

CyRIS (May14-04) Project Plan

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I. Executive Summary

Currently there is a cluster of 12 - 55in LED displays connected together to make a larger display. CyRIS, the name of this display and project, has some basic information displayed on the screens, and isn't very interesting. The display doesn't use the capabilities of the hardware and software components to the maximum peak performance. We are going to improve on this system by optimizing the interface used and include applications we customized to be used by passers-by. The design objectives we have for this project are as follows:

1. Utilize the software that is already in place, Intuiface
2. Implement several applications to be accessible to users
 - a. Campus Map
 - b. CyRide Route Tracker
 - c. Staff Directory
 - d. RSS Feeds
 - e. Hole-In-The-Wall
3. Create a interface that can be easily used by future groups
4. Make the display eye grabbing, the reason for passers-by to stop and interact

We have a planned strategy of how we are going to complete this project. The first step was to familiarize ourselves with Intuiface, the current interface running the display. By familiarizing with this interface, we are able to determine how feasible the applications we wish to implement are, and what the limitations of the interface are as well. Once we have this information we can determine if these specifications meet the needs of the applications we are going to deploy in the interface. After the application requirements and the software limitations match our specifications we can start testing and fix the bugs that come up. The final project will then be ready to be executed on the display and open to the student body.

At the moment we are in the middle of researching what the capabilities of the interface are and what our requirements are for our applications. The requirements will be based on the memory usage, the processor usage, the type of application execute being used, and the screen usage based on what is being used. The next step is to develop the applications into the interface and determine how they interact with one another. Testing and deployment will follow.

II. CyRIS Project Plan

Our goal is to create several applications to entertain and inform ISU students, to be displayed on the CyRIS system recently installed in the lobby of Coover Hall. These applications will be easily consumable in a short period of time by passers-by and will offer captivating distractions or the ability to look up useful information about the building, ECpE faculty, upcoming campus events, and the campus itself.

Our general plan for the project is to first research various methods of displaying content we have created on the screens. After this researching period, we will decide on the best implementation as a group and move forward. Ideally, we will be able to develop our own content manager program and use it to launch touch applications also hand crafted by our team. The types and realizations of sub applications will be fluid, so we can get as many completed as possible. If something comes up later in the project that we think would be a good addition, we will be able to include it.

III. Problem Statement

The current content shown on the CyRIS display is uninteresting, has input lag, and does not show off all the capabilities of the new technology. Our goal is to create applications to entertain users and to show off those capabilities, as well as to design a system to allow future project owners to create their own content for the system. These applications will be integrated into the existing system, if possible.

IV. Solution/Procedure Statement

To reach our goal of creating new and advanced content for the CyRIS system, we will take the current system and:

1. Familiarize ourselves with the existing system
 - a. Learn abilities and limitations of the existing system
 - b. Assess what apps would be feasible within the existing framework
2. Determine Application requirements
 - a. Survey Coover staff and students to find desired content
 - b. Evaluate other similar display installations for interesting content and applications to use or adapt
3. Develop new content for CyRIS
 - a. Develop a new interface that can do heavy lifting
 - b. Develop several applications in small teams of 2-3
4. Test our new content
 - a. Test in-progress applications on test system
 - b. Test completed applications on full CyRIS system
 - c. Test each application with a focus group of users
5. Deploy finished content onto the CyRIS system for daily use

V. Market Research

Potential application ideas that have been discussed by our group include the following. Some of these ideas were gathered from the department, some have been gathered from student feedback, and some have been brainstormed by our team.

1. Hole in the Wall
 - a. Similar to the Microsoft Surface Lagoon
 - b. Will differ by the fact that it will be using a live feed video that will need to have these surface effects added.
 - c. Could possibly include motion sensing that will change the orientation of the camera.
2. Cyrus Bus Schedule
 - a. Similar to Cyroid transit
 - b. Differences include getting a bus schedule between points on a map to find the best route for you to take given current data
 - c. Will not use the restrictive google maps, instead will function openMaps
3. Multitouch Content Manager
 - a. Currently assigned to use Intuiface which is limiting in the application development
 - b. Current implementations do not involve having multiple primary applications so that input can be directed to the application based on where you are in the screen
 - c. MT4j is an open source multitouch library for java to accomplish much of the project
4. Interactive campus map
 - a. Want to provide information targeted at students
 - i. Building resources (labs, printers)
 - ii. Classroom locations
 - iii. Campus cafes
 - b. Want to be more than just a draggable pdf
5. Staff directory
 - a. Possible integration with campus map on building select
 - b. Should be automatically updated as the online staff directory is updated
6. Departmental feeds
 - a. Alert users to upcoming events and departmental news
 - b. Provide advertising for ECpE events, deadlines, etc.

