CPSC01 Aurora

Description

Problem

Programmers are required to keeping an organized set of notes to work effectively. Common commands, snippets of code, mathematical tables, and other resources are vital to the success of a programmer. Existing note taking applications are not designed to help facilitate programming productivity and are instead a detriment to productivity. Specifically, Evernote, OneNote, and Google Keep all are inefficient because they use a traditional folder system, which creates overhead in storing a note and difficulties retrieving a note, and they also fail to take full advantage of the technology. As an alternative, many programmers simply repeatedly search the same topic whenever they need a piece of information, which is inefficient.

Goals

1. **Creation of an MVP (Minimum Viable Product):** We will create a basic version of the application that can achieve our core features of storing and retrieving notes. We will finish this version by **January 2018**.
2. **Completion of Final Application:** We will complete a final desktop application for OSX, Windows, and Ubuntu that builds on the MVP to including intelligent searching and tagging. We will finish this product by **April 2018**.
3. **User Efficiency:** The application should be minimalistic, user-friendly, and allow a user to store and retrieve a note in **under 20 seconds**. A tagging system will replace a folder system.
4. **Quality Requirements:** Our software must be free of software defects that hamper the productivity of our users. We will achieve this through continuous integration testing and responsible coding practices.
5. **User Testing:** We will integrate user testing into our iterative development process from the beginning to ensure that our product meets the needs of its users.

Scope

1. **Note taking:** We will support small notes entered by users on the desktop. Each note can have one or more tags associated with it.
2. **Search:** Our application will allow the user to search for notes by relevance and recency.
3. **User Testing:** We will interview our users in order to properly validate our assumptions about what is necessary and desired in our application.
4. **Cross-platform:** We will build our application for the MacOS and Windows desktop platform using Electron.

Deliverables
1. **MVP (Minimum Viable Product):** The application has the basic functions of storing and retrieving a note without using a traditional folder system, but instead a *tagging system*, in less than **20 seconds**.

2. **User Test Data:** We will perform user testing to obtain measurables in terms of the time it takes to *store a note* and the time it takes to *retrieve a note*. We will also get qualitative testing such as user feedback on the functionality of the user interface of the application.

**Final Product:** The application will have the same functions as the MVP in addition to having an easy to use *user interface* and more intelligent searching and storage.

**Summary**

We want to build an efficient and easy-to-use desktop note taking application for programmers.

**Please identify results you desire from team:**

- Summary Report
- Production-quality Project

**Does the project require Fabrication? Please Explain.**

No

**Will the Gonzaga machine shop be utilized?**

No

**Please describe any additional resources required for the project.**

- 100$ to release to the Mac App Store
- 250$ to cryptographically sign our Windows Application.
- 200$ for 9 months of Cloud Hosting.

**Any restrictions on the team? Please explain.**

No

**If NDA(nondisclosure agreement) or IPA (intellectual property agreement) is necessary it must be furnished by the sponsoring company. Do you anticipate an NDA or an IPA?**

**STUDENT: Names of Students on Proposed Team, Disciplines & Emails**

Ethan Mahintorabi, Emahintorabi@zagmail.gonzaga.edu; (CPSC)
Evan Conrad, Econrad@zagmail.gonzaga.edu (CPSC)
STUDENT: Identify a faculty advocate who worked with you on Project Proposal

Dr. Schroeder

STUDENT: Identify an external User/champion that would be appropriate to meet with your team

Marsh Sutherland, Jason Hagglund, Zachary Hargreaves, Steve Smith

STUDENT: Please list any additional students you will need on your team who have not been recruited or identified as yet with the required disciplines you are seeking

STUDENT: Identify any bonus features of your project such as: entrepreneurial focus, innovative ideas, improvement of human condition, promotion of sustainability, use of state-of-the-art technologies

Entrepreneurial focus

STUDENT: Do you anticipate any Fumes, Odors, Flammable substances or other Dangers associated with this project? If yes, please explain.

STUDENT: Any additional information you would like us to consider about your project or team?
CPSC02 Inter.Codes

Description

Inter.Codes is an platform that will provide a complete cloud based IDE. We would like students to work with our teams to develop with several aspects of the development of Inter.Codes.

