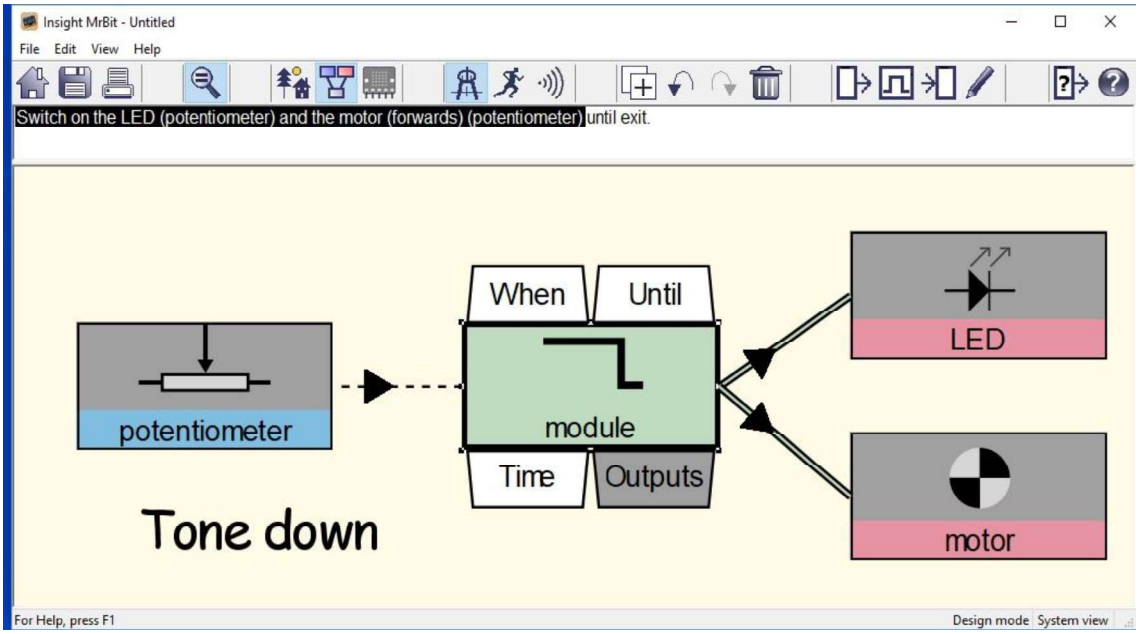
CHALLENGE

Larry really enjoyed his camp but always, he was never totally happy. His fire was burning too fast, and the fan was blowing so strong that he was actually cold. Could he slow it down?
And the night light. It helped keep the night monsters away all right… but it also meant that he couldn't sleep. He needed light but did it have to be SO bright..

WHAT WILL HAPPEN?

When the knob at the rotary angle sensor (or potentiometer) is rotated, it changes the analog input reading. In turn this changes the analog output values. This principle is used to regulate the current, speed or frequency of the output actuators.





