**PROJECT SUMMARY**

<table>
<thead>
<tr>
<th>Project Title: RealBed IE2</th>
<th>Statement of Work (SOW)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lead University: Univ. of Denver</td>
<td>Task1: Development of Real-Time Module</td>
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<td>Principal Investigator: M. Rutherford</td>
<td>Task2: Development of UI Module</td>
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<td>Team Members: Joseph Lewis</td>
<td>Task3: Development of signal generator Module</td>
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<td>Funding Amount/Source: $15K – IAB</td>
<td>Task 4: Development of signal recognition / analysis modules</td>
</tr>
<tr>
<td>Schedule: Ongoing</td>
<td>Task 5: Evaluation / testing of Aquapod</td>
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**Objective(s):**
The goal of this project is to create an “integrated evaluation environment” (IE2) that enables engineers to explicitly control and monitor the inputs and outputs of the real-time system being developed.

**Deliverables:**
- RealBed R/T Module (XMOS hardware, C/C++ software)
- RealBed U/I Module (User interface written in Java)
- Software Library (Java / C / C++) of sensor emulators, digital communication analyzers
PROGRESS SUMMARY

Last Review Status:
• Fabricated / assembled first prototype unit
• Continued development of software to integrate basic timing / logic analyzer with peripherals: debugging I/O, external SSD, WiFly / Xbee
• Continued development of end-user software interface
• Improving layout of board to facilitate cleaner wiring, cleaner internal organization

Progress since Last Review:
• Designed PCB layout based on hand-assembled unit, printed, populated and tested
• Designed and documented RealBed Command Protocol (messages exchanged between user interface and real-time module), implemented lexer / parser in Java using JavaCC (for U/I) and in C (for real-time module) using Flex / Bison (including stubbed-out version for testing the U/I)
• Implemented graphical user interface for composing test sequences, initiating tests with real-time module and plotting results
• Working on real-time module software
**TECHNICAL SUMMARY**

- **RealBed** allows digital and analog signals to be acquired:
  - Passed through to the Device Under Test
  - Recorded locally for off-line analysis
  - Digital signals can be injected with precise timing
  - Post-processing of signal data to determine test-case outcomes and for debugging

- **Memory constraints:**
  - DSP core has relatively low memory available to user programs, was limiting the length of signal trains that could be captured
  - Integrated the signal capture unit with an onboard datalogger device which enables logging to an SSD
  - Supports a directory/file structure which will enable users to label “runs” and keep them on the device

- **Hardware enclosure developed:**
  - Designed to support the engineer with desktop testing
  - Flexible prototype / ribbon-cable arrangement
  - Rapid-prototype enclosure
  - Internal electronics for: 9, 5, 3.3 VDC Power, 4 ADC channels, SSD, serial debugging
TECHNICAL SUMMARY
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research • deploy • train • evaluate
TECHNICAL SUMMARY

The scenario plot shows the results of a scenario once it has been run or loaded.

**Functionality**
- Right-click on a plot name to enable/disable it.
- Click and drag to zoom.
- Right-click to zoom out.
TECHNICAL SUMMARY

![Image of RealBed v0.1](image)

**Console**

All communication with the RealBed can be viewed in the black box.

Enter commands in the white box to send to the realbed.

Press ENTER to send a command.

Use the up and down arrows to review prior commands.
PLAN FOR NEXT REVIEW

- Task 1: Finalize 1st fabricated unit (software for real-time module) – Spring 2014
- Task 2: Extensive testing / use with UGVs and UAVs – Summer 2014
- Task 3: Write invention disclosure - Spring 2014
- Task 4: Support Analog I/O - Fall 2014
- Task 5: Support group / swarm functionality: Winter / Spring 2015