IPRO 355

Enhanced Vision System for Construction Safety
Agenda

• Problem Statement and Objectives
• Methodology and Organization
• Product
• Business Concept and Market Research
• Target Markets and Competitor Analysis
• Value Chain and Monthly Sales
Problem Statement

• Case studies:
  – Stephanie Hammacott, UK
  – Ghislenghein, Belgium (2004)
  – Chicago Flood (1992)

• 5,000 construction worksite deaths occur annually

• $250 million lost in accidents annually
Objectives

• Dedication to saving lives and preventing accidents
• Design an enhanced vision system
• Provide reliable, timely, and accurate information to construction workers
Methodology

- Communication / Project Management
  - Meetings
  - Reports and Presentations
- Business
  - Market Research
  - Business Development
- Technology
  - Proof-of-concept Prototype
Organizational Chart

Advisors:
- James Burstein
- John Stoner

IPRO Team
Leader: Devaraj Ramsamy

Business Team
Leaders: Vlad Rusz & Savina Jose

Members:
- Vlad Rusz
- Savina Jose
- Devaraj Ramsamy
- Meng Zhang

Technology Team
Leader: Jeffrey Mizek

Members:
- Jeffrey Mizek
- Adam Bain
- Maximillian Estrada
- Timothy Madsen

IPRO Day Coordinator: Vlad Rusz
Product Overview

• Information overlays
  – Improve visibility
• Simple operation
• Rugged
• Mount to existing vehicles
Product Features

• Two positioning systems
• Rugged camera
• Durable display
• On-board computer
• Advanced models:
  – Additional cameras
  – Tool sensor
Business Concept

• Value Proposition
  – Save Lives
  – Reduce Accidents
  – Provide Value

• Business Model
  – B2B
  – Outsource
  – Technology Development
Market Research & Conclusions

• Primary
  – CAE Professors
  – Industry Specialists

• Secondary
  – Market Data
  – Annual Reports
Competitors Strengths & Weaknesses

- **Price**
  - High: EVS, DNR Garmin, ESRI ArcPAD, Topcon
- **Ease of Use**
  - High: EVS, DNR Garmin, ESRI ArcPAD, Topcon
- **Feature Set**
  - High: EVS, DNR Garmin, ESRI ArcPAD, Topcon
- **Accuracy**
  - High: EVS, DNR Garmin, ESRI ArcPAD, Topcon
Business Risks

- Start-up Risks
- Intellectual Property
- Quality
- Feasibility
- Entry Barriers
Target Markets & Sales Projections

• Target Market
  – Geographic location
  – Number of machines

• Sales Projections
  – New market every 6 months
  – New: 4 customers per month
  – Mature: 1 customer per month
Monthly Sales

Unit Price
Year 1: $5,000
Year 2: $8,000
Year 3: $10,000

Unit Cost
DM: 44% of Price
DL: $180
QA: $120
Financial Projections

Startup needs: $1,800,000
Questions
Law and Regulations

Canon: We will comply with all intellectual property and regulatory laws to the best of our abilities.

Pressure: To make a product that does not infringe on other intellectual property.
Risk: Not doing enough research into patents that exist on augmented reality and infringing on other patents.
Risk: The patent research being performed too narrowly and other non augmented reality patents being infringed.
Measure: Being threatened with law suites due to patent infringement.
Pressure: To complete the work and building the prototype on time.
Risk: Exposing the project to unnecessary liabilities due to the legal and regulatory research being insufficient due to time restrictions.
**Canon**: We will abide by all the terms of the contracts and all non-disclosure agreement that apply to our project.

**Pressure**: To use the prototype hardware for personal or non-project related uses due to the hardware’s other functions, such as using the GPS device for car navigation.

**Risk**: Violating terms of contracts with sponsors which can lead to withdraw of support.

**Measure**: Sponsors withdrawing their support for the project.

**Pressure**: Needing assistance from third parties for equipment operation and prototype building.

**Risk**: Violating non-disclosure agreements.

**Risk**: Releasing trade secrets to outside parties.

**Measure**: Trade secrets being stolen and patented.
Professional Codes

*Canon*: We will abide by the construction industry professional codes as pertaining to safety equipment.