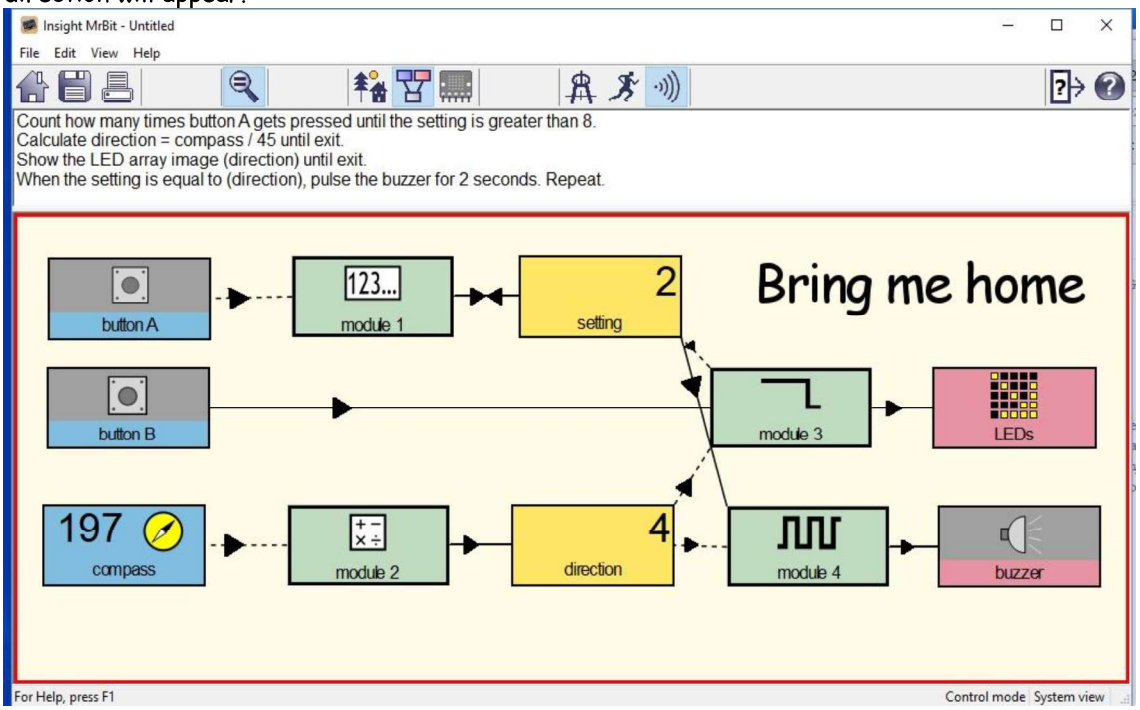
BRING ME HOME

CHALLENGE

Larry thought that he had the best way of getting around in the forest – he had read it an old book written by two brothers. Taking the remains of his breakfast sandwich, he left a trail of bread crumbs behind him to mark his trail. Naturally by mid-afternoon, he was hopelessly lost as the breadcrumbs he left behind mysteriously disappeared. While he had enjoyed the birdwatching that day (there seemed to be an unusually large number of birds gathering near him), there was no trail to be found! Those two "experts" were fakes. That's the last time he'd trust anybody with the name like "grim".

WHAT WILL HAPPEN?

Press A to select the direction that you want to head and B to confirm. Following that, turn the compass to figure out where exactly you should go. As you turn towards the selected direction, the buzzer will beep repeatedly. The closer you are to the direction, the faster the speed of beeping. Once you have successfully figured out the direction, an arrow pointing towards the direction will appear.



