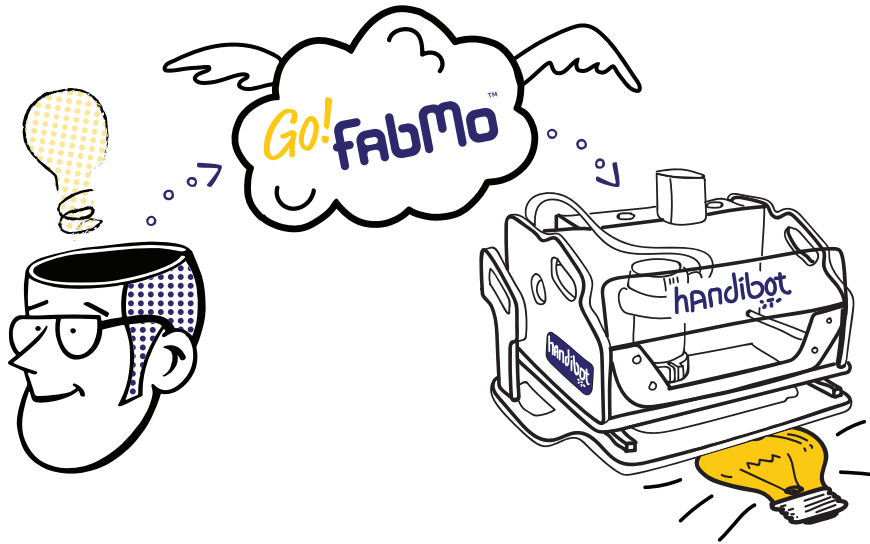


At Last ... Innovative Control for the **Smart Tools** of Today & Tomorrow



FabMo is an open-source digital fabrication and motion platform of software and hardware. Initiated by the development team at ShopBot Tools, FabMo is meant to be adapted by and used by anyone, to run every smart tool imaginable, today and tomorrow.

Freedom of Access

Access your digital fabrication tools from any device (whether a subtractive CNC tool or an additive 3D printer):

FabMo will link your network-enabled devices to your digital fab tool. Access a tool from your phone or via any computer. Control the tool or just monitor the action. Do it wirelessly, or hardwire with ethernet or USB to achieve industrial robustness. Use job files from your cloud storage, or only use locally generated files. You have the freedom.

Freedom to Create

Generate machine files from a wide range of programs (CAD/CAM) or from digital-fabrication apps:

FabMo supports a wide range of digital-fab workflows from a traditional CAD > CAM approach to the increasing range of "apps." Some of these "apps" are oriented to carrying out common jobs, others can produce complex digital-fab projects whose parameters can be customized by you! FabMo supports several motion languages including OpenSBP and legacy g-code. New languages can be added. Go FabMo to create, produce, and manufacture in ways that suit your style.

Freedom to Innovate

Modify FabMo to fit your needs or the needs of your specialized tools:

We're encouraging the open creation of a system that will evolve to meet the needs of the fabrication, motion, and robotics community and provide a platform for shared innovation. Several development system hardware options are available to designers, and the software organization is modular and understandable. At the lowest level, the sophisticated FabMo motion is provided by G2 – a real-time, motion system core developed originally by the Synthetos team. At higher levels, FabMo manages files, projects, and apps and links your tool to the world.

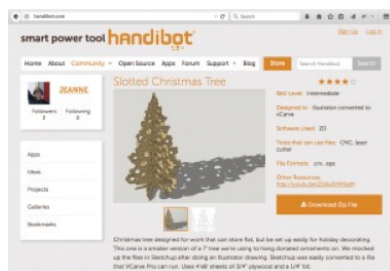
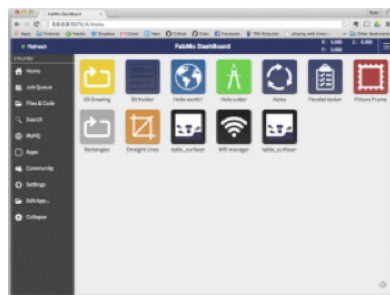
The FabMo Story

We have a challenge in digital fabrication. Here's what it is: The work flow is complex and restrictive and that makes it a whole lot harder to do digital fab than it should be.