*Pressure*: Create the most affordable prototype possible.

*Risk*: The product not providing any real value.

*Risk*: Not considering quality and safety issues in lieu of price.

*Risk*: Prototype not actually providing valuable information to the user and not providing any extra safety.

*Pressure*: Create the highest quality prototype.

*Risk*: Few consumers will be able to take advantage of its life saving ability due to its high price.

*Measure*: The change or lack thereof the number of recorded fatalities and accidents in the construction industry.
**Canon**: Performing to the highest ethical standards of the construction and safety industry, keeping in mind that our product saves lives.

**Pressure**: To produce a prototype as quickly as possible.

**Risk**: Disregarding the new safety issues that our product will create.

**Risk**: The production of a dangerous prototype

**Risk**: The product not being thoroughly tested in the field and thus not being guaranteed to be reliable.

**Measure**: Obtaining a safety certification from such organizations as OSHA.

**Pressure**: To produce a product that is robust.

**Risk**: The inability to efficiently test the product due to its many functions.
Community

*Canon:* The team will thoroughly test and ensure the product provides the best safety and most value to the communities in which our product is used.

*Pressure:* Get product to market as soon as possible.

*Risk:* Product is not thoroughly tested and does not provide the intended value.

*Risk:* Putting the community at serious risk due to malfunction of the product.

*Risk:* Business fundamentals of the product are not properly researched to provide the most value to the community.

*Measure:* Legal action taken against the product’s manufacturers by stakeholders.
Personal Relations

_Canon_: The team will respect each other’s opinions and completed work.

_Pressure_: To have a team and sub teams with a significant amount of autonomy.

_Risk_: Sub teams not understanding each other’s work.

_Risk_: Project being delayed due to lengthened discussions and team member conflict.

_Pressure_: To complete a large, varied amount of work in a short amount of time, such as weekly deliverables

_Risk_: Team members taking credit for other work.

_Measure_: Peer review at end of project
Moral Values

*Canon*: No team member will be required to do anything that violates their own personal, religious, moral, or ethical beliefs.

*Pressure*: The need to work outside of class.

*Risk*: Working on days that some consider religious holidays.

*Pressure*: To complete all assigned work on time.

*Risk*: Forcing a member to violate personal morals or values to meet deadlines.

*Measure*: Member brings up situation to team publicly or privately to the proper hierarchical person, possibly the team leader.
**Value Chain**

Firm Infrastructure: Entrepreneurial management team; Focus: building quality into product at every stage; Culture: we save lives

Human Resource: small number of engineers working on development; persons understand implications of their work; high productivity, loyalty, and compensation

Technology Development: continual development of product design and software to increase effectiveness of product and provide more value to the customer

Procurement: Production outsourcing company: good relationship; ensure quality of product; timeliness of delivery.
Installation service company: good relationship; ensure proper and prompt installation and service.

<table>
<thead>
<tr>
<th>Inbound Logistics</th>
<th>Operations</th>
<th>Outbound</th>
<th>Marketing</th>
<th>Customer Service</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Product</td>
<td>- Quality Assurance</td>
<td>- EVS units</td>
<td>- Trade Shows</td>
<td>- Installation provider diagnoses unit</td>
</tr>
<tr>
<td>(Production is outsourced)</td>
<td></td>
<td>- Units sold by company sales force</td>
<td>- Demonstrations</td>
<td>- Replace broken units</td>
</tr>
<tr>
<td>- Installation Service</td>
<td></td>
<td>- Installation training services</td>
<td>- Free Trials</td>
<td></td>
</tr>
<tr>
<td>(outsourced)</td>
<td></td>
<td></td>
<td>- Construction Magazines</td>
<td></td>
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</tbody>
</table>
Cash Inflow vs. Cash Outflow