1. Front end UI design
2. Integration to existing code frameworks
3. Design and implementation of a JavaScript IDE

Because this is a very large project, students participating will working on specific pieces of the platform, not the platform in whole. This will allow them to have achievable goals. We will encourage students to develope their own solutions for tasks given and will help them develop thier solutions.

We do not expect a full fledged platform by the end of the project, but our goal is to work with the students to design a working prototype of the platform with basic functionality. This functionallity includes:

1. A working web based UI
2. An IDE with syntax highlighting, limited error checking

Many aspect of the framework for this project are complete and the students will primarily be working on implementing the logic of the framwork as a web UI.

Summary

Inter.Codes is a platform that is being developed by Liquid Crystal Studios to allow for a complete development environment in the cloud. This development environment will include an IDE, version control, timeline and issue tracking, and basic communication systems for developers. The goal of the project is to expose students to working on large enterprise platforms.

Please identify results you desire from team:

- Website Development

Does the project require Fabrication? Please Explain.

No

Will the Gonzaga machine shop be utilized?
Please describe any additional resources required for the project.

A development server at Gonzaga would aid students as a test environment but is not required. Such a server if used would be provided.

Any restrictions on the team? Please explain.

None

If NDA(nondisclosure agreement) or IPA (intellectual property agreement) is necessary it must be furnished by the sponsoring company. Do you anticipate an NDA or an IPA?

Yes

STUDENT: Names of Students on Proposed Team, Disciplines & Emails

STUDENT: Identify a faculty advocate who worked with you on Project Proposal

STUDENT: Identify an external User/champion that would be appropriate to meet with your team

STUDENT: Please list any additional students you will need on your team who have not been recruited or identified as yet with the required disciplines you are seeking

STUDENT: Identify any bonus features of your project such as: entrepreneurial focus, innovative ideas, improvement of human condition, promotion of sustainability, use of state-of-the-art technologies

STUDENT: Do you anticipate any Fumes, Odors, Flammable substances or other Dangers associated with this project? If yes, please explain.

STUDENT: Any additional information you would like us to consider about your project or team?
CPSC03 Mind Palace (Method of loci)

Description
There are plenty of things to memorize these days, especially when you are a student. Our group of computer science students wants to create an application that would help users retain information effectively and long-term.

More specifically, we want to make the "mind palace" technique accessible to people who have trouble using the technique themselves. Mind palace technique implements the "method of loci," or the method of using spacial memory to quickly recall information.

As an example, let's say Sarah is studying for her Art History final. She is asked to memorize several eras of art, each consisting various artists and their paintings, each of which have a date and title. She would construct her mind palace by imagining a building and organizing it in accordance with her study material. Each wing of the building represents a different era, each room a different artist, and each wall in the room displays paintings from a particular year.

In theory, Sarah would be able to revisit her palace with ease. We hope to develop an application where a user can design his or her own mind palace, the app generates the custom building, and the user can use a VR headset to walk through the building.

Our Desired Results:
- A web application for the user to design a custom mind palace
- A file translator to convert app data to the correct filetype for the generator
- A mind palace generator
- Implementation of the mind palace walk-through on a VR headset

Minimum Results:
- A mind palace generator
- Implementation of the mind palace walk-through on a VR headset

Deliverables:
1. Design a file type and sample file
2. Design a base palace implementation and a sample palace which uses the info from the file
3. Design a file generator to create files for the palace implementation
4. Design the application which send data to the file generator
5. Create a working unit

Summary
We are implementing the mind palace technique (featured on Sherlock BBC) via headset so that ordinary people can memorize information effectively and long-term.

Please identify results you desire from team:
- Summary Report
- Design Document
Does the project require Fabrication? Please Explain.
No

Will the Gonzaga machine shop be utilized?
No

Please describe any additional resources required for the project.
HTC Vive

Any restrictions on the team? Please explain.
No

If NDA (nondisclosure agreement) or IPA (intellectual property agreement) is necessary it must be furnished by the sponsoring company. Do you anticipate an NDA or an IPA?