The first aspect of the challenge is the CAD to CAM process for generating tool-path files. The difficulty of doing CAD and CAM creates a tough hurdle, even if you are doing a simple project. The second is that running the files that are generated as CAM output is made complicated by proprietary or idiosyncratic tool languages with tool connectivity that is restrictive with little interoperability.

With the FabMo digital fabrication and motion platform, we introduce a new concept for performing digital fabrication that frees access to tools and opens new paths of use. FabMo takes advantage of progress in microprocessors and microcontrollers. These now offer new, low-cost options for managing and driving digital fabrication equipment, both subtractive and additive. On the one hand, the FabMo "Engine" looks out from a digital fab tool allowing access via a wide range of wired and wireless routes, and from almost any type of device, utilizing multiple and expandable motion languages. On the other hand, the FabMo "Core" is a low-level, real-time, high-performance motion system.

FabMo also links a user's tool to apps and projects. Such apps will make created content for digital fabrication more available and customizable to users' needs. FabMo links to environments for managing cloud apps, projects, and accounts.



RESOURCES

Read about the philosophy behind the Handibot Open Innovation Platform and FabMo.

Understand the organization of FabMo and our concepts for different types of Smart Tool Apps.



Download the App Programming Intro and Example:

<http://fabmo.github.io/>

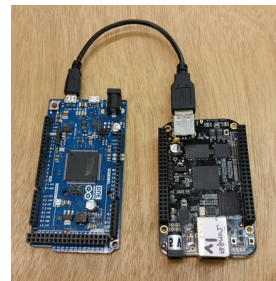
And find discussions on the Handibot App Developer Forum (just getting started):
<http://handibot.com/forum/>

THE HARDWARE

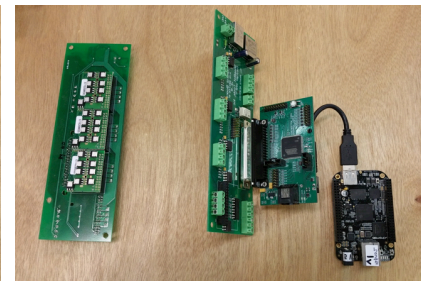
(Options for Users and Developers)

FabMo is based on two hardware components: 1) an SBC (single board computer) on which the "Engine" – interface, communications, and management systems – runs; and 2) a 32bit ARM microprocessor that provides a real-time environment for the "Core" motion functions.

- The SBC is loaded with a minimal linux install that underlies the FabMo Engine.
- The real-time microcontroller is loaded with the G2 motion system. Our reference implementation uses the Atmel SAM3X8E. This microcontroller is found on the Arduino Due, which makes the Due a useful development board. The real-time component of the system is also available in ShopBot's latest V300 Control Card. This Control Card modularly connects to a wide range of ShopBot CNC interface boards that provide drivers and I/O buffering and isolation. In addition, the real-time module is available as the V9 board from Synthetos with 4 stepper-motor drivers. These latter two systems support a variety of DIY, CNC tool formats and building projects.



BBB and Due: a Basic Development System



BBB and ShopBot Control Card and CNC Interface with Motor Drivers (shown on back): a DIY CNC builder system

THE SOFTWARE

(Concepts and Organization)

FabMo is a collection of software components and well-documented APIs. The FabMo Engine, running in linux on the tool's SBC, relates a digital fab tool to the world; handles local user needs; manages the flow of jobs to the real-time core.

Programmed primarily in javascript with node.js, the FabMo Engine serves up a contemporary, mobile-friendly web interface. Several base modules provide run-times for different digital-fab-tool path languages and serve as models for creating others.

More importantly, FabMo provides a framework for developing and hosting "apps" that will contribute a wide range of usability to digital fab tools. An App Developer Kit provides instructions and a template for app development as well as several examples. Apps are written in the languages of the web (HTML, Javascript, Coffeescript, CSS, etc.) so that as tools for the web grow, so do our tools for doing digital fabrication!

The FabMo "G2 Core" resides on the ARM microcontroller. It represents work of the Synthetos team. G2 is a sophisticated motion system: high speed (high step rates), advanced "S" shaped ramping for smooth and efficient accelerations and decelerations, while running in real time.

Go!
fabMoTM
G2 at the Core