($500,000)

Start-up

Mar-09

Jun-09

Sep-09

Dec-09

Mar-10

Jun-10

Sep-10

Dec-10

Mar-11

Jun-11

Sep-11

Dec-11

Time (Month)

Amount

Cash In

Cash Out

Cash

Cash Inflow vs. Cash Outflow

$3,000,000

$2,500,000

$2,000,000

$1,500,000

$1,000,000

$500,000

$0

($500,000)

Start-up

Mar-09

Jun-09

Sep-09

Dec-09

Mar-10

Jun-10

Sep-10

Dec-10

Mar-11

Jun-11

Sep-11

Dec-11

Time (Month)
Sales vs. Expenses

- Sales
- Operating Exp.
- Cost of Goods Sold

<table>
<thead>
<tr>
<th>Time (Month)</th>
<th>Amount ($)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Feb-09</td>
<td>$500,000</td>
</tr>
<tr>
<td>Apr-09</td>
<td>$0</td>
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<tr>
<td>Jun-09</td>
<td>$500,000</td>
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<tr>
<td>Aug-09</td>
<td>$1,000,000</td>
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<tr>
<td>Oct-09</td>
<td>$1,500,000</td>
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<tr>
<td>Dec-09</td>
<td>$2,000,000</td>
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<tr>
<td>Feb-10</td>
<td>$2,500,000</td>
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<tr>
<td>Apr-10</td>
<td>$3,000,000</td>
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<tr>
<td>Jun-10</td>
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<tr>
<td>Aug-10</td>
<td>$1,500,000</td>
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<td>Oct-10</td>
<td>$2,000,000</td>
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<tr>
<td>Dec-10</td>
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<tr>
<td>Feb-11</td>
<td>$3,000,000</td>
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<tr>
<td>Apr-11</td>
<td>$1,000,000</td>
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<tr>
<td>Jun-11</td>
<td>$1,500,000</td>
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<tr>
<td>Aug-11</td>
<td>$2,000,000</td>
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<tr>
<td>Oct-11</td>
<td>$2,500,000</td>
</tr>
<tr>
<td>Dec-11</td>
<td>$3,000,000</td>
</tr>
</tbody>
</table>
### Enhanced Vision System

#### Year-End

**Income Statement (Projected)**

<table>
<thead>
<tr>
<th></th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
</tr>
</thead>
<tbody>
<tr>
<td>Net Sales (less returns &amp; allowances)</td>
<td>810,000</td>
<td>12,307,000</td>
<td>26,093,000</td>
</tr>
<tr>
<td>Cost of Goods Sold</td>
<td>356,400</td>
<td>5,415,080</td>
<td>11,480,920</td>
</tr>
<tr>
<td><strong>Gross Income</strong></td>
<td><strong>$ 453,600</strong></td>
<td><strong>$ 6,891,920</strong></td>
<td><strong>$ 14,612,080</strong></td>
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<tr>
<td>Depreciation &amp; Amortization</td>
<td>10,952</td>
<td>10,952</td>
<td>10,952</td>
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<tr>
<td>Insurance</td>
<td>9,100</td>
<td>123,070</td>
<td>260,930</td>
</tr>
<tr>
<td>Marketing &amp; Promotion</td>
<td>90,720</td>
<td>1,378,384</td>
<td>2,922,416</td>
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<tr>
<td>Office Supplies</td>
<td>3,400</td>
<td>2,400</td>
<td>2,400</td>
</tr>
<tr>
<td>Payroll Expenses</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Salaries &amp; Wages</td>
<td>1,010,000</td>
<td>930,000</td>
<td>930,000</td>
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<tr>
<td>Benefits</td>
<td>202,000</td>
<td>186,000</td>
<td>186,000</td>
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<tr>
<td>Professional Fees</td>
<td>20,000</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Rent</td>
<td>36,000</td>
<td>36,000</td>
<td>36,000</td>
</tr>
<tr>
<td>Repairs &amp; Maintenance</td>
<td>1,010</td>
<td>24,614</td>
<td>52,186</td>
</tr>
<tr>
<td>Telephone</td>
<td>600</td>
<td>1,200</td>
<td>1,200</td>
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<tr>
<td>Utilities</td>
<td>3,400</td>
<td>2,400</td>
<td>2,400</td>
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<tr>
<td>Wearhousing</td>
<td>8,000</td>
<td>12,000</td>
<td>12,000</td>
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<tr>
<td><strong>Total Operating Expenses</strong></td>
<td><strong>$ 1,395,182</strong></td>
<td><strong>$ 2,707,020</strong></td>
<td><strong>$ 4,416,484</strong></td>
</tr>
<tr>
<td><strong>Operating Income</strong></td>
<td><strong>$ (941,582)</strong></td>
<td><strong>$ 4,184,900</strong></td>
<td><strong>$ 10,195,596</strong></td>
</tr>
<tr>
<td><strong>Income Before Taxes</strong></td>
<td><strong>$ (941,582)</strong></td>
<td><strong>$ 4,184,900</strong></td>
<td><strong>$ 10,195,596</strong></td>
</tr>
<tr>
<td>Income Taxes</td>
<td>-</td>
<td>1,046,225</td>
<td>2,548,899</td>
</tr>
<tr>
<td><strong>Net Income</strong></td>
<td><strong>$ (941,582)</strong></td>
<td><strong>$ 3,138,675</strong></td>
<td><strong>$ 7,646,697</strong></td>
</tr>
</tbody>
</table>
## Enhanced Vision System
### Year-End Balance Sheet (Projected)