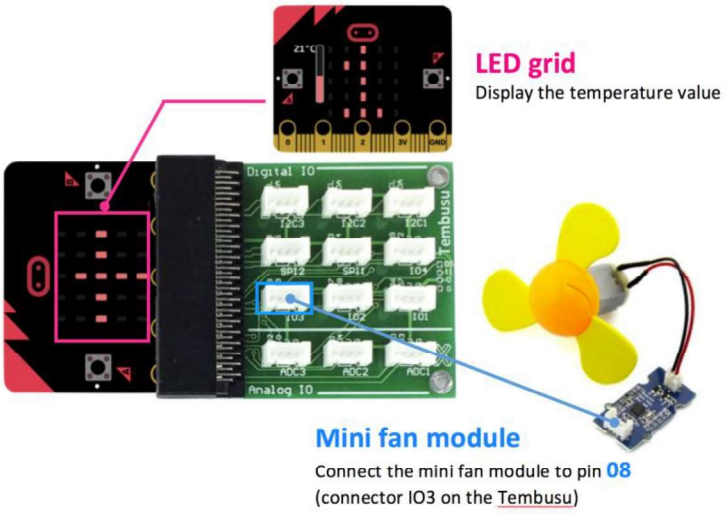
FISHBEANS

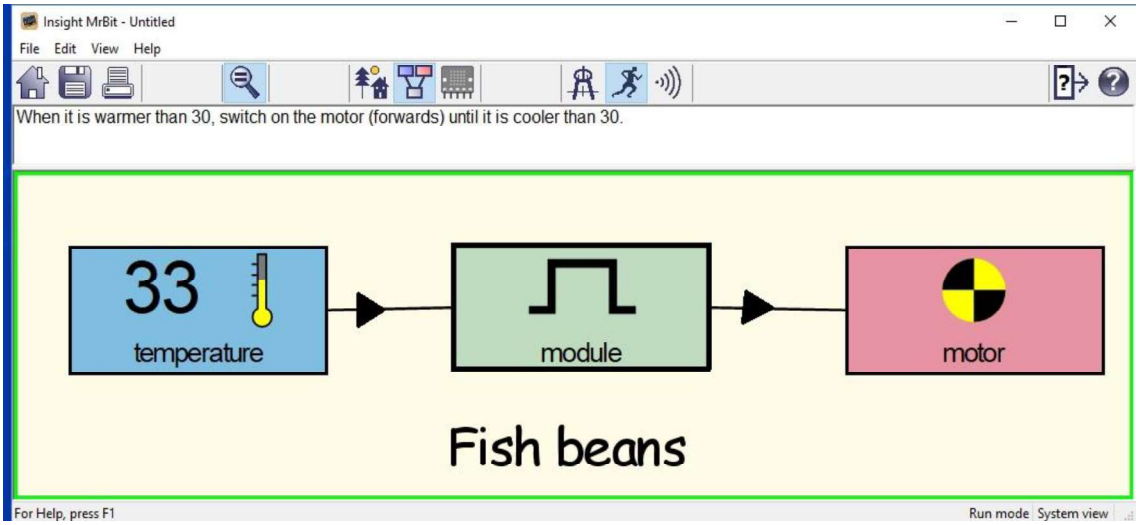
CHALLENGE

On the 3rd day, Larry thought of having some fish for his dinner and went on a fishing expedition at the lakeside. A slippery patch of moss-covered rock on the lakeside and that night's menu was baked beans eaten while sitting in damp underclothes as his lake-soaked clothes hung dripping wet on a nearby tree branch. With night falling, Larry wondered how he could get his wet clothes to dry faster. Back home he'd just hang them at the window to catch the breeze….
And he wished that the log in the fire pit would burn more strongly. He was too cold from his unscheduled dip in the lake to blow on the embers and eating cold beans didn't help either. If only there was a way to stoke the fire, then the log would burn better, and he'd be able to heat his dinner up too.
Was there a way to have a light to come on as it got dark? That way, it would also become a marker for him to follow back to camp.

WHAT WILL HAPPEN?

This challenge uses the micro:bit's on-board temperature levels as an inference to the actual ambient temperature. When the temperature reach a pre-determined threshold (e.g. 37 degrees C), the fan will turn on automatically. Otherwise it will be turned off.





