Augmented Reality Simulator

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Cornell Cup 2014

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# Challenge Definition

# Project Solution

## Customer Value Proposition

## Changes From Original Proposal

## Key Technical Elements

# Product Performance Evaluation

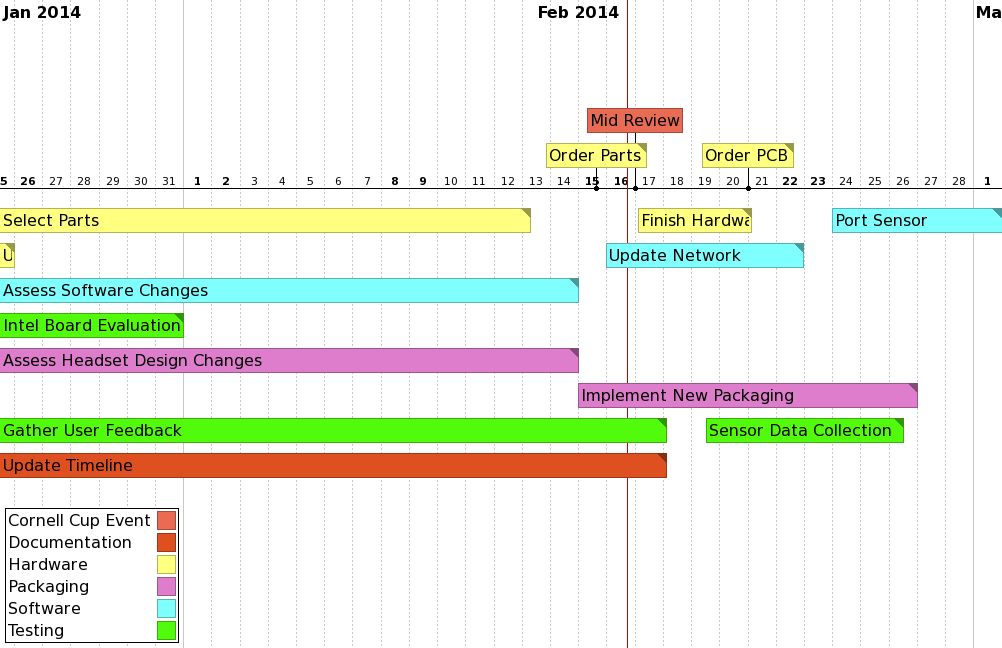
## Performance Metrics

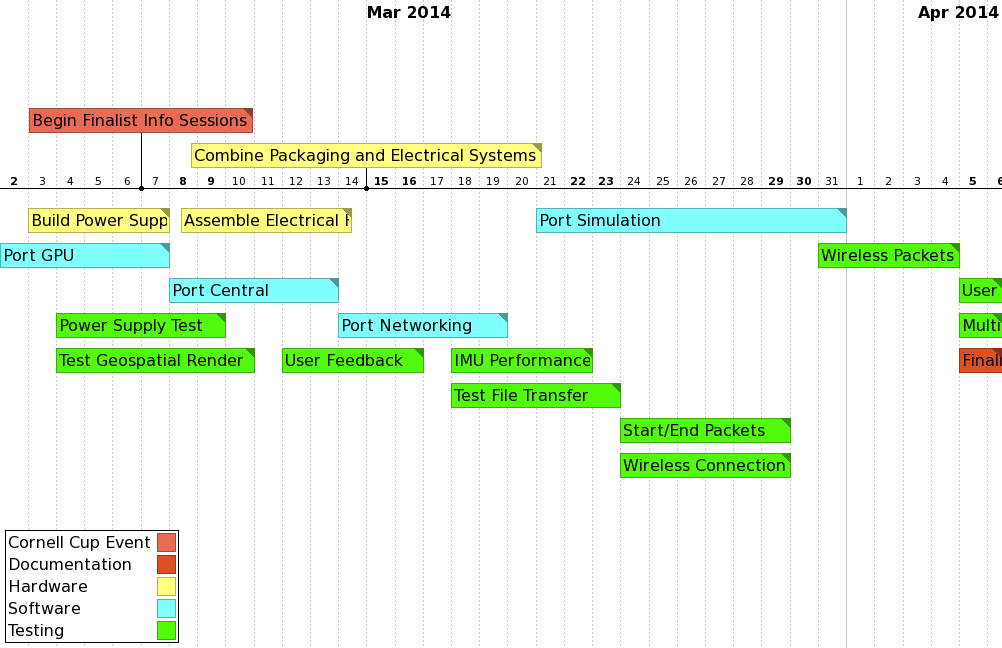
## Failure Analysis

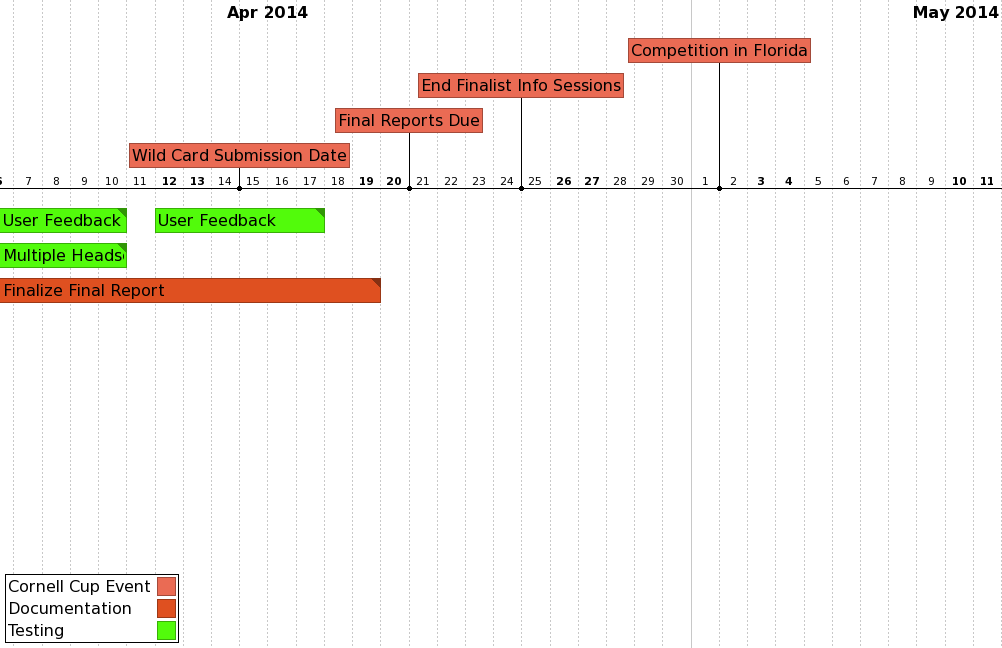
# Technical Documentation

# Project Execution

## Timeline







### Adjustments

## Budget

### Bill of Materials

Table 1

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Digi-Key PN | Description | Footprint | Qty | Unit Price | Cost |
| LVK12R010DERCT-ND | Resistor 0.5W 10mOhm | 1206 | 1 | $0.50 | $0.50 |
| 490-6521-1-ND | Cap 4.7uF 50V Ceramic | 1206 | 3 | $0.76 | $2.29 |
| P16460CT-ND | Cap 180uF 16V Low ESR | Panasonic E | 1 | $2.32 | $2.32 |
| 490-3367-1-ND | Cap 2.2uF 50V Ceramic | 1206 | 2 | $0.39 | $0.78 |
| CTX406-ND | Crystal 8MHz 20pF | HC-49US | 2 | $0.36 | $0.72 |
| 160-1889-1-ND | LED Blue | 1206 | 1 | $0.38 | $0.38 |
| 475-1407-1-ND | LED Green | 1206 | 2 | $0.11 | $0.22 |
| P68.1KBCCT-ND | Res 68.1K 0.1% | 1206 | 1 | $0.79 | $0.79 |
| P5.76KBCCT-ND | Res 5.76K 0.1% | 1206 | 1 | $0.79 | $0.79 |
| P100KBCCT-ND | Res 100K 0.1% | 1206 | 1 | $0.79 | $0.79 |
