

Senior Capstone Projects

Spring 2013

Project: Electronic Patient Charge Capture

Sponsor: Buck Taylor
Community Health Partners
Bozeman, MT

Description: Community Health Partners (CHP) is a private, not-for-profit healthcare corporation that provides high quality, cost effective primary and preventative care. As a federally qualified health center, they use a cost-based reimbursement system to serve a diverse population, including a high proportion of medically underserved and uninsured patients. They operate four medical clinics and two dental clinics in Gallatin and Park counties.

A few years ago, CHP transitioned from traditional paper-based medical charts to electronic medical records. However, while patients' health-related information is directly entered into a secure electronic database, the billing information is still collected using paper charge slips. Charge data is then entered into the billing system manually. Pending changes in medical reimbursement processes at the federal level will render the current paper-based system obsolete.

The objective of this project is to study the back-end work and paper flow at one clinic, and recommend changes to transition from the existing paper-based system to an electronic system. The new system must provide accurate entry of nurse and provider charges and codes into the practice management module of the electronic health record system, and do it timely enough that the patient can pay his or her bill before leaving the clinic (or at least know what the charges will be). It is expected that the team will pilot the recommended changes with at least one care team at the clinic to demonstrate feasibility of the recommendations.

Team Members: Kevin Murray
Colter Schilling
Jamie Schultz

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Project: Feasibility Study of Centralized Invoicing

Sponsor: Laura Humberger
Assistant VP of Financial Services
Montana State University

Description: Bill payment to vendors is currently a decentralized process at the Bozeman campus of Montana State University. After an order has been placed and delivered, the vendor sends an invoice to the department that originated the order. There, the invoice is processed, a bill payment authorization is initiated, the paperwork sent through appropriate approvals, and the package sent to Accounts Payable. In Accounts Payable, the invoice is again processed, which frequently involves duplicate activities and document retention to what occurred in the originating department.

The Purchasing department desires to investigate whether a more centralized process would be more cost effective for the university while still able to meet the needs of departments. The IE senior design team will assess the current set of processes involved with bill payment for academic departments (Facilities, Auxiliary Services, and Athletics are excluded), then generate several alternative invoice processing solutions, and evaluate them against the needs of departments, requirement of administration for document retention and accounting controls, remittance time reduction, and cost. The team will provide a set of recommendations, backed by engineering analysis, to dramatically improve MSU's bill payment processes.

Team Members: Josh Colvin
Wyatt Justinak
Molly Martin
Senny Saputri

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Project: Fly Fishing Reel Assembly

Contact: Matt McCune
Bozeman Reel
Bozeman MT

Description: Bozeman Reel is a start up venture to produce fly fishing reels for retail sale (www.bozemanreel.com). The product has been designed along with manufacturing and assembly instructions, and approximately 50 units have been produced for test purposes and sale to lead users. Management intends to start full production in the next six months. The need is to design efficient assembly work flow, workstation, and visual work instructions to meet projected demand targets. The design team will need to analyze the required assembly tasks in light of production projections, determine the required number of workers and stations to meet demand with flexibility for future growth, allocate the tasks to workers/stations, design jigs or fixtures as necessary to support assembly work, create workstation designs that support efficient workflow while complying with ergonomic considerations, incorporate appropriate quality control measures, and create visual work instructions to facilitate rapid training of new workers. In addition, management would like the team to devise a simple yet effective control system for the inventory stored at point-of-use, including desirable batch sizes for component part orders and reorder procedures.

Team Alex Chiapetta
Members: Will Hamel
Chris Hergett

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Project: Demonstration Program for an Automated Conveyor-Robot System

Sponsor: Durward Sobek
IE Program Coordinator
Montana State University

Description: The CIM Lab in EPS 115 has a functional PLC-controlled conveyor and two robot arms. The objective of this project is to continue development of this resource by creating a demonstration program suitable for departmental visitors such as corporate recruiters or prospective students. This would include:

- Creating a task accomplished by the two robots and requiring material movement between them which shows off the capabilities of the system and dazzles visitors.
- Designing and fabricating parts that are manipulated by the robots.
- Designing and fabricating pallet fixtures to hold the parts during conveyance and during robot manipulation.
- Creating and implementing the ladder logic program to control pallet movement and direct robot activities.
- Creating robot programs to accomplish the defined tasks.
- Specifying and implementing any necessary hardware modifications, subject to approval by the lab supervisor.
- Implementing the total package.

Deliverables will include a working demonstration program; appropriate documentation of the system upgrades, program and operating instructions; and at least one cadre of dazzled visitors.

Team Joe Johnson
Members: Nate Powell
Eldar Salmenbayev
Tim Talbot