Music and Lights

Time required: 60 minutes

Please read all the directions carefully before beginning the assignment.

- Comment your code as shown in the tutorials and other code examples.
- Follow all directions carefully and accurately.
- Think of the directions as minimum requirements.

Description

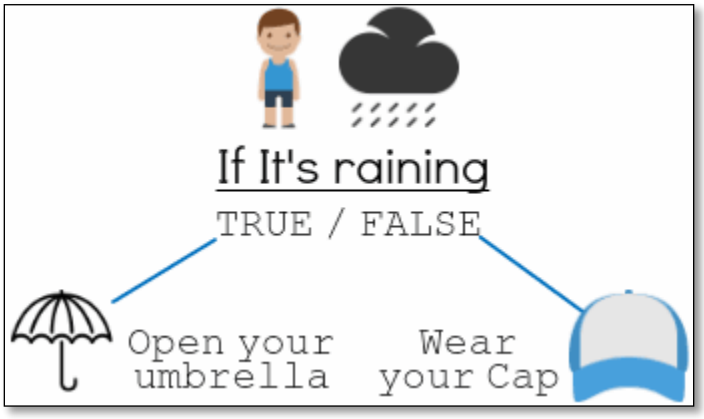
This project adds music along with lights to your mBot. This program introduces a decision structure, the if statement.

Knowledge Points

if then block, tone block

Decisions, Decisions: The if then Block

In life, people need to choose or carry out different tasks according to conditions, such as wearing T shirts in hot weather or padded clothes in cold weather. The air temperature is a condition. Whether you wear T shirt or padded clothes depends on the judgment of the air temperature.



Robots need to make decisions. For a robot, if the button is pressed, it turns on the LED's. If the button is not pressed, it does nothing. Whether the button is pressed or not is a

condition and whether to turn on the LED's or play sounds is the executed result after judgment.

In 

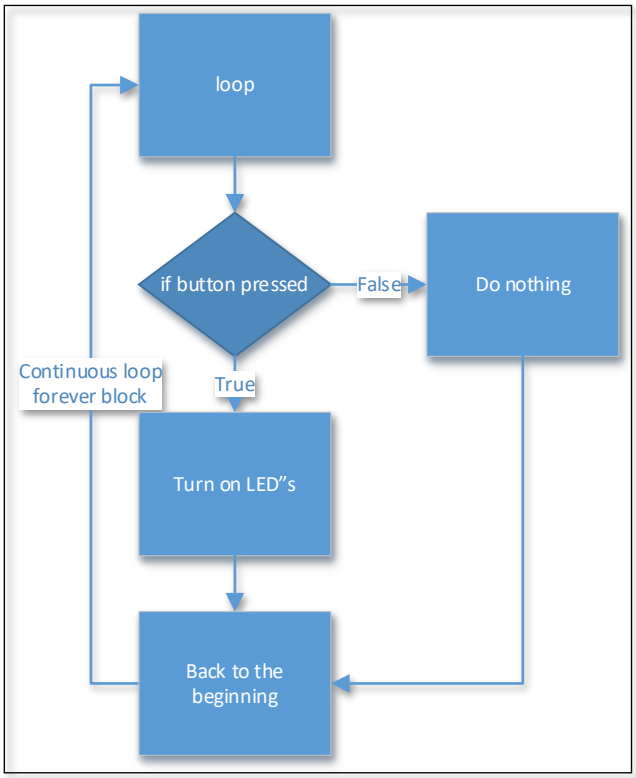
, if the "if" condition  is true, execute the block script within. In this program example, the condition is "whether the onboard button is pressed"; when it is true, the onboard buzzer sounds a tone and when it is not true, nothing is done.

What if I do not use 

?

To test the status of the onboard button all the time when the program is running, you need to use the "forever" block. If you do not use "forever", the program, when started, will run through the program once and then stop. Pressing the button will not control the program.

The following diagram shows the typical execution of an if statement in an Arduino type of program. It is continuously looping waiting for something to happen.



Play Tone Block

There is one drop-down menu in the play tone block 

defining the pitch of the note. The length of the note is defined in beats.

1) C/D/E/F/G/A/B in the tone menu defines the name of the tone, mapping to Do/Re/Mi/Fa/So/La/Ti of C major. The number behind a tone stands for different pitches, C4 for standard middle C, and C5 for a higher octave and C3 for a lower octave.

2) The beats option is how long the note is played. Each beat is a whole note, or 1000 milliseconds.

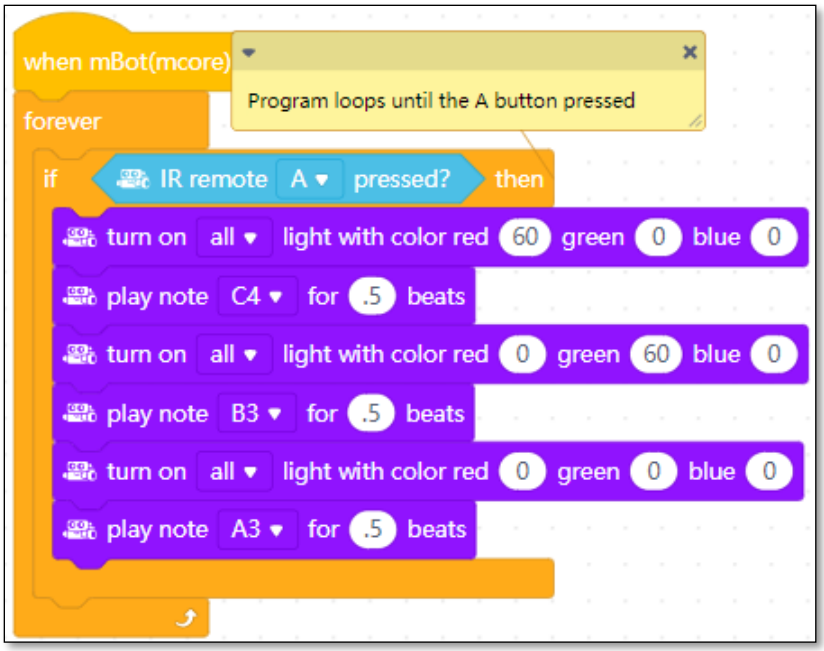
Double (two whole notes)	2 beats	2 seconds, 2000 milliseconds
Whole	1 beat	1000 milliseconds
Half	.5 beat	500 milliseconds
Quarter	.25 beat	250 milliseconds
Eight	.125 beat	125 milliseconds

Requirements

- The program will run when you press the number 1 button.
- The program will play 3 notes and change the LED colors at the same time, then wait until the remote button is pressed again.

Tutorial Assignment

1. Start mBlock. Save the program as **Music and Lights**.
2. Complete and test the program as pictured with the requirements listed.



Assignment

Start with your tutorial project and add the following.

- Add more notes, change their durations.
- Add more LED color changes, flashing and blinking.
- Change the sequence from alternating to a different pattern, both on at the same time, both off, etc.

Check Your Understanding

Please answer the following question.

1. **Why doesn't this program have wait blocks?**

Assignment Submission

- **All students** → Attach finished programs to the assignment in Blackboard.
- **In class assignment submission** → Demonstrate in person.
- **Online submission** → A link to a YouTube video recording showing the assignment placed in the submission area in BlackBoard.