TingStim

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Programming Languages and Translators

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TingStim:

Stimulator / Interface Test Driver

1 Introduction

1.1 Description:

TingStim is a simple, intuitive, and efficient language for stimulating communication interfaces. TingStim is used to test point-to-point terminals such as serial equipment as well as a wide array of networked devices such as routers or autonomous computing nodes. Using the TingStim language, the programmer captures the messages to be sent across the interface of interest along with the expected response messages in a plain text file called a scenario file. The scenario file is then compiled and the output ran on the TingStim interpreter. Finally, the results recorded by the interpreter of the interaction between the device of interest and the computer running the interpreter are analyzed by the programmer and compared with the expected results to validate and qualify the behavior of the device.

2 Details

2.1 Ease of Use

TingStim is simple, easy to learn, and intuitive. There are no complicated constructs or recursive functions. Only basic and necessary features are included in the language in order not to confuse the programmer with too many options. Yet, the TingStim is powerful enough to stimulate even the most complex interfaces.

2.2 Robust

TingStim Scenario files are robust. For instance, if the communication interface changes from a Serial to an Ethernet connection, the original scenario file can easily be adapted by changing only a few lines in order to use the same message exchange sequence for the new interface.

2.3 Architecture Neutral and Portable

TingStim is an interpreted language and since the interpreter is written in Java, TingStim is architecture neutral. Scenario files written in TingStim are just plain text files making them readable on any text editor. Compiled TingStim scenarios can be easily seamlessly ported to any platform that has Java Virtual Machine (JVM) running on it.

2.4 High Level

TingStim takes care of the complicated communication port initialization, connection, re-connection, etc.; allowing the programmer more time to focus on testing the device and not have to worry about these other mundane details.

2.5 Automation

TingStim scenario files, once compiled and executed by the interpreter, require no further human interaction until the completion of the entire scenario. This allows the operator the ability to run long scenarios overnight.

3 Example Scenario File

```
01    /* This line is a comment */
02    TIME 13:00
03    DISP "Initializing Communications..."
04    OPEN TYPE("RS232")
05
06    DEFINE ERR_VAL HEX(DEAD)
07    DEFINE ERR_MSG "Got error message"
08    WHEN ERR_VAL COUNT=4
09       DISP ERR_MSG
10    END-WHEN
11
12    HALT "Press Enter Key to Continue" BIND(KB_ENTER)
13    WAIT 0.10
14    SEND BIN(0001 0101 1111 0101)
15    EXPECT DEC(14 10 0 10) MIN(0.01) MAX(1.00)
16
17    CLOSE
```

Explanation: In the second line of this scenario immediately following the comment, the time is set to 01:00PM. Next, a textual message is sent to standard output stating "Initializing Communications." The serial port is then opened and initialized on line 4. Variables are declared and initialized on line 6 & 7 for use by the "WHEN" block on lines 8-10. This block will display the indicated textual message to standard output a maximum of 4 times whenever an interface message of the indicate value is received. The scenario is paused on line 12 and waits for the operator to press the indicated key prior to proceeding with the rest of the scenario. On line 13, the scenario delays for the indicated time period in milliseconds. On line 14, an interface message is sent as defined by in the scenario file in binary format. The statement on line 15 sets up a watchdog to expect a response message as defined in the scenario file in decimal format. If the response message does not arrive within the min and max time in milliseconds, an error message is sent to standard output. The scenario ends on line 17.

4 Possible functionality or extensions

- Read canned or predefined messages from file so that scenario files can share common messages
- Display interface messages content graphically
- Support syntax highlighting in custom or COTS editor
- Feature more interface and protocol support – FTP, USB, etc.
- Validate messages automatically

5 Related Works

LabVIEW by National Instruments is the industry-leading software tool for designing test, measurement, and control systems. It uses a graphical programming language similar to flowcharting. LabVIEW can be purchased for around $3000.

6 Conclusion

TingStim provides a simple yet powerful alternative for interface testing. TingStim scenario files are easily maintainable and robust. TingStim is a good choice for those who want a quick and efficient way to perform inter-device communication validation.