WATER BREAK

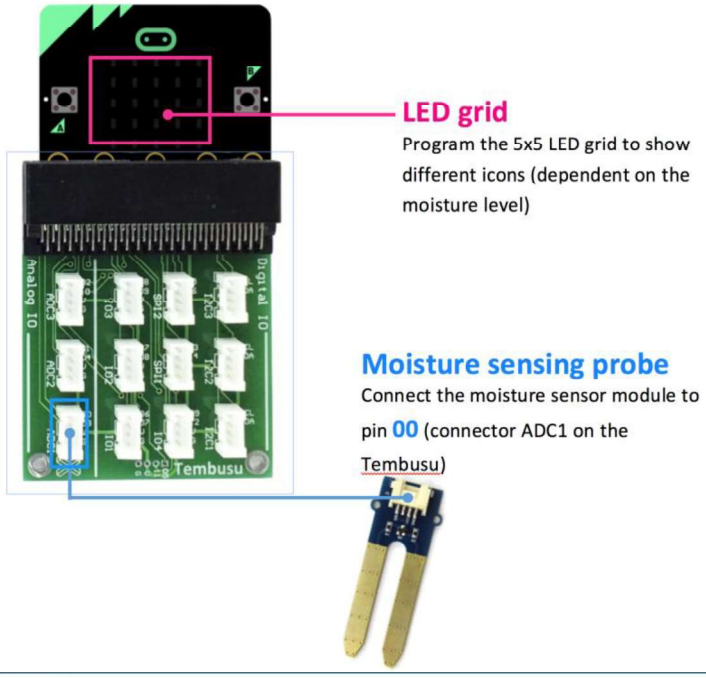
CHALLENGE

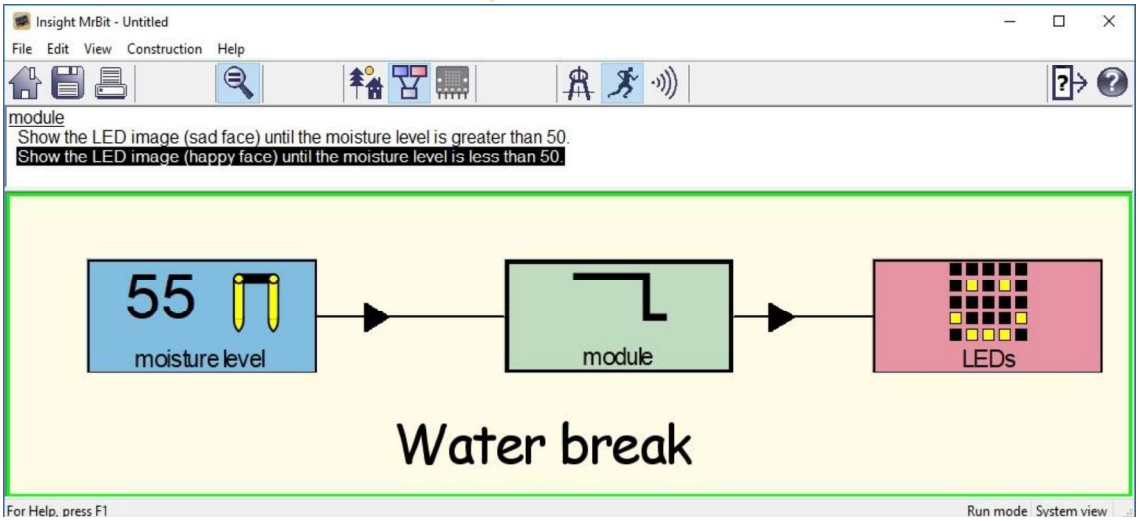
Larry realized that his camp was a bit far from the nearest river. What was he going to do for water? He could do without bathing for a few days (making a mental note to himself not to stand too close to others on the return bus home), but he still needed to drink?

Looking around him at the lush plants, he remembered reading somewhere about digging for groundwater. But where would he start? How would he find the best spot in the ground that had the highest level of water?

WHAT WILL HAPPEN?

The moisture (or water content) levels is taken from analog input pin 00 (connector ADC1 on the Tembusu board) and the value displayed on the micro:bit's LED grid. The threshold level is set at 50. If the value is below the threshold level, the micro:bit will display a sad face, prompting the user to water the plant. Otherwise, it will display a happy face and say the plant is well hydrated.