| P34KBCCT-ND | Res 34K 0.1% | 1206 | 1 | $0.79 | $0.79 |
| P499KBCCT-ND | Res 499K 0.1% | 1206 | 1 | $0.79 | $0.79 |
| P215KBCCT-ND | Res 215K 0.1% | 1206 | 1 | $0.79 | $0.79 |
| P2.43KBCCT-ND | Res 2.43K 0.1% | 1206 | 1 | $0.79 | $0.79 |
| ED2992CT-ND | Mini USB Connector | Special | 2 | $0.87 | $1.74 |
| 497-11767-ND | STM32F405RGT6 | TQFP 64 | 1 | $11.45 | $11.45 |
| 497-13631-ND | STM32L100RBT6 | TQFP 64 | 1 | $4.37 | $4.37 |
| 576-1827-5-ND | Regulator 3.3V 500mA | MSOP 8 | 1 | $2.35 | $2.35 |
| 576-1281-1-ND | Regulator 3.3V 150mA | SOT-23-5 | 1 | $2.01 | $2.01 |
| LM2936MP-3.3/NOPBCT-ND | Regulator 3.3V Low-Iq | SOT-223-4 | 1 | $1.78 | $1.78 |
| DS2782E+-ND | Fuel Gauge IC | TSSOP 8 | 1 | $7.46 | $7.46 |
| 296-20523-ND | Power Module 12V 3A | Special | 1 | $17.70 | $17.70 |
| 497-12918-ND | 9-DOF IMU Breakout | DIP 24 W | 1 | $27.60 | $27.60 |
|  |  |  |  |  | $89.20 |
| Items from Senior Design include: | | |  |  |  |
|  | Cap 0.1uF Ceramic | 1206 |  |  |  |
|  | Cap 1uF Ceramic | 1206 |  |  |  |
|  | Header Breakaway Female | 0.1 |  |  |  |
|  | Header Breakaway Male | 0.1 |  |  |  |
|  | Res 4.7K 5% | 1206 |  |  |  |
|  | Res 10K 5% | 1206 |  |  |  |
|  | Res 6.8K 5% | 1206 |  |  |  |
|  | Res 22 5% | 1206 |  |  |  |
|  | Res 1.5K 5% | 1206 |  |  |  |
|  | Cap 39pF Ceramic | 1206 |  |  |  |
|  | Cap 470pF Ceramic | 1206 |  |  |  |
|  | Cap 10uF 16V | Panasonic D |  |  |  |
