

## 1. Rockwell Automation Senior Capstone Project Description

Sponsor:

Amanda Shurilla <ashurilla@ra.rockwell.com>,  
Rockwell Automation Product Specialist, e---Learning  
1 Allen---Bradley Drive Mayfield Heights, Ohio 44124  
Phone: 440---646---4321 Fax: 440---646---4425

Our business objective is to create a software simulation of our Positioning Fault Simulator. The current simulator is a physical training unit that models a plant floor operation, and its purpose is to train users on the best practices for troubleshooting faults. The training unit uses actuators, photo sensors, and a programmable logic controller to assemble puzzle pieces to correctly spell "Training Advisor." The Positioning Fault Simulator has 20 fault simulations activated by toggle switches, allowing users to gain real---world troubleshooting experience without any risk to plant operations. For example, flipping switch A causes the photo sensor to malfunction and places a puzzle piece in the wrong position. The user must troubleshoot the root cause of the malfunction by examining the hardware and software to locate the fault and reset the operation. Other types of faults include, programming faults, sensor faults, safety faults, and hardware faults.

The current size/weight and cost of the physical training unit prohibits some customers from making a purchasing decision; therefore, the goal of this project is to create a soft simulation that has the same fault setting capability and allows users to practice the same troubleshooting skills. Our intention is to generate enough excitement surrounding the soft Positioning Fault Simulator that it will provide a low---cost, training alternative to our customers and exceed the current version's sales. At the close of the semester, the OSU project team will present the final prototype to Rockwell Automation and make recommendations for turning the prototype into a commercial product available for sale.

In order to successfully create a soft simulator, Rockwell Automation will ship our Position Fault Simulator to The Ohio State University to provide the project team with a "hands---on" learning experience with the hardware and software that is used in our physical unit. Rockwell Automation will provide one technical and one commercial expert to the project team to address questions as needed and meet weekly.

Project Deliverables:

- ☐ Capability Maturity Model Integration (CMMI) standard
- ☐ Standalone software simulation with a professional look and feel
- ☐ Successful simulation of physical workstation with 20 working faults
- ☐ Secured program code

## 2. Smartphone-based Inventory Management of Rural Libraries

Sponsor:

OCLC (<http://www.oclc.org>), Rajiv Ramnath, [Ramnath.6@osu.edu](mailto:Ramnath.6@osu.edu)

The idea behind this project is to ease the startup costs for libraries to become online available, especially emerging markets, where the items are not barcoded or labeled. Would it be possible to take a video stream passing by the shelf and extract the text on a item---by---item basis.... Would require the program to identify boundaries between books, OCR text from each item, and log that into a file. We would then take that text and do fuzzy matching on Worldcat to identify probable holdings of a library. From that point, detailed labeling might happen on demand as items are checked out from the library. An example input stream would look like this... <http://www.youtube.com/watch?v=Ir7r8NktXAI>. There is some prior work in other universities... Miami University QR code scanner <http://www.users.muohio.edu/brinkmwj/ar/> (second video on page).

An MS student has done a considerable amount of work to understand and develop the image processing and OCR algorithms and the web services components to match the extracted text to items in the OCLC catalog. This MS thesis is available as a reference.

The goal of this project is to integrate these algorithms into a mobile application running on a Smartphone.

### 3. Tasting Table To-Go (Mobile Application) Find A.../Nearby Update and Push Notifications Features

Sponsor:

Alicia Kim Producer, Tasting Table [alicia@tastingtable.com](mailto:alicia@tastingtable.com)

646---380---2961

#### A Capstone Design Project with Tasting Table

Tasting Table (<http://www.tastingtable.com>) is a free daily email publication on the best of food and drink culture. Tasting Table delivers curated restaurant/bar reviews, dining trends, chefs' recipes and food events to hungry eaters across the country.

Tasting Table currently publishes 10 editions:

- ☐ National
- ☐ Chefs' Recipes
- ☐ Good Taste
- ☐ Top Shelf
- ☐ Sous Chef Series
- ☐ New York City
- ☐ Miami
- ☐ Chicago
- ☐ San Francisco
- ☐ Los Angeles

Tasting Table has developed the mobile application, Tasting Table To-Go (<http://www.tastingtable.com/togo>), to provide content to readers on the go. The app has been developed natively in the past but we had a hard time keeping the content updated without making the user update their application. In the spring/summer of 2012, the app switched over to displaying the same content as TastingTable.com with a mobile CSS wrapping/view.