STUDENT: Names of Students on Proposed Team, Disciplines & Emails
Julie Prichard, Comp Sci (Math Minor), jprichard@zagmail.gonzaga.edu
Ross Brandt, Comp Sci (Business Minor), rbrandt@zagmail.gonzaga.edu
Max Baker, Comp Sci, mbaker7@zagmail.gonzaga.edu

STUDENT: Identify a faculty advocate who worked with you on Project Proposal
Bowers

STUDENT: Identify an external User/champion that would be appropriate to meet with your team

STUDENT: Please list any additional students you will need on your team who have not been recruited or identified as yet with the required disciplines you are seeking
We are looking for one more CS major who shows interest in our project.

STUDENT: Identify any bonus features of your project such as: entrepreneurial focus, innovative ideas, improvement of human condition, promotion of sustainability, use of state-of-the-art technologies
State-of-the-art-technologies

STUDENT: Do you anticipate any Fumes, Odors, Flammable substances or other Dangers associated with this project? If yes, please explain.
No

STUDENT: Any additional information you would like us to consider about your project or team?
CPSC04 Neural Network Facial Recognition

Description

Neural networks are software-models that have experienced significant resurgence in the academic domain in recent years. These networks can accomplish image recognition tasks with far more accuracy than many of their conventional counterparts. We expect to experiment with a number of different types of neural networks to find the specific type that will classify human facial and emotional features the best. We are planning on building a neural network, assembling a training dataset, and producing a software package that can identify human facial-emotional features with some degree of accuracy (dependent on a number of factors).

Summary

We are going to build a neural network to perform facial emotional recognition tasks.

Please identify results you desire from team:

- Summary Report
- Working Prototype
- Research

Does the project require Fabrication? Please Explain.

No

Will the Gonzaga machine shop be utilized?

No

Please describe any additional resources required for the project.

We do not expect to use other campus services/resources at this time
Any restrictions on the team? Please explain.

Math and Comp Sci students preferred

If NDA (nondisclosure agreement) or IPA (intellectual property agreement) is necessary it must be furnished by the sponsoring company. Do you anticipate an NDA or an IPA?

STUDENT: Names of Students on Proposed Team, Disciplines & Emails

Elijah Michaelson, Computer Science, emichaelson@zagmail.gonzaga.edu
Brian Mackessy, Computer Science, bmackessy@zagmail.gonzaga.edu

STUDENT: Identify a faculty advocate who worked with you on Project Proposal

Paul de Palma helped us

STUDENT: Identify an external User/champion that would be appropriate to meet with your team

STUDENT: Please list any additional students you will need on your team who have not been recruited or identified as yet with the required disciplines you are seeking

Mathematics or Computer Science students preferred

STUDENT: Identify any bonus features of your project such as: entrepreneurial focus, innovative ideas, improvement of human condition, promotion of sustainability, use of state-of-the-art technologies

Entrepreneurial opportunity, state-of-the-art technologies

STUDENT: Do you anticipate any Fumes, Odors, Flammable substances or other Dangers associated with this project? If yes, please explain.

No
CPSC05 SpareSpace

Description

Every year, college students rent out storage units to store their belongings. It makes sense; students have a ton of possessions and seem to acquire more and more things as time goes on. There’s no reason to bring back home everything brought to school when the school year ends. Some items are seasonal and need to stay in the area, or some things are just too big to pack into luggage bags or in the trunks of cars. Students aren’t allowed to leave their stuff in the dorms. So the only option is to rent out a storage unit for the summer.

However, storage units are expensive, and are getting more expensive every year it seems like. Plus some of the really nice or cheap ones are not as convenient to get to as one might like. This becomes an even more of a hassle when a student has multiple trips to take or does not own a car. This problem can be solved through an alternative storage system fostered through increased communication around the community by way of technology.

Our expectation for this project is to develop a professional application, SpareSpace, that will solve the storage unit problem through an alternative storage system. We expect SpareSpace to connect users in need of storage space to other users who might have storage space to offer. Storing belongings in another person’s house will act as a much cheaper alternative than the traditional storage unit while maintaining the key aspects of a traditional storage unit. Finally, we want users to be able to search for/post storage space and be able to connect with other users through in-app messaging. Our personal expectations for this project is that this project will be an important learning opportunity that challenges us to make a professional, commercial application. We will learn valuable skills that will help us get a job in the computer science field upon graduation. We will fully understand relatively new programming and/or markup languages as well as building a backend that often goes along with professional, commercial applications.