VI. Intended Use and Users

1. Intended Use
 - a. The system will be used to to display information relevant to the university
 - b. The system will be used to display entertaining content, such as news channels, sports games, and interactive entertainment applications
2. Intended Users
 - a. Coover Staff
 - i. View brief, entertaining content going to/from classrooms and offices
 - ii. Read news about campus events, weather, announcements, etc.
 - b. Prospective Students and Families
 - i. View campus maps and information about the university
 - ii. Be attracted to the ECpE department
 - c. University Students
 - i. Read news about campus events, weather, announcements, etc.
 - ii. View brief, entertaining content going to/from classrooms
 - iii. View campus maps and bus routes
 - iv. Find places on campus and in buildings using the map

VII. Assumptions and Limitations

1. Assumptions
 - a. Display panels can accurately display content without significant lag
 - b. Server
 - i. The computer connected to the displays has enough power to send high resolution signals to the CyRIS monitors without the loss of signal quality or the loss of frames.
 - ii. The computer connected to the displays is connected to the Internet as well as to the campus intranet.
 - c. Test device will accurately represent the CyRIS system that the final content will be deployed on.
 - d. Multi-touch system can accurately track 32 distinct “fingers”
2. Limitations
 - a. Any network communications with the Internet or campus intranet will be limited by the driving computer's network connection, which may possibly introduce uncontrollable latency
 - b. Any attached video cameras' resolutions will limit the resolution of video displayed on the CyRIS screens.

VIII. Expected End Product

The final product for the CyRIS software project will be a number of software applications, able to be used by any person passing through the building. One important aspect of the end product is a robust system capable of displaying content on a deeper level than currently possible- instead of displaying a map as a static image, it should be interactive.

IX. Deliverables

These deliverables are not finalized and currently very loosely defined. They are subject to change after discussion with the client, and feedback from potential users.

1. Final choice of interface
 - a. Continue using Intuiface software
 - b. Develop our own launcher
2. Staff Directory Application
 - a. Display staff photos
 - b. Display staff offices
 - c. Display staff courses and their office hours
 - d. Display staff contact information
 - e. Automatically updated as the staff directory changes
3. Interactive Map
 - a. Display best routes between Coover and other locations
 - i. User can choose the type of route to suggest
 - ii. Map will notify user if a faster route exists
 - b. Display Coover Building maps
 - i. Display room schedules
 - ii. Display best routes through Coover
 - c. Display campus bus route information
 - i. Time tables, route maps
 - ii. Integration with CyRide NEXT BUS
4. Camera-based Entertainment Application
5. RSS Feed Displays
 - a. Show recent RSS items from various feeds
 - b. Data will crawl across the bottom of the screen during usage of other apps

X. Proposed Approach

1. Consideration of current platform
2. Gather requirements for each application we plan to implement
3. Develop applications
4. Test applications in a scaled down environment
5. Deliver tested applications and gauge user interest

XI. Project Tracking Procedures

To keep team members updated on the progress of the project, a meeting will be scheduled regularly each week. This meeting will be held Wednesday at noon in 2222 Coover. Team members will meet with their adviser, and frequently the client, to discuss the status of the project and weekly goals. Other meetings between team members will be held as-needed to discuss problems or ideas that need to be addressed, and are outside the scope of the weekly meetings.

In addition to weekly meetings, the team will submit weekly reports. These reports will record the progress made during the previous week, as well the number of hours each team member worked on the project. The weekly report will be stored as a Google Document to allow easy collaboration, so that each member can record their own progress.

