Intel Leap Ahead Logo

E3VB

**Engineering Engagement Electrical Validation Board**

**Project Proposal**

Revision 1.6

March 2015

Team 12

Owners: Kris Gibbs, Brandon Towell, Luis Santiago, Travis Berger

Table of Contents

[Table of Contents 2](#_Toc413501253)

[About this Document 3](#_Toc413501254)

[Introduction, Purpose and Scope 3](#_Toc413501255)

[Document Revisions 3](#_Toc413501256)

[Abbreviations, Acronyms and Terminology 3](#_Toc413501257)

[Reference Documents 4](#_Toc413501258)

[Project Proposal 5](#_Toc413501259)

[Background 5](#_Toc413501260)

[Problem Statement 5](#_Toc413501261)

[Project Tasks 5](#_Toc413501263)

[Improve Project Documentation 5](#_Toc413501264)

[Create Peripheral Boards 5](#_Toc413501265)

[Task Breakdown 6](#_Toc413501266)

[Kris 6](#_Toc413501267)

[Luis 6](#_Toc413501268)

[Travis 6](#_Toc413501269)

[Brandon 6](#_Toc413501270)

[Project Timeline 7](#_Toc413501271)

[Experiments Expected Completion: 7](#_Toc413501272)

[Website Expected Completion: Mid May – End of May 7](#_Toc413501273)

[Promotion Expected Completion: Mid May 8](#_Toc413501274)

# About this Document

## Introduction, Purpose and Scope

This document covers the project proposal.

## Document Revisions

|  |  |  |  |
| --- | --- | --- | --- |
| **Rev.** | **Date** | **Owner** | **Details** |
| **1.0** | 1/13/15 | Kris Gibbs | Initial doc with initial outline of project |
| **1.1** | 1/17/15 | Kris Gibbs | Added more detail to the documentation and added a new section for board improvements |
| **1.2** | 1/17/15 | Brandon Towell, Travis Berger, Luis Santiago | Group revisions and expansion to proposal points. Added team number to Title Page. |
| **1.3** | 1/24/15 | Travis Berger, Luis Santiago, Kris Gibbs | Added task breakdown and task timeline. |
| **1.4** | 1/26/15 | Dr. Morris | Edited experiments in timeline. |
| **1.5** | 3/7/15 | Travis Berger | Changed Project Proposal to reflect change in scope. |
| **1.6** | 3/14/2015 | Travis Berger | Added Experiment Details. |

Table 1 – Document Revisions

## Abbreviations, Acronyms and Terminology

|  |  |  |
| --- | --- | --- |
| **Term** | **Acronym** | **Description** |
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Table 2 - Abbreviations, Acronyms and Terminology

## Reference Documents

|  |  |  |  |
| --- | --- | --- | --- |
| **Ref #** | **Document Name** | **Doc Ver.** | **Relevance** |
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Table 2 – Reference Documents

# Project Proposal

## Background

The E3VB board is a learning tool developed by Intel as part of a program called Intel Learning Company 2.0. The E3VB board is made up of various circuits that coincide with experiments that teach students and industry members’ validation techniques. These experiments highlight common problems that occur when creating PCB layouts.

## Problem Statement

## To aid in further development of the E3VB board three experiments will be created that demonstrate common signal degradation issues in PCB manufacturing. The experiments will be on one or more peripheral board(s) that is/are totally independent from the E3VB. Each experiment will have documentation that explains the experiment. The experiments will be intended for senior level Electrical Engineering students and the necessary equipment will be available at major EE Universities.

## Project Tasks

### Experiments

* Mixed Signal Ground Technique

This experiment explores the importance of proper ground techniques when working with mixed signal devices and layout. Due to the highly sensitive nature of analog devices steps need to be taken to ensure that there is minimal interference from digital devices when working with mixed signal applications. The experiment will demonstrate negative effects by utilizing improper ground techniques. The user will be able to observe these negative effects by connecting test equipment to test points placed throughout the board.

* Connector Experiment

Connectors are mandatory in electronics and have become more important in business and everyday life. A connector provides a separable connections between elements inside an electronic system. This experiment will demonstrate the reliability of different connectors in respect to how they affect the degradation of the signal passing though the connectors. One main point to focus on in this experiment is how ranging frequencies cannot be handled by common connectors and how they specifically change the signal.

Refer to Connector Reliability and Signal Degradation document for more details.

* ISI Experiment

The new Intersymbol interference (ISI) experiment consists of expanding the ISI experiment and the crosstalk experiment on the original board. ISI distortion is a result of previous symbols interfering with the current symbol. Crosstalk is another form of signal distortion that happens when the nearby traces interfere with each other. Since often there are multiple factors that may affect signals simultaneously our focus is to provide with an experiment that will allow to show each type of interference individually and simultaneously. The experiment will have more than one way of introducing timing and patterns signals to it.

## Deliverables

##### Three Experiments on Peripheral Board(s)

1. Mixed Signal Ground Techniques
2. Connector Experiment
3. ISI Experiment

##### Experiment Documentation

Each Experiment will have documentation that consists of the following format:

* Background Theory
* Objective
* Necessary Equipment List
* Setup
* Procedure
* Conclusion

## Task Breakdown

### Experiments

##### Mixed Signal Ground Techniques

* Primary: Travis
* Support: Kris Luis

##### Connector Experiment

* Primary: Brandon

##### ISI

* Primary: Luis and Kris

## Testing

##### Stage I

* Alpha Testing amongst group

##### Stage II

* Beta Testing amongst classmates

##### Stage III

* Sponsor Testing

## Expected Budget

##### $100 per experiment (including PCB manufacturing)

## Schedule

##### Refer to ProjectSchedule.mpp

## Project Requirements

##### Refer to ProjectRequirements.doc