<table>
<thead>
<tr>
<th></th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Assets</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Current Assets</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cash &amp; Equivalents</td>
<td>213,188</td>
<td>2,515,544</td>
<td>9,101,835</td>
</tr>
<tr>
<td>Accounts Receivable</td>
<td>39,650</td>
<td>46,320</td>
<td>80,700</td>
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<tr>
<td>Inventory</td>
<td>566,532</td>
<td>1,407,133</td>
<td>2,444,111</td>
</tr>
<tr>
<td><strong>Total Current Assets</strong></td>
<td><strong>$ 819,370</strong></td>
<td><strong>$ 3,968,997</strong></td>
<td><strong>$ 11,626,646</strong></td>
</tr>
<tr>
<td><strong>Fixed Assets</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Property, Plant &amp; Equipment</td>
<td>50,000</td>
<td>50,000</td>
<td>50,000</td>
</tr>
<tr>
<td>Less: Accumulated Depreciation</td>
<td>(10,952)</td>
<td>(21,905)</td>
<td>(32,857)</td>
</tr>
<tr>
<td><strong>Total Non-Current Assets</strong></td>
<td><strong>$ 39,048</strong></td>
<td><strong>$ 28,095</strong></td>
<td><strong>$ 17,143</strong></td>
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<tr>
<td><strong>Total Assets</strong></td>
<td><strong>$ 858,418</strong></td>
<td><strong>$ 3,997,092</strong></td>
<td><strong>$ 11,643,789</strong></td>
</tr>
<tr>
<td><strong>Liabilities</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total Liabilities</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Equity</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Equity Investments</td>
<td>1,800,000</td>
<td>1,800,000</td>
<td>1,800,000</td>
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<tr>
<td>Retained Earnings</td>
<td>(941,582)</td>
<td>2,197,092</td>
<td>9,843,789</td>
</tr>
<tr>
<td><strong>Total Equity</strong></td>
<td><strong>$ 858,418</strong></td>
<td><strong>$ 3,997,092</strong></td>
<td><strong>$ 11,643,789</strong></td>
</tr>
<tr>
<td><strong>Total Liabilities and Equity</strong></td>
<td><strong>$ 858,418</strong></td>
<td><strong>$ 3,997,092</strong></td>
<td><strong>$ 11,643,789</strong></td>
</tr>
</tbody>
</table>