State Machine (Flags)

Time required: 30 minutes

This program demonstrates how to store the state of the machine (mBot) in a flag variable. Flags are a way of keeping track of the state or history of a robot. The robot can then access that history and decide based on that history. Flags allow for fast switching and checking of task states. Checking a flag is a common Arduino practice for modular programming.

In this program, we are changing modes, which allows the remote buttons to be reused for other code blocks. This is how the default program that came with the mBot works. When the mBot is in **ModeA**, you can set remote button actions in that code block. Switch to **ModeB**, the buttons can have other actions in that code block.

How it Works

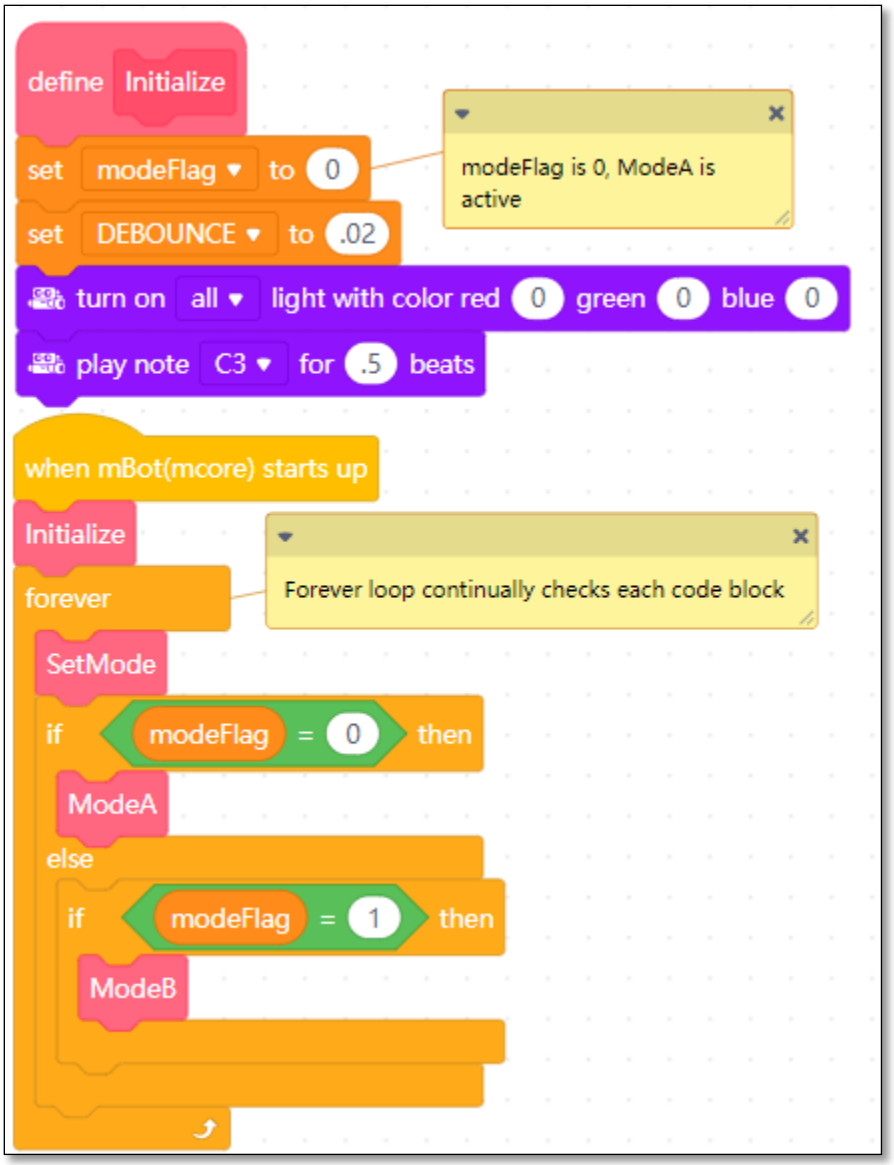
1. The **modeFlag** is set to 0 in the **Initialize** block. **ModeA** code block is active.
2. The forever loop checks for a remote key press in the **SetMode** block.
3. The **SetMode** block changes the **modeFlag** to 1.
4. The **ModeA and ModeB** code blocks keep testing for a **modeFlag** change. When **ModeB** sees the **modeFlag** = 1, it executes and **ModeA** stops.
5. When **SetMode** changes the **modeflag** to 0, we go back to **ModeA**.

