Getting Started with Arduino!

Introduction

The MiiA.bit robot is based on the Arduino Platform. This platform provides easy to use Microcontrollers along with a Software Suite to program these devices. Although MiiA.bit comes pre-loaded with the correct software for you to use with the LoFi Platform, you may wish to upload your own programs that you may eventually end up writing.

This guide describes how to get started using the Arduino Platform to program MiiA.bit with new and updated RD9 Firmware. Although this guide focuses on programming the RD9 Firmware, it can be followed to upload your own programs written in the Arduino Platform.

Step One: Downloading the Arduino platform

This is the programming platform that is used to load the firmware code on to the microcontroller. The Arduino Integrated Development Environment (IDE) can be downloaded here: https://www.arduino.cc/en/Main/Donate. Choose "Other" when selecting a contribution to skip this and download the platform.

Ensure that you download version 1.8 or later of the Arduino IDE.

Once downloaded, simply install the Arduino IDE.

Step Two: Downloading the MiiA.bit Firmware

The RD9 Firmware for MiiA.bit can be downloaded here: https://github.com/RD-9/miia.bit. Click on the green "Clone or download" button and select "Download ZIP". This will download a .zip folder with the firmware. Extract the folder and navigate to the "Firmware" folder. The programming file containing the firmware is called *miia_bit_firmware_v0.1.ino*

Remember the location of this file.

Note: *Should you wish to use MiiA.bit with the LoFi Programming Environment, the RD9 Firmware must be uploaded to your MiiA.bit. Other firmware will not allow MiiA.bit to be controlled through LoFi.*

Step Three: Installing the Required Board Libraries

MiiA.bit uses a custom microcontroller and the libraries required to use it do not come standard with the Arduino IDE. To install these libraries, perform the following steps in the Arduino IDE.

- Navigate to “File” then “Preferences”. In the pop-up box, locate the field that is labelled “Additional Boards Manager URLs:”
- Copy the following URLs into this field:
    - https://downloads.arduino.cc/packages/package_avr_3.6.0_index.json
    - https://github.com/watterott/ATmega328PB-Testing/raw/master/package_m328pb_index.json
- Click “Ok” to close the “Preferences” pop-up box
- Navigate to “Tools” then “Board” and select “Boards Manager…”
- In the pop-up box, search for “Arduino AVR Boards”. When an entry pops up, click on “More info”. Select version 1.6.2017 and click “Install”
- Finally, in the “Boards Manager” pop-up box, search for “ATmega328PB Boards” and install the latest version.

Step Four: Uploading Firmware to the Microcontroller

The next step is to upload the programming file to the microcontroller inside MiIA.bit. To do this, open the Arduino IDE. Once open, navigate the menu bar to “File” and “Open...” and locate the programming file you wish to program. Select this file and click “Open”.

The file will load into the Arduino IDE. The text you see may seem strange, but fear not! What you are looking at is raw code that has been written in the C programming language.

With the programming file loaded in the Arduino IDE, the next step is to upload the code onto the microcontroller board. To do this, first connect your MiiA.bit to your computer via a USB cable - the kind that most smartphones use these days. Ensure that your MiiA.bit is switched off and ensure that the Bluetooth Communication switch, in the middle of the board, is set to the “USB” position.

Before you proceed, you need to determine which COM port number has been assigned to your MiiA.bit. This tells the Arduino IDE where to find your MiiA.bit when sending the programming file to it.

On your PC, navigate to Control Panel and then Device Manager. In the Device Manager, expand the “Ports (COM & LPT)” section and note the port number

associated with the device called “Serial-USB”. The port number will be in the form “(COM##”).

We can now use this port number in the Arduino IDE to ensure we’re communicating with the correct microcontroller. In the Arduino IDE, navigate to “Tools” and then “Board” and select “ATmega328PB External Clock”.

Then navigate to “Tools” then “Speed” and select “16 MHz”.

Navigate to “Tools” then “Port” and select the port number that you noted earlier.

These steps are required to ensure that the Arduino IDE can communicate correctly with the microcontroller in you MiiA.bit.

After this setup, you are now ready to program the firmware on to the board!

To do this, simply click on the **Right Arrow** icon in the Arduino IDE just below the Menu Bar. This will start the uploading procedure. It will take a couple of seconds and you will see the message “Done uploading” near the bottom of the IDE when uploading is completed.

Congratulations! You have successfully reprogrammed your MiiA.bit with new firmware (or your own custom code if you’re adventurous). You may now disconnect the board from your PC, return the Bluetooth Communication switch to the “BT” setting and continue using your MiiA.bit.

Happy Coding! ☺