XII. Statement of Work

1. Overall Design
 - a. Understand current system capabilities
 - i. Understand the capabilities of the Intuiface content management system
 - ii. Understand the capabilities of the multi-touch interface
 - iii. Determine the best way to run custom interactive content from Intuiface
 - b. Determine new capabilities that should be added to CyRIS
 - i. Conduct survey to determine desired functionality
 - ii. Determine feasibility of desired functionality
 - iii. Select functionalities to implement
 - c. Develop new software to be run on CyRIS
 - i. Gather requirements for new software
 - ii. Design the software architecture
 - iii. Implement software design
 - iv. Test the software
 - v. Integrate parts of the software
 - vi. Document the software
 - d. Test & integrate developed software with CyRIS
 - i. Ensure that the software functions as desired on CyRIS
 - ii. Integrate software into the current CyRIS environment
2. Staff Directory Design
 - a. Understand currently available external systems
 - i. Explore current web-based staff directory
 - ii. iExplore any other systems that could be useful
 - b. Design content organization
 - i. Determine content to be included
 - ii. Determine content that may be desired in the future
 - iii. Design a way to collect/store that content
 - c. Design update mechanism
 - i. Allow addition of individual, group, and all-staff content
 - ii. Allow removal of individual, group, and all-staff content
 - iii. Allow modification of existing individual, group, and all-staff content
3. Interactive Map Design
 - a. Explore possible available external systems
 - i. Explore map display solutions
 - ii. Explore current room schedule information availability
 - iii. Determine useful ways to define a location
 - iv. Understand possible routing concepts or solutions
 - v. Explore and understand current CyRide mapping capabilities
 - b. Develop path routing algorithm
 - i. Design pedestrian routing algorithm
 - ii. Design car routing algorithm

- iii. Design CyRide routing algorithm
 - iv. Integrate routing algorithms to allow a combination of transport. methods
 - c. Design interactive maps for Coover Hall
 - i. Design information gathering system(s)
 - ii. Design information display methods
 - d. Design CyRide interactive map
 - i. Design method for collecting route/stop/bus information from CyRide
 - ii. Design method for user to get desired route information
- 4. Camera-based Entertainment Application
 - a. Explore possible applications and implementation methods
 - i. Explore “hole in the wall” idea (adjust video image based on user location)
 - ii. Explore “mirror” idea (use video camera to create a “mirror”)
 - b. Design camera system
 - i. Enable cameras to react to control signals
 - ii. Enable user-tracking
 - c. Design user location tracking
 - i. Track user location using camera
 - ii. Use user-tracking to adjust camera(s)
- 5. RSS Feed Display
 - a. Design interaction with external services
 - i. Facebook integration
 - ii. Twitter integration
 - iii. RSS integration

XIII. Estimated Resource Requirements

Item	Estimated price
Intuilab Enterprise Edition License	\$1908/year
HD Camera for potential camera-based applications	
Logitech HD Pro Webcam C910	\$144
Microsoft LifeCam Cinema	\$69
Kinect	\$99
Flea3	\$675