More detailed information is provided in a separate attachment.

#### 4. Media Search Engine - Digiclips

Sponsor:

Digiclips, Contact: [rshapiro2@msn.com](mailto:rshapiro2@msn.com) , (303) 926---0334 Cell (720) 280--- 5335. Welcome! This project is to develop a Media Search Engine with Ad Hoc searches, email alert searches with Media Analysis, online Cloud DVR or TIVO. The search engine will create reports from the data video, audio, close caption, speech to text, audio mining, video and image text recognition. The media covers Television, Radio, Newspapers, Magazines, Social Media, and Blogs. The functionalities should be able to create an online way to capture programming similar to a DVR or TIVO in the future and from the past. The idea is for the software to be portable, supportable, and very intuitive and user friendly.

I have provided a detailed description of the project, and other helpful guidelines in a separate document.

Some of what I send you will be redundant – if you are not completely clear on what is needed please email me [rshapiro2@msn.com](mailto:rshapiro2@msn.com) or call me (303) 926---0334 Cell (720) 280---5335.

## 5. GM Asset Manager

Sponsor:

Ed Freeman, General Motors Office 248---330---6672 Email [ed.freeman@gm.com](mailto:ed.freeman@gm.com)

The Computer Science and Engineering (CSE) Department within the OSU College of Engineering offers a Software Applications Capstone Program that opens a broad range of authentic software development and problem---solving opportunities for CSE students. The program provides students the opportunity to apply and "pull together" multiple facets of their education and develop professional skills while working on real---world projects. This program is also a key outreach capability for CSE.

This GM sponsored project will strengthen the relationship between GM and the Computer Science and Engineering department, differentiate GM---IT from the typical engineering profile manufacturing companies have, introduce students GM IT projects prior to graduation, attract talent that GM would not otherwise be able to attain. In addition, the Capstone project will be relevant, challenging, fun and a rewarding experience for computer science students.

The specific project is a smartphone application for Android devices. The application, which is available to anyone with a valid GM identification and log---in credentials will connect to a central asset database and allow the user to find, view and update asset records. It will provide the company with a fast, ubiquitous, portable tool that allows cost effective, real---time asset management. The app will support multiple screen sizes and will include usability features such as gesture--- based pointing, clicking, and scrolling through menus and drop downs.

Specific features of the app include a one time view of asset details, asset audit validation, "on the fly" asset verification, and the searching and location of physical devices. The app could be used in Receiving to capture detailed information at time of arrival into the receiving area, by using the inbuilt camera to scan barcoded asset hardware serial & part number information, quantity, date, vendor, PO number etc. The app will provide edit/modify capability to the user to update a newly received asset upon deployment or "end user" receipt, plus maintain existing asset record accuracy by updating data fields each and every time an asset is touched. A detailed powerpoint document has been provided as a separate attachment.

## 6. Monitoring Labor Progress – College of Nursing

Sponsor:

Jeremy L. Neal, PhD, MS, College of Nursing, 1585 Neil Avenue, Columbus, OH 43210, [neal.167@osu.edu](mailto:neal.167@osu.edu), 614-292-9848

I am in need of assistance in developing a computerized research instrument to aid clinicians in monitoring labor progress during childbirth.

Background: My research team has developed an evidence-based instrument (called a partograph) to be used in the labor assessment of low-risk, nulliparous women with spontaneous labor onset (an image of the partograph is included as well as examples of use). Partographs have been used since the early 1970s but existing partographs are flawed and not based on contemporary evidence. Ours is based on 4 evidence-based principles. We estimate our partograph will:

- ☐ Safely limit diagnoses of dystocia during the first stage of labor to only the slowest 10% [dystocia (or slow abnormal labor progress) is well-known to be over-diagnosed at around 50% leading to the use of interventions aimed at speeding labor progress]

- ☐ Decrease oxytocin augmentation rates by 50% or more [presently, approximately 50% of low-risk nulliparous women with spontaneous labor onset are augmented with oxytocin, a 'high-alert' medication per the Institute of Safe Medication Practices; oxytocin is the intervention most commonly associated with preventable adverse perinatal outcomes and its misuse is involved in half of all paid litigation claims]

- ☐ Decrease cesareans performed for dystocia by 50% or more while having no significant influence on other labor outcome variables, e.g., Apgar scores, postpartum hemorrhage rates.

