A.I. Emotion Detector

Quantum computing has the potential to radically improve the accuracy and speed of systems that use artificial intelligence and machine learning. In this activity, students will train a computer to use a webcam to detect and respond to different emotions using machine learning. Students will train the system using Google Teachable Machine and will code a MicroBit to handle the algorithm using the Vittascience Adacraft platform. Students will get first-hand experience training a digital system to interact intelligently with the real world and will bump into the limitations presented by classical computing. This project was adapted from the *AI Detection of Tiredness* by Diana Khalipina available at https://microbit.hackster.io/dianakhalipina/ai-based-detection-of-tiredness-4af0cd.

Components Needed

	Micro:Bit V2 with USB cable	$\times$ 1
	Google Teachable machine	
	Vittascience	

The Challenge

It is important to be aware of our emotions, but after sitting a computer for a long period of time, it is often difficult to remain self-aware and be mindful of how we are expressing our feelings. This is where artificial intelligence can help! To simplify the modeling process, focus on one emotion you would like to AI to monitor. You might have it look for when you are angry, happy, tired, sad, or bored.

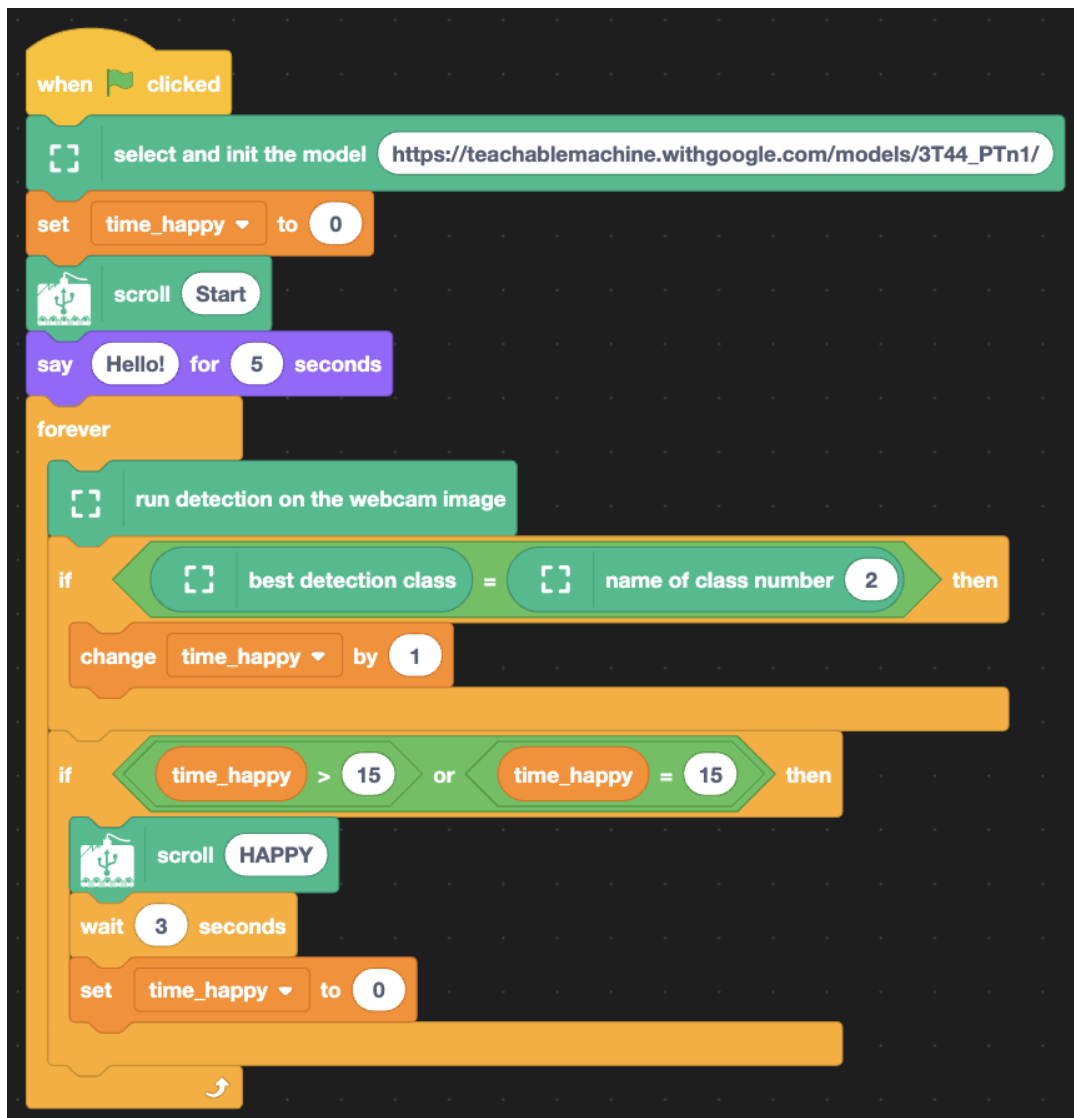**What emotion will you track?**   _____ (keep it simple)

Create Your Artificial Intelligence Model

In order to use AI to help evaluate our emotions and give us a prompt when we demonstrate the cues, we need to "train" a model using machine learning. Keep your two cues in mind and train an AI model on Google Teachable Machine using the steps below. Rather than trying to code for every possible shift in facial expression or emotional visual cue, we can use machine learning to train an AI model that can accurately infer (guess) our emotional state after just a bit of training. To get started:

1. Go to teachablemachine.withgoogle.com/train, click "Get Started" and create a *standard image project*.
2. Follow the video prompt and tutorial to gather data for Class 1 (your emotion visual cue). Use your webcam for best results and gather about 100 images.
3. Gather data for Class 2 (your "normal" visual cue – not smiling, not sad, just normal). Use your webcam for best results and gather about 100 images.
4. Once you have both of your classes gathered, you can *train your model*. Watch the short tutorial video for helpful tips and tricks.
5. Before you export your model, check the results in the Preview window at the right. If they are not accurate, gather additional samples and retrain the model.
6. Once you are satisfied with the preview results, *export your model* with the default settings. Click *Export Model*, then in the pop-up window with different settings, click *Upload my model to the Cloud*. Then you can copy the shareable link.

Coding Your Micro:Bit

You can use the [Vittascience Adacraft platform](#) to prepare the code that will allow you use the trained emotion detector to control the micro:bit LED display. More precisely, the code shown below will scroll "HAPPY" across the LED display each time it senses happy emotions for 15 seconds. This code assumes Google Teachable Machine Class 1 is normal faces, and Class 2 is happy faces. You may need to change the green "name of class number ___" to 1 instead of 2 if you train your model differently.

NOTE: you can try this project with the built in simulator with Vittascience in case you don't have access to a Micro:Bit.