Our desired result is a professional, commercial-ready, fully functional iOS/ANDROID/WEB application that utilizes a server, cloud based messaging system, and location based services.

In terms of deliverables, we will have monthly and weekly plans for what our team wants to accomplish. This will include how long it will take to accomplish tasks, and if we accomplished the task on time. On the presentation side, we will have a weekly summary of what we were able to accomplish that week in general and our overall goals for the next week. We hope to work with a Gonzaga student life led focus group which will critique our development and provide us with their observations. Other deliverables include a Business Function Model, Design Documents, UI mockups, and Unit testing.

There are many challenges that come with the scope of this project. From a coding standpoint, if we choose to make a web application, our team will need to become highly proficient in skills that include HTML, CSS, and JavaScript. If we choose to do develop this as an iOS application, our team will need to become comfortable with Swift and Xcode. We plan on making this app as professional as can be, so design and app reliability will be key aspects we must focus on. Further challenges that come with the scope of this project will be integrating different API’s...
into our application. This includes building a server from a third-party source’s API (such as Firebase) to host cloud based messaging and application data. Being a location based application, we will need to integrate a location service’s API into our app (such as Google Maps). Aside from these technical challenges, we will face challenges in marketing and advertising of our application, and must work out and avoid any legal, social, or other issues that may arise.

**Summary**

The goal of SpareSpace is to connect users in need of storage space to users who have storage space to offer with an easy to use platform. SpareSpace’s design will look as if it were implemented by a professional team. We hope companies see this application as something they would legitimately pay a team of developers to produce.

**Please identify results you desire from team:**

- Summary Report
- Design Document
- Production-quality Project
- Website Development
- App

**Does the project require Fabrication? Please Explain.**

No, our project just consists of a application built from previously fabricated technology.

**Will the Gonzaga machine shop be utilized?**

No

**Please describe any additional resources required for the project.**

The main resource we will need for this application would be startup funds for a server service to store our application information. We have narrowed down our possible servers to use for our application, amazon web services or Firebase. Both are promoted to help out clients develop their application, and has the ability to expand based upon need. Firebase is approximately 25$ a month which we would not activate till needed (likely in February/March of 2018). We will also need money for an Apple developer account to be able to submit our app to the app store if we choose to make an iOS app. This will cost $100. If we choose to make an Android application, the fee for submitting an app to the Google play store is a one time fee of $25. If we choose to make a web application, the cost for web hosting is approximately $100.

**Any restrictions on the team? Please explain.**

No
If NDA (nondisclosure agreement) or IPA (intellectual property agreement) is necessary it must be furnished by the sponsoring company. Do you anticipate an NDA or an IPA?

**STUDENT: Names of Students on Proposed Team, Disciplines & Emails**

Evan Arends - earends@zagmail.gonzaga.edu  
George Kunthara - gkunthara@zagmail.gonzaga.edu  
Devin Roche - droche2@zagmail.gonzaga.edu  
All Computer Science

**STUDENT: Identify a faculty advocate who worked with you on Project Proposal**

David Schroeder, schroederd@gonzaga.edu

**STUDENT: Identify an external User/champion that would be appropriate to meet with your team**

Undecided. May seek out an iOS/Android/Web Developer working for a Spokane business. May work with a Gonzaga-based student focus group.

**STUDENT: Please list any additional students you will need on your team who have not been recruited or identified as yet with the required disciplines you are seeking**

N/A

**STUDENT: Identify any bonus features of your project such as: entrepreneurial focus, innovative ideas, improvement of human condition, promotion of sustainability, use of state-of-the-art technologies**

Entrepreneurial focus, innovative idea.

**STUDENT: Do you anticipate any Fumes, Odors, Flammable substances or other Dangers associated with this project? If yes, please explain.**

No.

**STUDENT: Any additional information you would like us to consider about your project or team?**

N/A
CPSC06 Tempo

Description

The issue our team wishes to address is the lack of software that facilitates the curation of music based upon the user’s vitals and mood. We live in the age where wearables, such as the Apple Watch, constantly monitor the user’s health, vitals, and well-being. This data is extremely valuable and can be used to benefit the user in ways that they can not yet comprehend. We propose an iOS Application that will utilize the iPhone and Apple Watch health data to determine the music that should be playing based upon the user’s current activity.