Green = All
 Red = Subteam 1
 Blue = Subteam 2

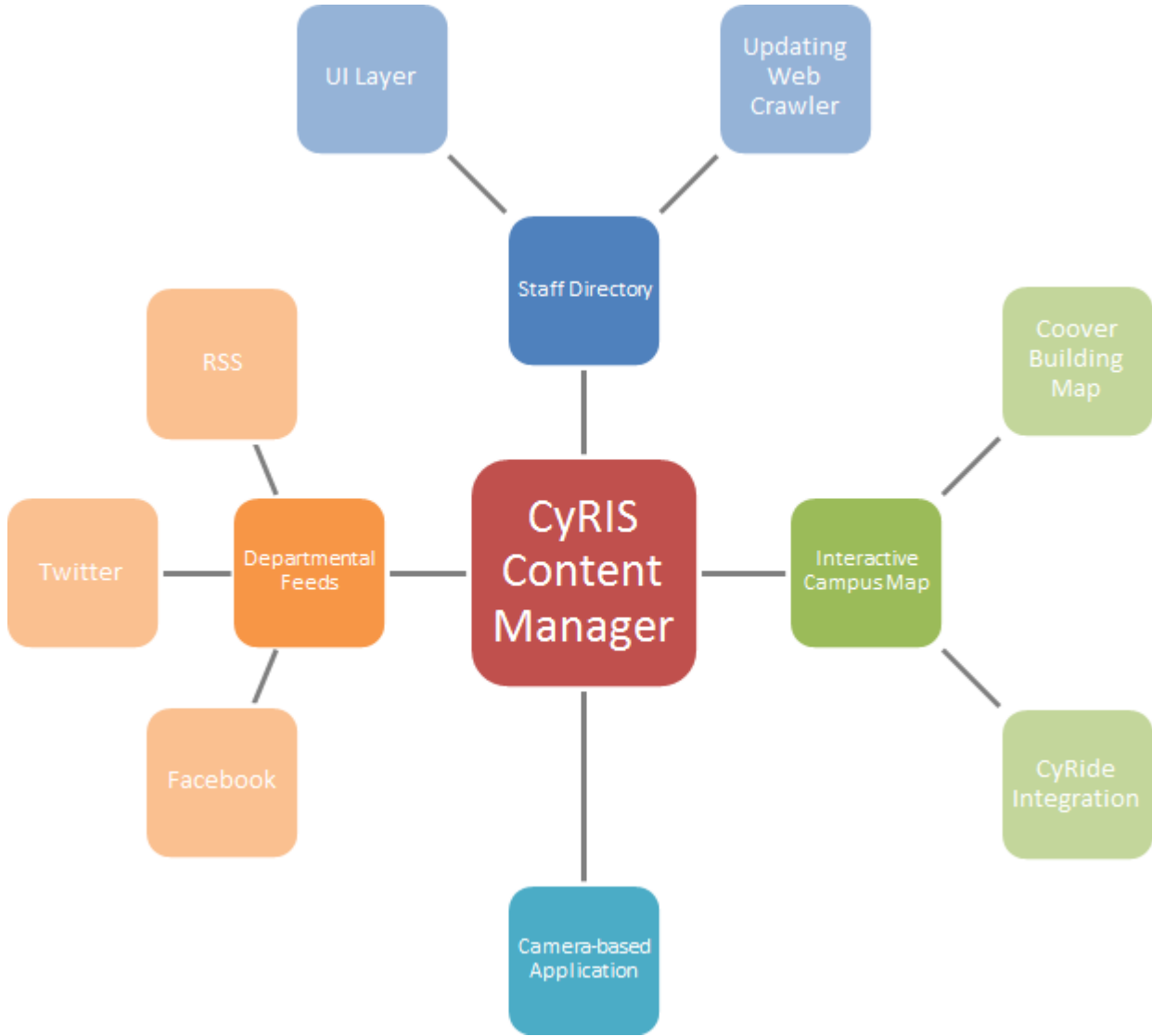
Start date: 10 / 21 / 2013

Project: CyRIS Senior Design

XIV. Timeline

Tasks	Weeks	10/21 to 10/28	10/28 to 11/04	11/04 to 11/11	11/11 to 11/18	11/18 to 11/25	12/02 to 12/09	12/09 to 12/16	12/16 to 12/23	01/13 to 01/20	01/20 to 01/27	02/03 to 02/10	02/10 to 02/17	02/17 to 02/24	03/03 to 03/10	03/10 to 03/17	03/17 to 03/24	03/24 to 03/31	04/07 to 04/14	04/14 to 04/21	04/21 to 04/28	04/28 to 05/05
Create specification documents		Green																				
Finalize interface choice			Green																			
Build new interface/modify existing interface				Red	Red	Red																
Create staff directory app				Blue	Blue	Blue																
Test the system																						
Present deliverables for semester 1																						
Create interactive maps app																						
Create Twitter/RSS feed app																						
Create CyRide app																						
Integrate maps and CyRide apps																						
Test integrated maps app																						
Create camera-based app																						
Integration testing with all apps																						
Stress testing																						
Prepare final report																						
Present final set of deliverables																						
Tasks	Weeks	10/21 to 10/28	10/28 to 11/04	11/04 to 11/11	11/11 to 11/18	11/18 to 11/25	12/02 to 12/09	12/09 to 12/16	12/16 to 12/23	01/13 to 01/20	01/20 to 01/27	02/03 to 02/10	02/10 to 02/17	02/17 to 02/24	03/03 to 03/10	03/10 to 03/17	03/17 to 03/24	03/24 to 03/31	04/07 to 04/14	04/14 to 04/21	04/21 to 04/28	04/28 to 05/05