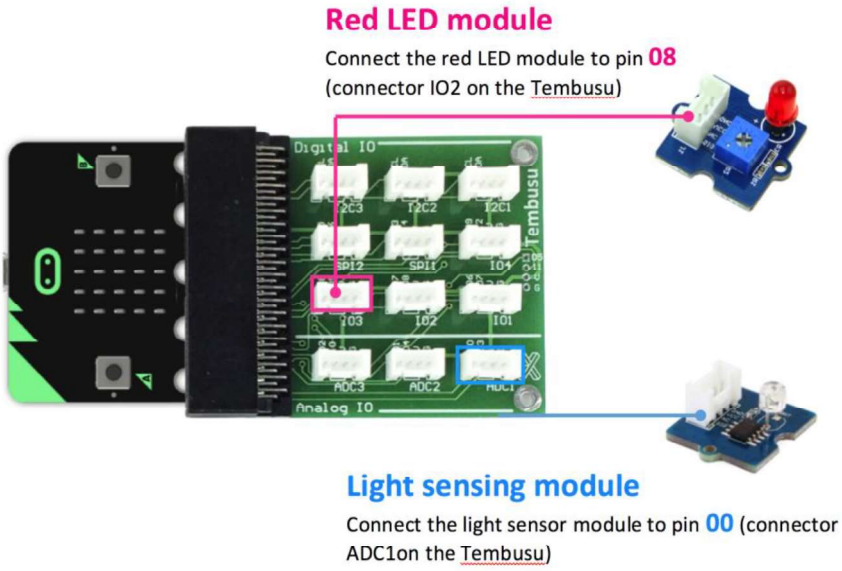
LIGHT SENSOR

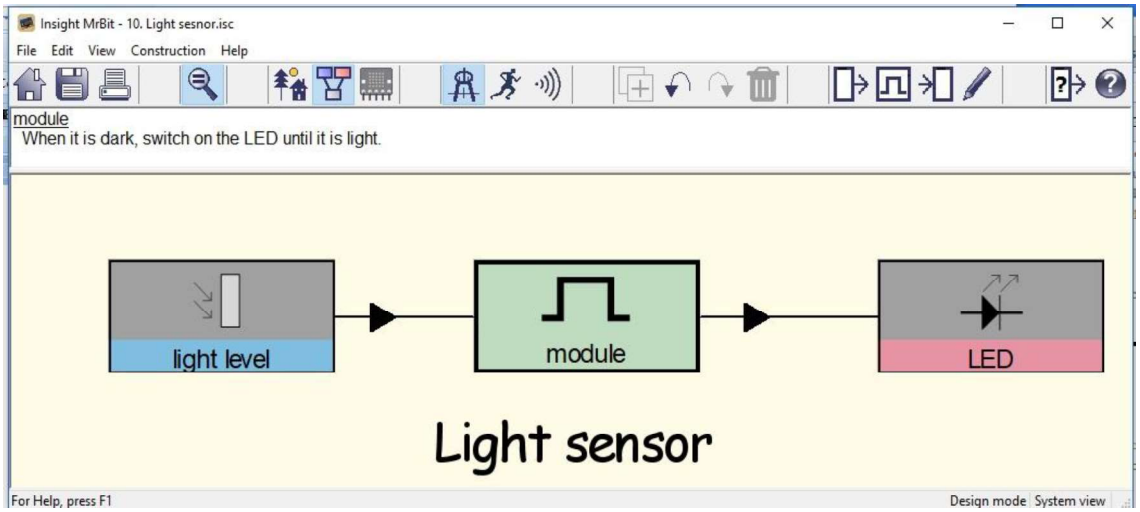
CHALLENGE

It occurred to Larry that in the great outdoors of the Grove, there weren't streetlights that came on when it was dark. And if he was going to be trekking in the woods for mot of the day, there was a strong possibility that he'd be stomping around in the dark when evening came… and he was NOT a fan of the dark (see Makersuit Larry in micro:bits First Steps). But he didn't want to spend his afternoon sitting in camp waiting for nightfall.
Was there a way to have a light to come on as it got dark? That way, it would also become a marker for him to follow back to camp.

WHAT WILL HAPPEN?

When the light level falls to a certain threshold, the LED light will blink intermittently.