In short, our partograph should improve birth safety, improve birth outcomes, and decrease health care costs (estimated at \$2 billion savings each year).

We are performing preliminary work on the partograph but only in a paper-and-pencil form. We would like to computerize the instrument so that clinicians need only chart [1] time of exam; [2] cervical dilatation (in centimeters); [3] and fetal station and the plots will automatically be made on the partograph. A computerized version of the partograph will then compute 1) cm change from last exam, 2) cm/hour change from last exam, 3) cm/hr change since first exam, 4) whether labor progress is left or right of the 'dystocia line, and 5) interpretation of progress for the clinician (standard statements). We envision graphics being similar to the how the graphics work on an on-line partograph (not evidence-based) [http://www.babymed.com/partogram-partograph-labor-dilatation-curvecalculator?](http://www.babymed.com/partogram-partograph-labor-dilatation-curvecalculator?data=[]&showResults=1&redirect=1)

[data=\[\]&showResults=1&redirect=1](http://www.babymed.com/partogram-partograph-labor-dilatation-curvecalculator?data=[]&showResults=1&redirect=1) <[http://www.babymed.com/partogram-partograph-labor-dilatation-curvecalculator?](http://www.babymed.com/partogram-partograph-labor-dilatation-curvecalculator?data=%5b%5d&showResults=1&redirect=1)

[data=%5b%5d&showResults=1&redirect=1](http://www.babymed.com/partogram-partograph-labor-dilatation-curvecalculator?data=%5b%5d&showResults=1&redirect=1)>

The final partograph program would be used in research so would need to be easily loaded onto labor room computers (so women can see their own progress) and the data would need to be able to be downloaded into a research database; as it will contain health data, the program would also need to be very secure. This is beyond the scope of my team's skills so we would like to partner with you and your students to make this happen.

A paper describing the system in more detail has also been provided.

## 7. Online Business Offering of Industrial Engineering SaaS (Software as a Service) to a Small and Medium Manufacturer (SME) anywhere in the World

### Contacts:

1. Dr. Shahrukh Irani, Director IE Research, Hoerbiger Corporation of America, 1212 Milby Street, Houston, TX 77023 ([shahrukhirani1023@yahoo.com](mailto:shahrukhirani1023@yahoo.com), 713-226-2446)
2. Mike Zazon ([zazon.1@osu.edu](mailto:zazon.1@osu.edu), 614-441-8741)
3. Min Wang ([swiftwangster@gmail.com](mailto:swiftwangster@gmail.com), 614-432-4026)

**Website:** <http://pfast.ise.ohio-state.edu/pfast/>

**Background for the Project:** The PFAST (Production Flow Analysis and Simplification Toolkit) software was developed by a team comprised of myself (Dr. Irani), Dr. Rajiv Ramnath, three ISE Ph.D.s and two CSE graduate students. It works! The PFAST Input File consists of three spreadsheets. PFAST reads this file and auto-generates a variety of outputs that need to be stored in a project folder on the user's computer. Once that first run is over, the user can run PFAST again but this time PFAST will allow him/her to produce the same outputs in a single multi-tabbed Excel 2003 file. Armed with this all important PFAST Analysis Report (or additional reports generated from different versions of the original Excel input file for the project), a suitably-trained IE can implement a variety of improvements projects in any machine shop, hospital, office or other high-mix low-volume work environment.

**Deliverables:** It is desired to host PFAST on an OSU server and make it available to any interested person anywhere in the world via the Web. There is a need for error-checking of the PFAST Input File, which is perhaps the hardest step in the entire process for getting the highly-valuable outputs from the software. If the input file is good, it will be submitted to PFAST which must auto-generate the Excel version of the PFAST Analysis Report, assign it a user-specified filename and return that file as an email attachment to the user. The user must pay a reasonable fee, say \$50 for each report that they receive by email. They must pay online before they will receive the PFAST Analysis Report from each run that they authorised. Finally, if the user wants assistance from OSU students, they can fill up an application to recruit an ISE intern at <http://pfast.ise.ohiostate.edu/pfast/hireintern.html>. This intern will utilize the PFAST Analysis Report to implement JobshopLean in their facility.