XV. Conceptual Diagram



XVI. Requirements

Application	Functional Requirements	Non-Functional Requirements
Feeds	<ol style="list-style-type: none"> 1. Feed will be populated by social updates approved by admin 2. Feed updates from various sites will be combined in one feed 3. User will be able to scroll through updates 4. Feed will automatically crawl while user using another app 5. Touching feed will pause automatic scrolling 6. Photos and links embedded in feed updates will be displayed 7. User will be able to click on a link 8. Clicked links will open in a new window 	<ol style="list-style-type: none"> 1. The use of this app will be straightforward (the user should understand how to use it almost immediately) 2. The automatic crawling feature will crawl at a speed that provides a pleasing user experience 3. The app will be tested with at least ten different feed sources at one time to ensure reliability as well as client satisfaction 4. The app will be tested with the internet turned off to ensure that recent feed updates are still displayed
Content Manager	<ol style="list-style-type: none"> 1. Able to generate our apps inside of itself 2. Have multiple apps simultaneously accessing I/O 3. Give no access to the windows taskbar 4. Allow for return to interface 	<ol style="list-style-type: none"> 1. Generate no memory leaks 2. Minimize lag between touch screen inputs and response of the manager
Campus Map	<ol style="list-style-type: none"> 1. The map will display campus map 2. Map will be able to be panned, zoomed, and navigated 3. Building sub-maps will be displayed when building on campus is selected 4. Professor and office hours will be displayed when professor's office is clicked 5. Classroom schedules available when searching 	<ol style="list-style-type: none"> 1. Lag is minimized between the user touch controls to the map output on the screen 2. Map should be graphically pleasing to the eye of the passer-bys 3. OpenStreetMap API to be downloaded and saved as a local copy to insure no internet network problems will cause problems with usage

	<p>rooms</p> <ol style="list-style-type: none"> Resources of each building (computers, printing, mail dropbox, vending, etc) Full-Screen and scalable when needed 	
CyRide Map	<ol style="list-style-type: none"> The map will show all currently-operating CyRide routes The map will show all currently-operating CyRide bus locations & the route of each bus The map will show all currently-operating CyRide bus stops A user should be able to select a starting point, a destination point, and a departure/arrival time and be given a path to get from the starting point to the destination using CyRide The map should show predictions for bus arrival for the stops nearest Coover Hall The map will include a disclaimer stating that this project is not affiliated with CyRide Data updates must remain within NextBus's data transfer limits 	<ol style="list-style-type: none"> The map should be up-to-date The map should be resistant to service disruptions (network outage, NextBus API outage) The map should be responsive to user input The map should generate a path from starting point to destination point quickly Each bus route should be distinguishable from other routes (not overlapping, not super skinny lines)
Camera Application	<ol style="list-style-type: none"> The application shall stream video taken from a webcam or other camera feed on campus 	<ol style="list-style-type: none"> Streamed video will be transformable by the user with various effects
Staff Directory	<ol style="list-style-type: none"> Directory will be populated/ updated from the university website Touching names will display detailed information based of that person as a popup. 	<ol style="list-style-type: none"> The directory shall show members of the engineering department Information shall include name, photo, courses, position, office location, corresponding major, phone number, and email.

XVII. Use Cases

Feeds

ID: UC-1

Title: View feed.

Description: User views the feed updates ordered by most recent first.

Primary Actor: Student, Visitor

Preconditions:

1. App has been opened in Intuiface

Main Success Scenario:

1. User can scroll through feed updates
2. Feed crawls while user is using other apps at the bottom of the screen
3. Images and links are displayed in feed updates
4. Feed closes after period of inactivity

ID: UC-2

Title: Click link within feed.

Description: User clicks a link within a feed update.

Primary Actor: Student, Visitor

Preconditions:

1. App has been opened in Intuiface

Main Success Scenario:

1. User can click link in feed updates
2. Link opens in another window in Intuiface
3. New window closes after period of inactivity

Campus Map

ID: UC-1

Title: View Map Overview

Description: User views map of campus when first loading the application.

Primary Actor: Student, Visitor, Staff

Preconditions:

1. Application has been opened in Intuiface

Main Success Scenario:

1. User can pan through the different sections of the map
2. User can select a building on campus
3. Zoom in and out of the Map screen
4. Multi-Touch to allow various navigation abilities (i.e. pinch-to-zoom)
5. Map closes after inactivity period

ID: UC-2

Title: Building Information Selection

Description: When the user selects a building, additional information is displayed.

