In order to evaluate the performance of the MinSeg robot in operation, there is a need to read multiple values from the robot while is operating in normal mode (as opposed to external mode which downloads a data server that wrecks the timing). The best way I can think of doing this is put the data in a frame structure that can later be re-interpreted by software. This will allow Simulink to dump multiple values onto the serial port that can be read and interpreted by the software. The frame is loosely based on the Modbus frame format [1]. There is some deviation in that the Modbus frame has timing requirements that here will be replaced with zero-arrays and that the data will be from a single robot so there is no station address.

|  |  |  |
| --- | --- | --- |
| Name | Length(bits) | Function |
| Start | 16 | 2 characters of zero arrays (mark condition) |
| Frame size | 8 | Total number of bytes in the packet, maximum of 256. |
| Address | 8 | 1 unsigned 8-bit integer describing the address. |
| Function | 8 | 1 character describing type of data:  0x00 32-bit float  0x01 16-bit unsigned integer |
| Data | n x 8 | Data/length depending on the message type |
| CRC | 16 | CRC:  Width = 16 bits  Truncated polynomial = 0x1021  Initial value = 0xFFFF  This calculated using the standard library <util/crc16.h> that ships with the Arduino. The function call is:  static \_\_inline\_\_ uint16\_t \_crc\_xmodem\_update ( uint16\_t \_\_crc, int8\_t \_\_data ) |
| End | 16 | 2 characters of zero arrays (mark condition) |

# References:

1. "Modbus." Wikipedia. Wikimedia Foundation, n.d. Web. 18 Jan. 2015.