Vision (EARL: Egg Alert and Real-time Logistics)

Version <2.1>

Revision History

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| --- | --- | --- | --- |
| **Date** | **Version** | **Description** | **Author** |
| <09/13/11> | <1.0> | The original, unrevised, vision document. | Matthew Rasler, Mark Parker, Andrew Habegger |
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Vision (Egg Flow Communicator)

# 1. Introduction

The purpose of this document is to collect, analyze, and define high-level needs and features of the Egg Flow Communicator (EFC) as determined by the Egg Alert and Real-time Logistics (EARL) Group. It focuses on the capabilities needed by the stakeholders and the target users, and **why** these needs exist. The details of how the EFC fulfills these needs are detailed in the use-case and supplementary specifications.

## 1.1 References

This subsection provides a complete list of all documents referenced elsewhere in the **Vision** document. Identify each document by title, report number if applicable, date, and publishing organization. Specify the sources from which the references can be obtained. This information may be provided by reference to an appendix or to another document.

We currently have no references to make in this document.

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# 2. Positioning

## Problem Statement

|  |  |
| --- | --- |
| The problem of | Chicken eggs randomly jamming on an automatic conveyor |
| affects | The client (and sponsor), Tim Habegger, proprietor of Habegger Poultry |
| the impact of which is | Loss of productivity from flow rate a flow rate problem that must be identified by personnel effort |
| a successful solution would be | A software/hardware solution that identifies in real time when a flow rate problem occurs (egg jam), and notifies the user of the production system when and where the problem occurs. |

## 2.2 Product Position Statement

|  |  |
| --- | --- |
| For | Initially Tim Habegger, proprietor of Habegger Poultry, and more generally the chicken egg industry. |
| Who | Would realize efficiency gain and labor cost reduction through automation. |
| The Egg Flow Communicator | Is a mechanized unit assisting in the Chicken Egg Packaging Process |
| That | Would decrease downtime and labor needs while increasing the efficiency of the chicken egg packaging process through automation. |
| Unlike | Tradition conveyor systems that are prone to jamming from various reasons without an ability to notify the operator stationed at a remote location of the lost flow. |
| Our product | Mechanically isolates which conveyor lane is suffering from a flow rate problem and notifies the user in real time when and where the problem has occurred, delimiting the need to search all conveyor lines manually. |

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# 3. Stakeholder and User Descriptions

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Name** | | **Description** | | **Responsibilities** | |
| Tim Habegger, | | Proprietor of Habegger Poultry | | This Stakeholder:  ensures that the system will be maintainable  will be working co-operatively to provide the hardware components  monitors the project’s progress  approves funding | |
| Prof. Tanik | | Professor | | Responsible for overseeing project performance and progress. | |
| Mark Parker | | EARL Group co-owner | | Insure the continued development and deployment of this product. | |
| Andrew Habegger | | EARL Group co-owner | | Insure the continued development and deployment of this product. | |
| Matthew Rasler | | EARL Group co-owner | | Insure the continued development and deployment of this product. | |

## 3.1 User Summary

|  |  |  |  |
| --- | --- | --- | --- |
| **Name** | **Description** | **Responsibilities** | **Stakeholder** |
| Small Business | Primary User | Uses system in day to day production as an automation entity. |  |

## 3.2 User Environment

The typical working environment would be alongside the production system in place, on the packaging line of a chicken egg farm. From here the system may extend a notification channel that prompts from the typical working environment to a home/central office via mobile phone or a web interface when the production line is not in use. Tasks include: responding to the alert by manually fixing the jam/problem notified by the mechanical counters, and resetting the alert on the GUI, possibly adding notes to the error state to allow for “teaching” of the system. Possible future platforms may involve self-correcting systems.

The primary GUI will be incorporated into a standard PC already established on the production line. Initially, the User will be responsible for adjusting sensitivity parameters. Future development may include “learning” algorithms for self-sensitivity adjusting.

## 

## 3.3 Summary of Key Stakeholder or User Needs

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Need** | **Priority** | **Concerns** | **Current Solution** | **Proposed Solutions** |
| Insert mechanical means to measure flow of independent conveyors | 1 | Need to study how flow rate can be isolated as normal or abnormal | Hindered flow can be recognized after some time at primary conveyor, or manually searching | Install mechanical counters that have communication ability on each conveyor; state of conveyor can be determined by state of other conveyors, and probability of a flow stoppage can be ascertained there from. |
| Create communication flow from conveyors | 1 | Cost effective mechanical sensors have small internal memory with low level communication; will require learning language specific to device | None | Be flexible as to language appropriate for cost-effective development |
| Establish GUI | 1 | Decide as to “learning capability” of program, and determine requisites | Only interface with system is completely manual and eyes-on. Cameras are only installed at the final packaging area. | Create GUI on primary production CPU as initial phase, with manually adjustable parameters for sensitivity. |
| Establish alert system | 1 | Need to decide on modes of alert, whether local to the PC or to add mobile/web capability | Hindered flow can be recognized after some time at primary conveyor, or manually searching. No other means of alert | Add an audio alert that may be suspended and reset which sounds at the PC. See also next item. |
| Create mobile alert/ and or alert to web interface, or other location | 2 | Establish what most effective means of communication is for current stakeholder and potential future stakeholders | none | To be determined |

## 3.4 Alternatives and Competition

No comparable system is known to currently exist. Known alternatives involve already established precedents of manually polling and fixing problems as they arise.

# 4. Product Overview

Creation of a system that automates the process of determining when and where a chicken egg flow problem (egg jam) occurs on a system of conveyors through the chicken egg packaging process. Mechanical units will be installed along separate conveyors to track the flow of eggs down that specific conveyor. These units will report to a software program designed to determine if the flow is normal or abnormal. In the case of abnormal flow, the system should alert the user in real-time as to which specific line the problem has occurred on. In a typical situation, thousands of feet of conveyor lines would require manual searching when a jam occurs. This system would minimize the searching, thus reducing the need for multiple personnel to locate the jam. The system also eliminates unnecessary loss in production by alerting remote operators to jams when the packaging system is running automatically.

## 4.1 Product Perspective

This product is a stand-alone system that acts as a solution to one independent problem of the chicken egg packaging process.

## 4.2 Assumptions and Dependencies

# This product is being created in an environment with the following already established requisites: A production line is already established with individual conveyors fed from lines of chicken coops into primary lines that feed into the packaging area, and a windows PC with touch screen exists at the user-operated packaging area.

The primary assumption being made is that alerts can be made intelligible enough to decrease performance loss by manual checking.

# 5. Product Features

Features of the Egg Jam Communicator will include:

* A touch screen interface to access user options, such as locating jams, suspending and resetting alerts, and viewing log files.
* An alert function that is loud and visually-stimulating enough to warn a user of an egg jam condition. The GUI will also provide information about where the egg jam is located. The system should also provide log files for debugging, since this product is the initial version developed.

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# Other Product Requirements

The existing workstation runs on the Windows platform, so the software should be developed with a Windows environment in mind.

The environment that the system is being installed in is corrosive and dusty, so all mechanical and electrical components should be isolated from these conditions. Further, no toxic components should be able to come in contact with either eggs or chickens.

The software system is to be developed using the Rational Unified Process (RUP) with axiomatic design tools. Several IEEE standards are to be applied, including IEEE-830 (Software Requirements), IEEE-1058 (Project Management), IEEE-1540 (Risk Management), and IEEE-1016 (Software Design).