|  | Cap 22uF 16V | Panasonic D |  |  |  |
|  | PCB Button | Special |  |  |  |

### Expenditures

### Funding Sources

Table 2

|  |  |
| --- | --- |
| Cornell Cup | $1500 |
| Purdue University | $300 |

## Mid-Review

## Process Understanding

# Recommendations and Next Steps

# Glossary

Augmented Reality: a system which overlays a computer generated image on top of real world objects

Virtual Reality: a system which fills the user’s entire field of view with a computer generated image

# References

**There are no sources in the current document.**

# Acknowledgements

# Survey Responses

# Appendix

## Performance Measures

**Table 3**

|  |  |  |  |
| --- | --- | --- | --- |
| Metric | Phase 1 (Measured) | Phase 2 Target | Phase 2 (Estimate) |
| Mass | Headset: 1.3kg | Headset: 1 kg  Backpack: 3 kg | Headset: ~1kg  Backpack: ~2.5kg |
| Power | ~3 hours | 3 hours runtime | ~4 hours |
| Location Precision\* | ~1.5 m | 2 meters | ~1.5m |
| Wireless Range | 200 m | 80 m, line of sight | 200 m |
| Display Refresh | 10 FPS | 20 FPS | 60 FPS |
| Network Refresh | Unimplemented | 20 FPS | 60 FPS |
| Usability | Turnkey startup | User can start and use without a technician | Turnkey startup |
| Simultaneous Device Limit | 5-6 | 16 | 32+ |
| Head Tracking Latency | ~100ms | 50ms\* | >=16ms |

## Test Plans

### Range Test

### Latency Test

## Assembly and Construction