For example, have you ever been working out and the music you are listening to does not match the intensity of the workout? If the music is too slow, you will lose motivation to push on and if the music tempo is too fast, you will tire out early. Studies from Durham University have shown that music has a direct connection to a person’s mood, outlook, and physical endurance. We believe that we can benefit user’s health by using our proposed application.

The concept would be to integrate wearables, such as the Apple Watch, to detect the user’s motion and heart rate. By utilizing the motion data and heart rate, we can determine if the user is running or having a panic attack. If the heart rate is high, but user motion is not detected, we can conclude that the user is stressing out and then suggest playing music that has a soothing connotation. Likewise, in the case that the user has a high heart rate and vigorous motion is detected, it can be assumed that the user is exercising. The program would then detect the tempo or strides per minute and translate it into beats per minute. The application would then sort through a selection of music based on the user’s preferred genre and then match it to the tempo of their movement. Similarly, we are going to add a feature where the user can tap on the screen to a beat that generates a list of songs that have that same beat. This is important because it will allow the user to customize their own songs to help with a person’s mood, outlook, and physical endurance. For example, the user is riding the bike and our application has already generated music based on his or her heartbeat, but he or she doesn’t feel like they’re going fast enough. With this feature the user will be able to tap the screen to a faster beat that they can then match to increase the quality and intensity of their workout. This feature also has interesting collateral effects. For example, if the user knows the beat to a song but does not know the name or the words, he or she can tap on the screen to the beat that they know and our application will generate songs that have that beat. This will help our users identify songs that they previously did not know the names to.

We are choosing to use Spotify as our media source due to their vast selection of music and their media datapoints. They have already cataloged songs based off of their danceability, energy, tempo, and valence. The most important of these data points are tempo and valence. The tempo of a song is the overall estimated tempo of a track in beats per minute (BPM). In musical terminology, tempo is the speed or pace of a given piece. The valence of a song is a measure from 0.0 to 1.0 describing the musical positiveness conveyed by a track. Tracks with high valence sound more positive (e.g. happy, cheerful, euphoric), while tracks with low valence sound more negative (e.g. sad, depressed, angry). With these data points, and a seemingly endless media collection, we can create an extremely meaningful app. It is our hope to
incorporate a machine learning algorithm that will allow our app to learn and adapt to the user’s daily routine. This will make the app more convenient and easy to use.

Research

According to the research we did to try and find something in the marketplace that was close to this idea, there are things that are similar, but differ in the exact functionality. The closest sorts of apps that already exist are things like Shazam or SoundHound. These apps listen to the music that is playing and try to tell you what song you’re listening to. These apps can identify a single song based on a full audio track that you are trying to identify and can tell you exactly what it may be. This is a little different then what we would be trying to do in terms of how the input would be given. Instead of receiving audio, it would only receive a pace.

As part of our research we will be working with exercise science to get their input on design and feedback on their functionality. They will hopefully be able to provide us with some valuable information on the best standard beats per minute to get the best workout for the user’s unique physical build.

Summary

The issue our team wishes to address is the lack of software that facilitates the curation of music based upon the user’s vitals and mood. We will create an iOS Application that will utilize the iPhone and Apple Watch health data to determine the music that should be playing based upon the user’s current activity.

Please identify results you desire from team:

- Design Document
- Research
- App

Does the project require Fabrication? Please Explain.

No

Will the Gonzaga machine shop be utilized?

No

Please describe any additional resources required for the project.

In order for us to complete the project we would need access to a Macintosh operating system, a Spotify API account, and an Apple Watch.

Any restrictions on the team? Please explain.
If NDA (nondisclosure agreement) or IPA (intellectual property agreement) is necessary it must be furnished by the sponsoring company. Do you anticipate an NDA or an IPA?

