MTRN 3500 ASSIGNMENT 2

A Systems Integration Practical with a UGV. MTRN laboratory network required.

Platform Address:	"**weeder" (192.168.5.140)**
Laser Port:	**23000**
GNSS Port:	**24000**
Motion Control Port:	**25000**
Camera Port:	**26000**

AUTHENTICATION SCHEME

The on-board control and laser services have a built-in authentication scheme to identify and authorise users connected to the UGV. This protocol is identical for both the vehicle control service and the laser service, and occurs prior to normal service traffic. In the spec shown below, *<student id number>* is your zID without the z prefix and *n* represents the newline character LF.

(REQUEST, 8 characters) CLIENT to SERVER: *<student id number>**n*
(RESPONSE, 3 characters) SERVER to CLIENT: **OK***n*

This authentication scheme should be implemented on the TCP socket using the **recv** and **send** socket functions. Examples on how to use these socket functions are available in the sample source code on Moodle. MSDN references for these two functions can be found online here:

- https://msdn.microsoft.com/en-us/library/windows/desktop/ms740149(v=vs.85).aspx
- https://msdn.microsoft.com/en-us/library/windows/desktop/ms740121(v=vs.85).aspx

LASER SERVICE

REQUIRES AUTHENTICATION. The laser device is accessible using a TCP socket over port 23000, and is set to operate in read-only mode. This device will reject any commands to write to or configure the laser with a *sFA* telegram message. As such, the laser has been configured with the following command for 50hz -45 to +45 degree operation using the following commands:

```
sMN mLMPsetscancfg +5000 +1 +5000 +450000 +135000
sWN LMDscandatacfg 01 00 0 0 0 00 00 0 0 0 0 +1
sWN LMPoutputRange 1 1388 +450000 +1350000
```

These configuration settings may be verified and read from the laser using the `SRN LMPscancfg` or `SRN LMPoutputRange` telegram messages.

MOTION CONTROL SERVICE

REQUIRES AUTHENTICATION. Over a TCP connection to port 25000, the vehicle platform will receive, but may not respond to control messages. The control messages should be formed using the format listed in the assignment specification. To see if the vehicle is responding to your commands, ask a demonstrator for assistance. The platform is only configured to listen to commands from one student (identified via the zID number) at a time, and a demonstrator must use the platform's Xbox controller (deadman and remote latch buttons) to enable drive commands to pass to the platform hardware.

GNSS SERVICE

NO AUTHENTICATION. Using a TCP socket over port 24000, the GNSS receiver will transmit a binary stream of GPS data that will need to be decoded. Refer to Moodle or the hardware manual of the receiver unit for more information about decoding the binary data format.

CAMERA SERVICE

NO AUTHENTICATION. Compressed JPEG frame data from an onboard camera is accessible using a ZMQ 4.x SUBSCRIBER socket over port 26000. To receive data after connecting, an empty "" filter will need to be applied to the subscriber socket using the following command in C:

```
zmq_setsockopt(subscriber, ZMQ_SUBSCRIBE, "", 0);
```

or the equivalent in C++:

```
subscriber.setsockopt(ZMQ_SUBSCRIBE, "", 0);
```

Each ZMQ message will contain a single frame of compressed jpeg data. The jpeg data will most likely need to be decompressed using a method or jpeg library of your choice prior to use.