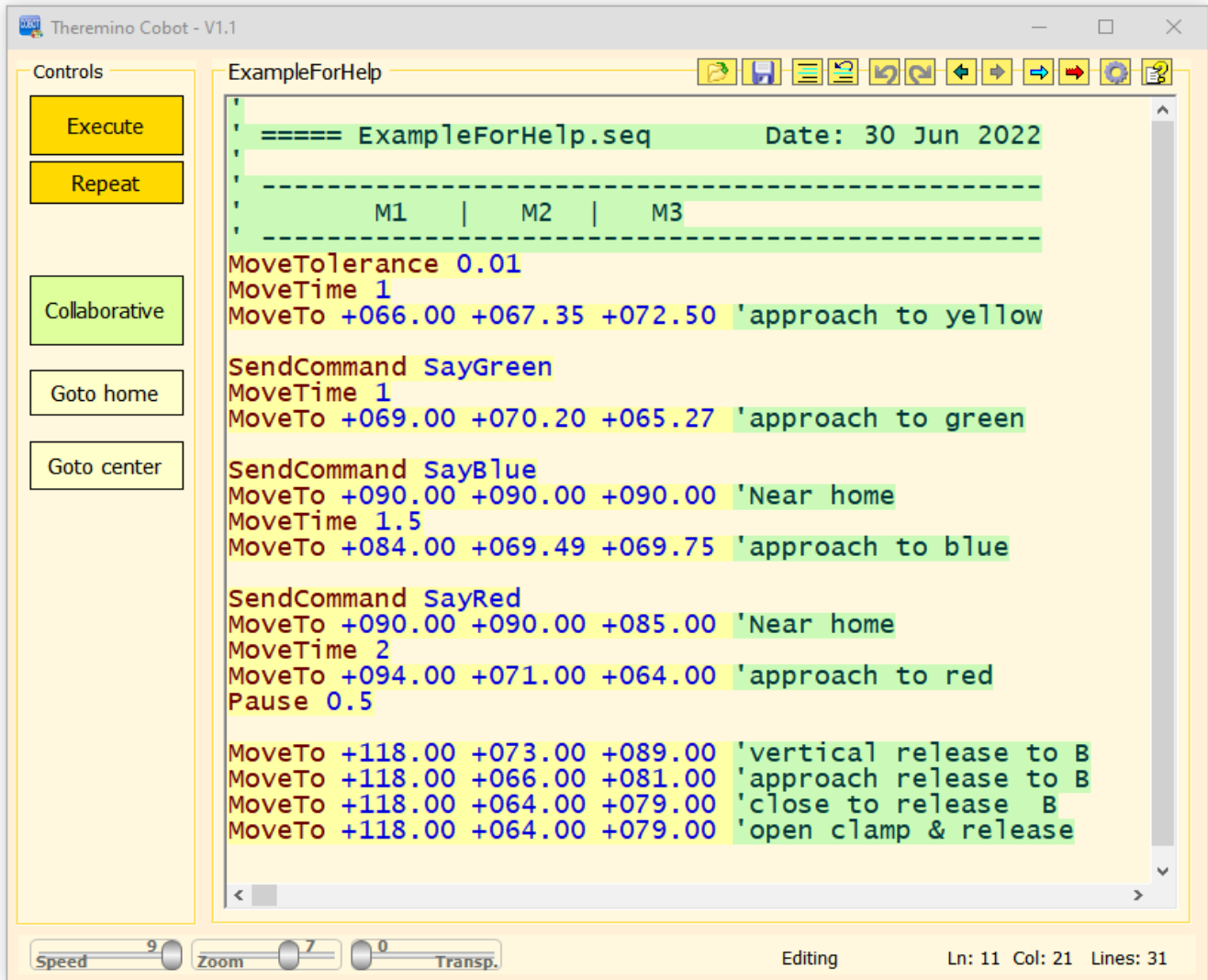


theremino System



Cobot Protocols

The Modbus, Can and Ethercat protocols

Using a standardized and well documented protocol facilitates the design of control software, motor firmware and also the applications that make up the systems for testing and manufacturing in an industrial environment.

Theoretically, with a common protocol it should be possible to use engines from any manufacturer without modifying the application software.

In practice, however, the Can, Modbus and EtherCat protocols have been designed for very large systems, with millions of registers (it's not a mistake, that's right, 254 devices for 65536 registers make over 16 million registers).

Moreover, in this vision each device could also become a "master" and send commands to any of the others. In practice they are networks that allow point-to-point communications between each pair of devices and they do so on a single, fairly slow serial cable (maximum at 115200 baud since such a large number of devices are necessarily far from each other).

It goes without saying that communications in such a network can generate collisions that the protocol must handle and are therefore slow. We speak of at least tens of milliseconds for each exchange.

It is possible to use these protocols on Cobots for small industry but those who did it immediately encountered a series of problems and everyone tried to overcome them in their own way.

So the "standard" protocols are gone
and it becomes impossible to use different products with the same software.

These protocols, which in theory were supposed to facilitate the design,
are in fact a source of great difficulty
for those who have to control the devices of the company X or Y.

Anyone who designs a system has to write different software each time, based on scant
documentation, not english commented and different for each manufacturer.

The communication protocol

For the Theremino system cobots we have designed an alternative that eliminates all problems, speeds up communications, allows you to control dozens of motors smoothly (at least 20 or 50 exchanges per second) and facilitates users to design their systems.

- A fast, collision-free protocol is used, with only one Master (the PC).
- The communication is managed by our Theremino RS485 application which sends the data ready in the Slots.
- The data is easy to use and pre-calculated (e.g. in degrees or millimeters).
- The system designer does not need to know the details of packet bytes and error checks.
- Time to market is shortened.
- Users do not have to waste time and money to write complex and specific software for the different devices of the various manufacturers.

The DXP1 protocol

The DXP1 protocol is compatible with the **Dynamixel Protocol 1** which is used for all **Dynamixel**, **FeeTech** and **Theremino (TMOT)** motors.

We have kept identical and totally compatible, the structure of the messages and also all the rules for the values of Broadcast, registers and CRCs.

The only parts that vary from one engine to another are the register tables that follow the following rules:

- Dynamixels have different tables for different motors. The register addresses range from 0 to a maximum of 99
- FeeTechs have identical tables for all motors. The register addresses range from 0 to a maximum of 99
- Theremino have identical tables for all motors. Register addresses range from 100 upwards.