

MOOS Meets Matlab — iMatlab

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1 Introduction

Not everyone want to program in C++. Many folks are happy using matlab as their research tool. Whilst not advising the use of matlab to control a real vehicle, it seemed a useful to build an application that allows matlab to join a MOOS community - if only for listening in and rendering sensor data. The project **iMatlab** allows that to happen. In essence it “mex”s up some central MOOS code so it can be called from inside matlab. The **CMake** build system supported by current releases of MOOS will build the project for Linux or Windows version of matlab.

1.1 Configuration

iMatlab allows Matlab programmers to access some of the benefits of MOOS. It allows connection to the MOOSDB and access to local serial ports. Configuration for the most part is done via a *.moos file which is either the default **iMatlab.moos** found locally or at a location specified at initialisation. Figure 1 shows a typical configuration block for **iMatlab** .

Most of the fields are understandable by reading the MOOS documentation. The application specific fields are:

MOOSComms : “true” or “false” - do you want to connect to a community?

SerialComms : “true” or “false” - do you want to use serial ports ?

SUBSCRIBE : *VariableName @ Period* - one entry for each variable you want to subscribe to and the maximum update rate you are interested in . You can have many SUBSCRIBE lines.

Importantly always call **iMatlab('init')** first — an error message is printed if you forget. By default **iMatlab** looks to read configuration data from **iMatlab.moos**. Alternatively you can use **iMatlab('init','CONFIG_FILE','XYZ.moos')** to read from the file “XYZ.moos” You can specify a process name other than the default “iMatlab” by passing the **MOOSName** parameter at initialisation: **iMatlab('init','MOOSNAME','MyName',.....)** .

```

ProcessConfig = iMatlab
{
    AppTick      = 10
    CommsTick    = 10
    Port         = COM6
    BaudRate     = 4800
    Verbose      = false
    Streaming    = false
    MOOSComms    = true
    SerialComms  = false
    SERIALTIMEOUT = 10.0
    SUBSCRIBE    = DB.TIME @ 0.0
}

```

Figure 1: A typical configuration block for `iMatlab`

1.2 Usage

If `MOOSComms` is “true” in the configuration file then MOOS Comms functionality is enabled.

1.2.1 Publishing

To send data use the following syntax `iMatlab('MOOS_MAIL_TX',VARNAME,VARVAL)`

e.g

```

iMatlab('MOOS_MAIL_TX','A_DATA_VALUE',10)  or
iMatlab('MOOS_MAIL_TX','MY_NAME','PMN')

```

1.2.2 Receiving Notifications

To receive data use the syntax `D = iMatlab('MOOS_MAIL_RX')`. This will return a structure array describing the data that has arrived (because of a subscription) since the last call `'MOOS_MAIL_RX'` call. Each element of `D` will be a structure with the following fields given in Table 1.2.2.

1.2.3 Registering for Notifications

This is done either through the configuration file using `SUBSCRIBE=...` or by calling `iMatlab('MOOS_REGISTER',VarName,MinTime)`. For example calling `iMatlab('MOOS_REGISTER','DESIRED_RUDDER',0.0)` will subscribe to *every* change in `'DESIRED_RUDDER'` while calling `iMatlab('MOOS_REGISTER','DESIRED_RUDDER',0.2)` will subscribe in a way that means we'll only be told about changes in `'DESIRED_RUDDER'` every 0.2 seconds.

1.3 Serial Ports

If “SerialComms = true” in the configuration file then serial port functionality is enabled.

Field	type	Description
KEY	string	the name of the variable
TYPE	string	the type of the variable ('DBL'/'STR')
TIME	double	the time the data was valid
STR	string	the string value of the data if TYPE=='STR'
DBL	double	the double value of the data if TYPE=='DBL'
SRC	string	the name of the process that issued the data
ORIGINATING_COMMUNITY	string	the name of the community which SRC belongs to

Table 1: The contents of a MOOS mail structure in iMatlab

1.3.1 Sending Data

Call `iMatlab('SERIAL_TX',Data)` where `Data` is a string or a vector of type `uint8`.

1.3.2 Reading Data

To receive data on a serial port call `D = iMatlab('SERIAL_RX',Data)`. If "Streaming=false" in the configuration file then the function will block until a timeout occurs or a telegram is received (ASCII, carriage return terminated only in the release). If "Streaming = true" the function returns immediately with a structure array containing all the telegrams received since the last call. Each element of *D* is a structure described by Table 1.3.2.

Field	Description
STR	the data Rx'd
TIME	the time it was received

Table 2: The contents of the data structure pertaining to received serial data in iMatlab

1.4 Other Functionality

1.4.1 Pausing

Calling `iMatlab('MOOS_PAUSE',T)` suspends the calling thread (matlab itself in this case) for T seconds. This is pretty useful for a non-busy wait in contrast to the CPU loading when calling Matlab's own `pause` function.