STUDENT: Names of Students on Proposed Team, Disciplines & Emails

Alexander Susee (Computer Science): asusee@zagmail.gonzaga.edu
Rudy Bermudez (Computer Science): rbermudez@zagmail.gonzaga.edu
Ryan Rozema (Computer Science): rrozema@zagmail.gonzaga.edu

STUDENT: Identify a faculty advocate who worked with you on Project Proposal

Dr. Shawn Bowers

STUDENT: Identify an external User/champion that would be appropriate to meet with your team

Dr. Gina Sprint

STUDENT: Please list any additional students you will need on your team who have not been recruited or identified as yet with the required disciplines you are seeking

N/A

STUDENT: Identify any bonus features of your project such as: entrepreneurial focus, innovative ideas, improvement of human condition, promotion of sustainability, use of state-of-the-art technologies

We will be using innovative ideas such as a machine learning algorithm to help the application adapt to the user's every day life and make it easier to use.

STUDENT: Do you anticipate any Fumes, Odors, Flammable substances or other Dangers associated with this project? If yes, please explain.

No

STUDENT: Any additional information you would like us to consider about your project or team?

N/A
CPSC07 3D Timeline Application

Description

The new Woldson performing Arts Center is being created via a significant donation from the Woldson family. As part of the donation, a large number of historical artifacts from the Woldson family are available to support telling a rich collection of storylines. The university plans to use part of the facility space as a student curated learning center. Due to the limited space, a digital medium will be used to tell the stories of the Woldson legacy in the pacific northwest which dates back to the beginning of the area mining industry, and ranging in area from Montana to Seattle.

Summary

The goal of this project is to design a customizable 3d timeline application that will display a timeline of events/artifacts (images, text). The application is to provide multiple historic storylines customizable to allow the addition of new story timelines. The application is to be used in the new Woldson Performing Arts Center as part of an interactive museum display.

The application must engage the user while providing views of the various historical storylines. Since the exhibit is to be student moderated and will change over time, it must be configurable and expandable. This project’s origins come from the digital humanities and will reply on integration of the historical archives digitized by Gonzaga historians. To achieve visitor engagement, consideration should be given to the user interface which could include gesture controls utilizing technology similar to the Kinect system. Deliverables include a windows compatible application, integrated database to catalog the artifacts of images, video, audio, and text, engaging user interface, detailed user manual, and system maintenance instructions.

Please identify results you desire from team:

- Working Prototype
- User Manual
- Research

Does the project require Fabrication? Please Explain.

No.

Will the Gonzaga machine shop be utilized?

No

Please describe any additional resources required for the project.

Sponsor will provide display and interface system as well as historical artifacts (text, videos, and images). Students will need desktop computers.
Any restrictions on the team? Please explain.

If NDA (nondisclosure agreement) or IPA (intellectual property agreement) is necessary it must be furnished by the sponsoring company. Do you anticipate an NDA or an IPA?
No

STUDENT: Names of Students on Proposed Team, Disciplines & Emails

STUDENT: Identify a faculty advocate who worked with you on Project Proposal

STUDENT: Identify an external User/champion that would be appropriate to meet with your team

STUDENT: Please list any additional students you will need on your team who have not been recruited or identified as yet with the required disciplines you are seeking

STUDENT: Identify any bonus features of your project such as: entrepreneurial focus, innovative ideas, improvement of human condition, promotion of sustainability, use of state-of-the-art technologies

STUDENT: Do you anticipate any Fumes, Odors, Flammable substances or other Dangers associated with this project? If yes, please explain.

STUDENT: Any additional information you would like us to consider about your project or team?
CPSC08 Gonzaga Campus AR Walking Tour

Description

Augmented reality (AR) mobile application for GU campus.

Summary

The goal of this project is to design an interactive history application for mobile devices. The final end product will be a guided augmented reality walking tour of the Gonzaga University campus. At specific points on campus, the user will be able to see historical photographs superimposed on their screen with access to historical facts and stories relevant to the specific location. By incorporating augmented reality in this walking tour, the user will be more engaged in the history behind the Gonzaga campus. The popular Pokemon-Go application is a similar model for the basis of the project idea.

Please identify results you desire from team:

- Working Prototype
- User Manual
- Research

Does the project require Fabrication? Please Explain.

No.

Will the Gonzaga machine shop be utilized?

No

Please describe any additional resources required for the project.