Primary Actor: Student, Visitor, Staff

Preconditions:

1. Application has been opened in Intuiface

Main Success Scenario:

1. User can select a building to display open building hours
2. Other displayed information is professors that have offices in that building, what resources that are available in that building, and classroom schedules.
3. Building sub-map is displayed that displays the layout of the rooms on each floor of the building
4. Access cameras in the classroom that are available (ones that are publicly available)
5. Returns to main map screen after time of inactivity

CyRide Map

ID: UC-1

Title: Update All CyRide Map Data

Description: At certain intervals, the map is updated with route information and bus stop information

Primary Actor: Time, NextBus API

Preconditions:

1. Application is open in Intuiface

Main Success Scenario:

1. The application sends request to NextBus API for route and bus stop information
2. The application clears out old route and bus stop information
3. The application redraws new route and new bus stops

Exceptions:

1. Route/bus stop information is not available from NextBus
2. A large portion of the new route information/bus stop information is different from the old route information

ID: UC-2

Title: Update CyRide Bus Location information

Description: At certain intervals, the map is updated with bus location information

Primary Actor: Time, NextBus API

Preconditions:

1. Application is open in Intuiface

Main Success Scenario:

1. The applications sends request to NextBus API for bus location information
2. The application clears out old bus location information
3. The application redraws new bus locations

Exceptions:

1. Location information is not available from NextBus
 - a. Try to get information again
 - b. Keep old information for a short amount of time
 - c. Remove bus location information after a few unsuccessful retries

2. Current bus location information is old
 - a. Indicate information is old for a short amount of time
 - b. Remove information after a longer amount of time

ID: UC-3

Title: Show nearby bus departure times

Description: At certain intervals, a display is updated with upcoming departure times for a nearby bus stop(s)

Primary Actor: Time, NextBus API

Preconditions:

1. Application is open in Intuiface

Main Success Scenario:

1. The application sends request to NextBus API for predicted bus departure times for a nearby bus stop(s)
2. The application clears out old prediction information
3. The application adds & displays new prediction information

Exceptions:

1. Predicted bus departure times are not available from NextBus
 - a. Try to get information again
 - b. Remove expired information but keep other old information for a short amount of time

ID: UC-4

Title: Finding a path from a starting location to a destination point

Description: User selects 2 points within the city of Ames and the application finds a path using CyRide to get from one point to the other

Primary Actor: User

Preconditions:

1. Route information from NextBus is stored within the application
2. Transfer point information is stored within the application

Main Success Scenario:

1. User selects a start point and an end point
2. The application selects the bus stop nearest the start point and the bus stop nearest the end point
3. If the 2 bus stops are on the same route, the application stores this route as the path. If the 2 bus stops are on different routes, the application tries to find a common transfer point and

Exceptions:

Camera Application

ID: UC-1

Title: View a camera feed

Description: The user uses CyRIS to view a live feed from a camera. This camera may be functioning as a hole-in-the-wall five feet from the display or may be across campus.

Primary Actor: Student

Preconditions:

1. CyRIS has a connection to a camera or can get one

Main Success Scenario:

1. The feed is displayed on screen in a draggable window
2. Users can see live footage without lag

Exceptions:

1. The feed becomes laggy

ID: UC-2

Title: Facial recognition of passers-by

Description: CyRIS watches people who walk through the doors and greets those who it can recognize

Primary Actor: Anybody walking through Coover's east entrance

Preconditions:

1. CyRIS is in an idle state waiting for visitors to recognize

Main Success Scenario:

1. CyRIS notices a user entering the door
2. CyRIS executes facial recognition algorithms on the user's face frames
3. CyRIS displays a greeting message personalized to the user

Exceptions:

1. CyRIS cannot recognize the user
 - a. No greeting message is displayed or
 - b. An impersonal greeting message is displayed

Staff Directory

ID: UC-1

Title: View Directory

Description: When user selects staff directory, and overview of all names associated with that department (Engineering) are displayed.

Primary Actor: Student, Visitor, Staff

Preconditions:

1. Application has been opened in Intuiface

Main Success Scenario

1. User can view information on which staff are in that department (Engineering).

ID: UC-2

Title: View Staff Information

Description: When user selects staff directory member, a detailed popup displays the information pertaining to that person.

Primary Actor: Student, Visitor, Staff

Preconditions:

1. Application has been opened in Intuiface

Main Success Scenario

1. User selects a staff directory member's name and a popup displays showing that person's name, photo, courses, position, office location, corresponding major, phone number, and email.