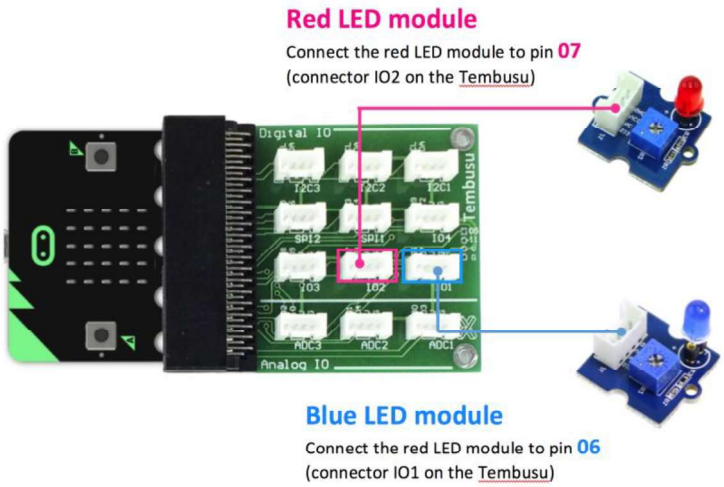
SIGNAL LIGHTS

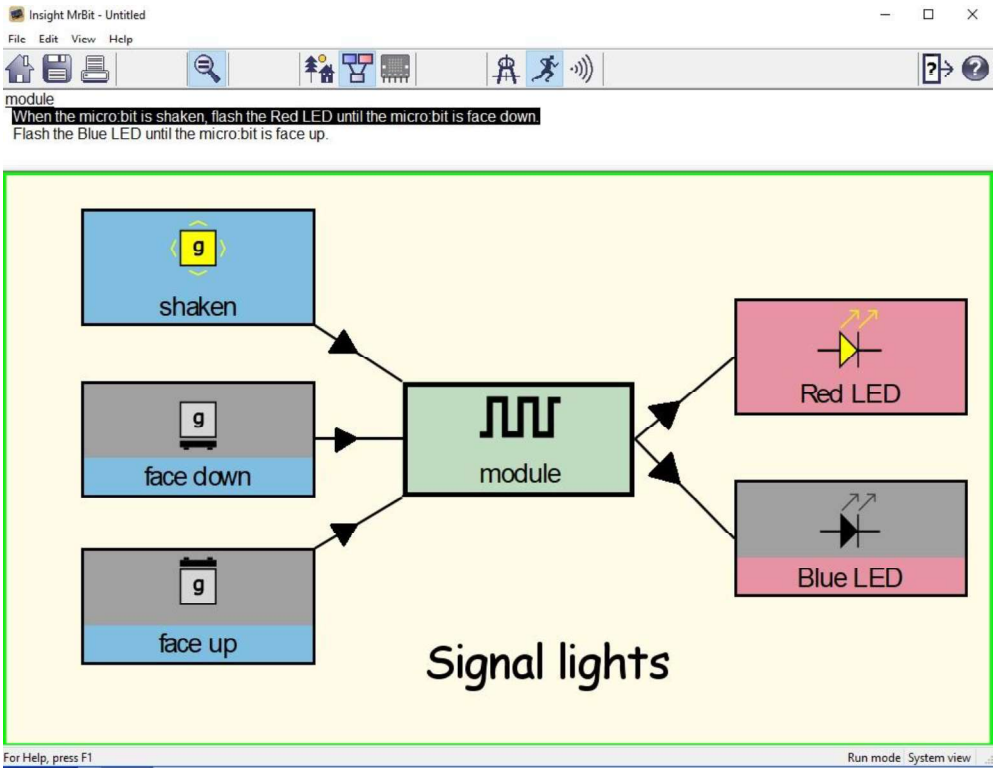
CHALLENGE

Larry was not alone in the Grove. While trekking, he met another explorer like himself. She was called Wandering Wanda. But after a few minutes of silence, they both realized that despite the being grateful for the company, they'd rather enjoy the Grove alone. But then again, they admitted that it was probably safer not be alone. So they came up with an idea. They'd stay far away from each other but still keep in touch. Maybe a little light signal with an agreed series of flashes like a code of sorts? They also agreed on a set of colour codes to indicate whether they were OK, needed help or that the other should seriously start running for his or her life because there was a hungry bear in the vicinity…

WHAT WILL HAPPEN?

When the micro:bit is shaken, the Red LED module will flashes for a while and when it is flipped over, the Blue LED module will flashes.





INTRUDER ALARM

CHALLENGE

On his first night in the Grove, Larry couldn't sleep a wink. In the middle of the night, he woke up to a noise in the bushes around the camp. Were they footsteps? Was that a growl? He frantically started to flip through his knowledge of the known animal life in the Grove? It could have been anything from a mouse or the fearsome bear. It would have been rather dumb to be kept awake all night by the scrabbling of a rodent… but would he know to run in case it was a bear? When morning came, he knew he had to make a sort of animal trap – not to catch the creature but detect its presence by the sound it made. It'd ignore harmless ones like rabbits or mice, but would take notice of anything bigger like a wild dog or bear. And if the beastie was loud enough to trigger the trap, it'd wake Larry up, giving him enough time to run for his life.

WHAT WILL HAPPEN?

The vibrating motor will vibrate when the loudness (sound level) reaches a certain pre-set threshold.