Sponsor will provide historical artifacts (text and images) needed for project. Computers and Android mobile devices will be required for project.

Any restrictions on the team? Please explain.

If NDA(nondisclosure agreement) or IPA (intellectual property agreement) is necessary it must be furnished by the sponsoring company. Do you anticipate an NDA or an IPA?

No

STUDENT: Names of Students on Proposed Team, Disciplines & Emails

STUDENT: Identify a faculty advocate who worked with you on Project Proposal
STUDENT: Identify an external User/champion that would be appropriate to meet with your team

STUDENT: Please list any additional students you will need on your team who have not been recruited or identified as yet with the required disciplines you are seeking

STUDENT: Identify any bonus features of your project such as: entrepreneurial focus, innovative ideas, improvement of human condition, promotion of sustainability, use of state-of-the-art technologies

STUDENT: Do you anticipate any Fumes, Odors, Flammable substances or other Dangers associated with this project? If yes, please explain.

STUDENT: Any additional information you would like us to consider about your project or team?
Concrete has been delivered to millions of locations using paper tickets. Once the concrete is delivered, there is no way to determine the exact location of the concrete that was delivered. For quality control purposes, it is important to know the location of the tested material, particularly if the material fails long term testing such as strength in structural members of pavements. The goal of the project is to develop a cloud based data system that could become the complete quality control record for the concrete project.

Concrete has been delivered to millions of locations using paper tickets. Once the concrete is delivered, there is no way to determine the exact location of the concrete that was delivered. For quality control purposes, it is important to know the location of the tested material, particularly if the material fails long term testing such as strength in structural members of pavements.

The goal of the project can be broken down into several aspects. 1) To locate or develop an RFID or other technology device that could be programmed and batched in to the concrete that can be found at a later date if the location of the concrete batch is needed. (Electrical Engineering Students)

2) To develop the device that would program multiple ECDID chips and dispense them into the concrete mixer or delivery unit while simultaneously upload the information to a cloud based database. (Mechanical Engineering Students)

3) To develop a cloud based database interface that would allow project personnel to determine what information they want to receive by text or email such as batch time, approximate delivery time, batch information, and possibly allow entry of project data such as air content slump, unit weight, temperature, etc. In essence, the cloud based data base could become the complete quality control record for the project. This will require Software development, a CPSC Data Management system and an RFID Reader Programmer. (Computer Science Students)

The CPSC students would be needed to write code to program the device along with code to easily access information from the device. CPSC students would also need to review code from multiple concrete batch systems. ACME Concrete Paving, Inc. operates a REXCON system in four portable batch plants. The computer output must be analyzed and possibly modified to put into a format that can be stored on the ECDID. We believe our relationship REXCON will allow us access to code to streamline this process.

We believe electrical engineering students would be necessary to work on the project to identify the proper RFID chip for use or determine if a different chip that would be programmable and be able to be identified in a load of concrete with it, be a mixer truck, dump truck, or harden placement. Electrical engineering students must also verify power requirements and help with how information can be sent and retrieved from the ECDID.
Mechanical Engineering students will be needed to develop the system to store, program, and distribute the ECDED to the concrete during the batch cycle. Given the difficult environment where concrete is batched, the system must be very resistant to dust, dirt, water, vibration, and so on.

A cost analysis of the device per cubic yard of concrete produced must be performed early in the project to determine the cost per cubic yard of material produced. Discussion with industry quality control individuals should also be performed under a non-disclosure agreement to determine all the information that they would like to see in the ECDID.

**Summary**

**What budget do you have for project?**

**Will sponsor furnish materials or resources?**

**Please identify results you desire from team:**

- Working Prototype
- User Manual
- Proof of Concept
- Research
- Website Development
- App

**Does the project require Fabrication? Please Explain.**

No

**Will the Gonzaga machine shop be utilized?**

No

**Please describe any additional resources required for the project.**

N/A

**Any restrictions on the team? Please explain.**

**Communication Expectations: what updates and reports do you want?**

CPM Schedule should be developed for the project along with a work breakdown structure that would interface the various computer science and engineering disciplines on the project. We would be willing to meet with the project teams weekly if required.

