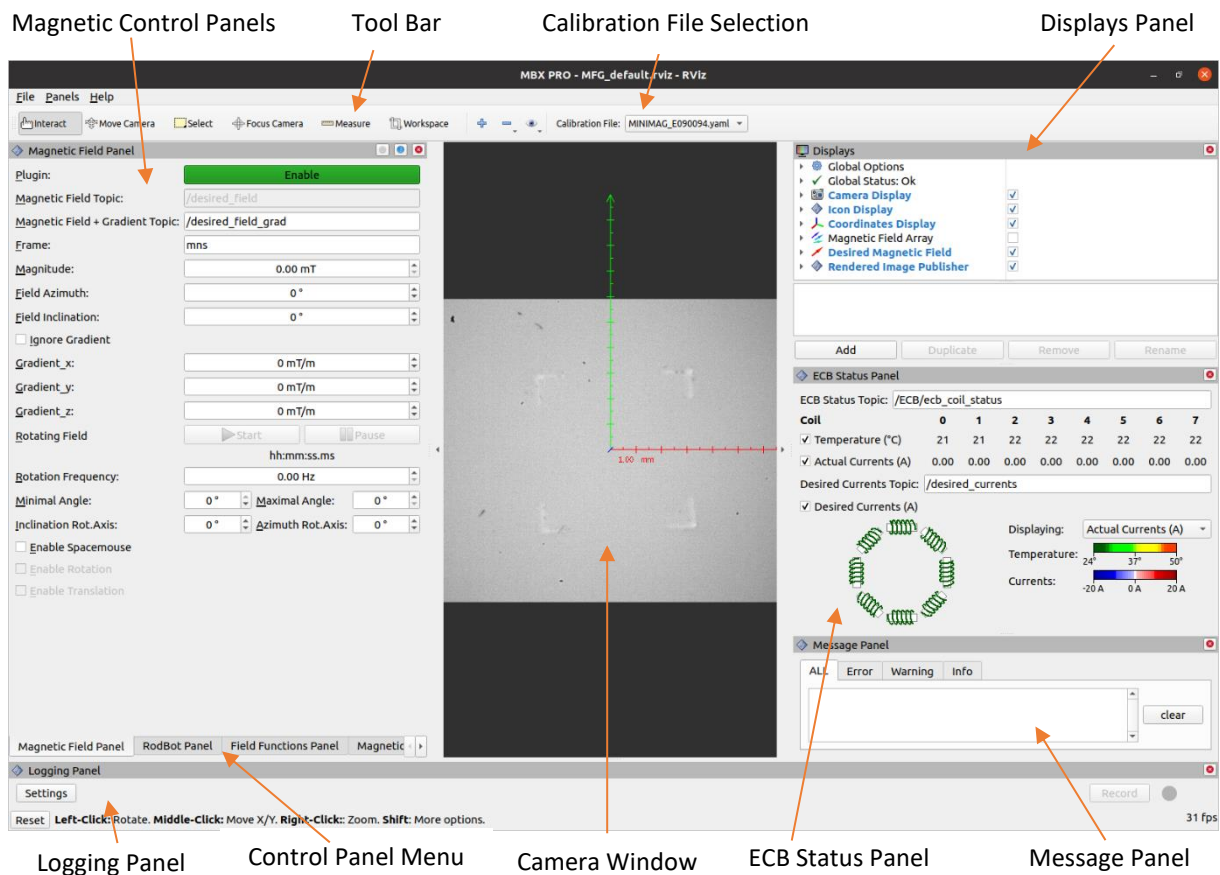


The MagnebotiX MBX pro control software

The new MagnebotiX **MBX pro** control software provides a wide range of functionality for the control of magnetic fields and field gradients, bound together in a convenient GUI. Field and field gradient values are presented graphically as overlays on the video picture from the experimental setup to provide live visual feedback. The user can enter field and field gradient values from the keyboard or through csv files, and the software will accept input from devices such as the 3Dconnexion Space Mouse™ or Sony PlayStation™ 3 controller for intuitive control of magnetic agents. Users can record their experiments for later numerical analysis and interpretation and even produce videos from the input frames.

MBX pro is based on the Robot Operating System (ROS) together with the RViz package. Using the coding language of their choice (C++, Matlab, Python...) users can adapt or extend the program to suit their specific needs. **MBX pro** runs under ubuntu 20.04 on standard PCs or laptops. It communicates with the MagnebotiX ECB-820 power supply over an ethernet port to deliver the currents needed by the field generator to produce the requested magnetic fields.

The user communicates with the program through a GUI:



The **MBX pro** GUI consists of multiple panels to display program information or accept input from the user. Panels can be added or deleted in the GUI in the "Panels" menu at the top left of the window to customize it to the user's tastes or needs.

The panels include:

- o Magnetic Field Panel: Set desired field values for a certain position and they are directly produced by the MFG. You can create rotating fields by defining the rotation axis and frequency and then starting the rotation by clicking on the "Start"-button. Optionally, a Spacemouse can be attached to intuitively control the field parameters

- o Field Functions Panel: Specify the desired components of the magnetic field with mathematical expressions. The variable “t” refers to the time in seconds since the “Start”-button has been pressed
- o Magnetic Field CSV Panel: Allows the import of a predefined field as a csv-file. The field is defined by mathematical expressions as in the Field Functions Panel
- o Displays: Graphical features like an arrow representation of the applied field or the message icons can be enabled/disabled.
- o ECB Status Panel: Shows ECB parameters such as the temperature or the actual applied current on each coil
- o Message Panel: Error, Warning and Information messages are displayed here
- o Camera Panel: Adjust camera parameters
- o Logging Panel: Tool to record messages, such as desired currents or images

The **MBX pro** control software allows intuitive control of the MagnebotiX field generating system. It provides a variety of high-level functionality as delivered and in addition it can be easily adapted by users to suit the specific needs of their experiments. Together with our powerful and reliable magnetic field generators it provides a versatile tool for any magnetic control task.

As standard delivery (item C-COMP) we supply the **MBX pro** software installed on a small form factor desktop computer with 256GB SSD memory and two ethernet ports.