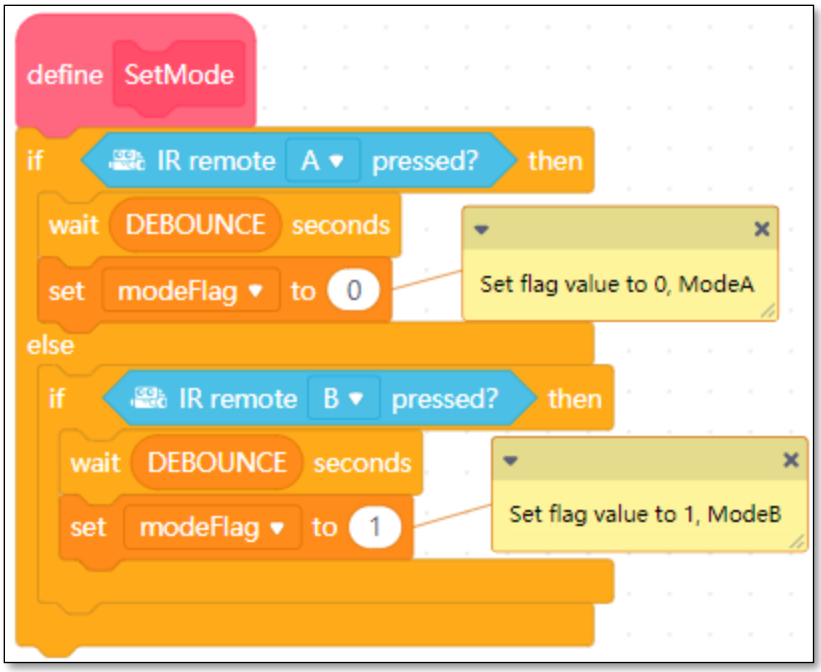
Tutorial Assignment

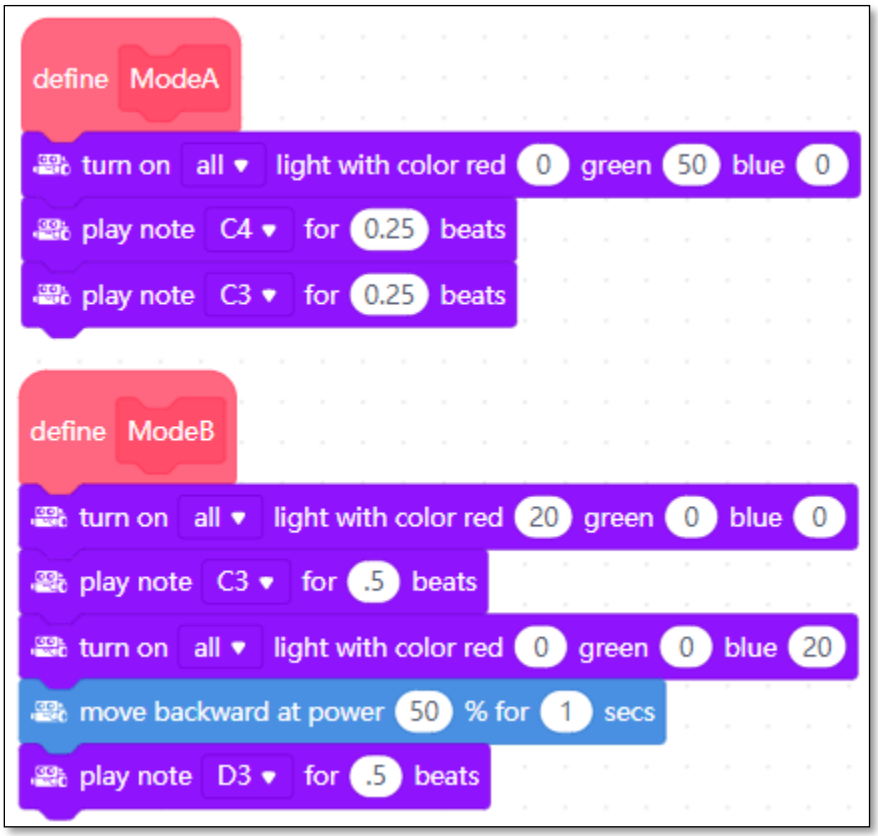
1. Start mBlock.
2. Save the program as **State Machine**.
3. Complete and test the program as pictured with the requirements listed.

Requirements

- Create and test the program.


define Initialize
set modeFlag to 0
modeFlag is 0, ModeA is active
set DEBOUNCE to .02
turn on all light with color red 0 green 0 blue 0
play note C3 for .5 beats
when mBot(mcore) starts up
Initialize
forever
Forever loop continually checks each code block
SetMode
if modeFlag = 0 then
ModeA
else
if modeFlag = 1 then
ModeB





Assignment

Start with your tutorial project and add the following.

- Add **ModeC** to the program. The Flag value would be 2.
- Have **ModeC** do something else.

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.