**How frequently can liaison meet with students?**
Sponsor will meet with team as needed.

If NDA (nondisclosure agreement) or IPA (intellectual property agreement) is necessary it must be furnished by the sponsoring company. Do you anticipate an NDA or an IPA?

Yes

STUDENT: Names of Students on Proposed Team, Disciplines & Emails

STUDENT: Identify a faculty advocate who worked with you on Project Proposal

STUDENT: Identify an external User/champion that would be appropriate to meet with your team

STUDENT: Please list any additional students you will need on your team who have not been recruited or identified as yet with the required disciplines you are seeking

STUDENT: Identify any bonus features of your project such as: entrepreneurial focus, innovative ideas, improvement of human condition, promotion of sustainability, use of state-of-the-art technologies

STUDENT: Do you anticipate any Fumes, Odors, Flammable substances or other Dangers associated with this project? If yes, please explain.

STUDENT: Any additional information you would like us to consider about your project or team?
CPSC10 I-Con Monitoring

Description

The problem is pretty straight forward, workers are getting entangled in machinery during maintenance and being killed or severely injured. This often occurs do to neglecting to replace machine guards, or to properly perform the “lock out-tagout” procedure, in the interest of saving time. The evidence of the problem comes from the agency which regulate the mining industry, namely MSHA or the mine safety and health administration. NIOSH researchers used historical MSHA data to discern that in 7 years 41 fatalities involved machinery in surface mines. Of those 41 fatalities 83% were during maintenance or cleanup. Additionally when looking at all severe accidents in surface mines the majority occurred in connection with conveyors. Our solution is to monitor machine guarding with sensors and to make that sensor information available to the foreman and to provide alarms in the event that the guards are missing, or the lockout-tagout procedure is not followed. Additionally the i-Conveyor system will replace current maintenance planning and record keeping via hard paper records by using electronic forms that are available to the worker via smartphone, tablet or computer.

Summary

This project will be done by a team of computer science students. The goal will be to design, build and test a graphical user interface (GUI) that will provide a way to present sensor data to the end user in a user-friendly way. The data or information may include equipment temperatures, status of guarding (ON/OFF), opening or closing of gates, and etc. Data will be stored in a database that is accessed in real time by the user interface.

The GUI will consist of web pages that are designed by the students using the “node-red” software. Example web pages will be provided to get the students started, based on specifics of our current field site and the sensors that will be deployed there. The students will refine the webpages aesthetically and optimize the linking of data with the GUI. This will entail improving the existing webpages (maintenance planning webpage, maintenance completion form webpage, real-time sensor data webpage) which are designed to fit with our current filed demo site. Since the next deployment of the intelligent conveyor system will require a new site-specific set of webpages, including electronic forms that would be filled out by the workers who are interacting with the actual equipment at the site (e.g. maintenance employees), the project will also include the design of additional pages that are tailored to our next field demo site.

The webpages should be interactive, thus the real time sensor will be compared to information in the database regarding the planned and completed maintenance. For example, in the event the maintenance was planned the display will show yellow where the sensor indicates the guarding has been removed, red if maintenance was not planned, and green if the guarding is present. Also, the user will receive an alarm text message (using node-red) if guarding is removed without planning.

What budget do you have for project?
approx. $1,000

Will sponsor furnish materials or resources?
Yes, as best we can.

Please identify results you desire from team:
Summary Report
Research

Does the project require Fabrication? Please Explain.
No

Will the Gonzaga machine shop be utilized?
No

Please describe any additional resources required for the project.

Smartswarm gateway, or raspberry pi for developing in node-red (if GU does not have these, we may be able to supply them)

Any restrictions on the team? Please explain.
No

Communication Expectations: what updates and reports do you want?

Communication at key points during the project with all parties is critical. It is expected the team will deliver all GU-required reports on time, and send a copy to NIOSH. Email or physical meetings will be the primary communication form (including sharing of documents), and all documents will also be stored on Edusourced.

How frequently can liaison meet with students?

Dr. David Parks will be the primary contact and will hold meetings with the students on a weekly or bi-weekly basis.

If NDA(nondisclosure agreement) or IPA (intellectual property agreement) is necessary it must be furnished by the sponsoring company. Do you anticipate an NDA or an IPA?
Maybe