XVIII. Risks and Mitigations

Risk	Probability	Criticality	Risk	Mitigation
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	of occurrence		factor	
<p>Hardware is not able to support new software to desired scale.</p> <p>While the current video cards can support basic functionality we are unsure if our added features can be sustained.</p>	0.2	85	17	We plan on stress testing our software to optimize it as much as possible. If needed we may scale down widgets where performance is an issue (ie. use fewer screens). Since we are ultimately limited by the hardware we recommend that the university upgrades its hardware components as necessary.
Live streaming video from classrooms or other areas across campus becomes laggy or unwatchable	0.40	35	14	No widget on the home screen interface is a permanent fixture. If a certain stream gets laggy we can either switch to another stream or replace the widget with another. If we can't implement live streaming without lag, this widget will be removed entirely.
We do not find a way to test our application before deployment on production hardware	0.3	40	12	We plan on obtaining a smaller scale version of the wall screen (ie. an extra TV screen) to test our application. If we can not acquire an extra TV screen we will test using a single screen in the production environment.
Screen or other hardware components break from mistreatment or continuous use	0.05	70	3.5	Part of our budget will be allocated to mitigate this risk. The money will be used to buy replacement parts if necessary. If possible we recommend that the university buy a protective barrier for the screen.
Computer operating system changes from Windows 7 to Windows 8	0.05	90	4.5	There is no way to mitigate this risk- our current setup will not work on Windows 8. We will communicate this to our advisors and make sure they understand the risk.

XIX. Security, Privacy, and Technology Considerations

The CyRIS project has many security and technology considerations we have to keep in mind while designing our applications and interface. As users come and go, they will use the display to do various tasks and run the applications we have set on the display. As a security measure, we do not want users accessing features not intended for use.

In the CyRIS project, users are not to be able to access the windows toolbar on the bottom of the screen. The reason we don't want anyone accessing this, is because we want to limit the user to only the specified applications in the interface. The interface is used to allow users to run the applications set inside, and avoid users from accessing additional functionalities. If we allowed the access of the toolbar, users would be able to view and edit the system settings, this would lead to corrupting the interface and display. Also, restricting the toolbar from users will eliminate the need to reset settings when they have been tampered with throughout the day.

Another security issue that needs to be addressed is application specific. Certain applications have certain features, in general, any application that includes links to web pages needs to be disabled. We are striving to limit the use of the display to the applications installed on the interface and nothing more than that. This will keep users from accessing restricted content via various web pages. Also, if any of the applications on CyRIS use an On-Screen keyboard, we need to disable the hotkeys setup. Hotkeys help the user use functions on a computer faster than manually clicking through menus. Some of these function we don't want the user to have access to.

While working with CyRIS, we have several technology considerations as well. One of the main technology considerations is the multi-touch display. The display must be able to handle multiple users, using multiple instances of applications at the same time. We have found a multi-touch interface that can handle multiple instances at one time.

The screen resolution and the server's output to the display are important factors to our project. With the hardware installed currently, we are unable to display a full-screen video on the display since the resolution of the display is much higher that can be outputted from the server. The camera application specifications that we are developing, will greatly depend on this factor. If the resolution of the output to the screen isn't high enough, the effect of the "Hole-In-The-Wall" will not be as impressive.

XX. Tasks and Responsibilities

Team member	Responsibilities
Nathan Clague	CyRide NextBus API expert
Michael Krantz	Staff directory lead
Zach Patzwald	Content deployment manager, MT4J expert
Max Philips	Project coordinator, document manager
Jake Roman	Communications specialist, OpenMaps API expert
Micah Stevenson	Facebook, Twitter, RSS feeds and Interface Asset expert
David Vriezen	Webmaster

XXI. Time Estimate

As of 12/2/2013, the time contributions of each team member are as follows.

Team member	Total time spent
Nathan Clague	15 hrs
Michael Krantz	10.5 hrs
Zach Patzwald	35 hrs
Max Philips	32 hrs
Jake Roman	38 hrs
Micah Stevenson	11.5 hrs
David Vriezen	22 hrs

XXII. Team Info

Nathan Clague
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Zach Patzwald
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Max Philips - Document Manager
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Jake Roman - Communications Specialist
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