Homework 5

Assistant for Recycling and Waste Management to Reduce Recyclables in Landfills

Noah Beach, Kevin Christensen, Emmet Cooke, Jacob Leno, Caleb Scott
CS361 Group 18 - Spring 2018

1. Contributions Summary

The work was divided among our group for HW5 as follows: Noah Beach - User Stories, Dev Env, UML/Spikes, Document compilation Kevin Christensen - User stories, Logical ordering, Implementation schedule Emmet Cooke - User Stories, Dev Env, UML/Spikes, Document compilation Jacob Leno - User stories, Logical ordering, Implementation schedule Caleb Scott - User Stories, Dev Env, UML/Spikes, Document compilation.

2. User Stories

2.1 User Story Descriptions

Story: 1
Order: 1
Predecessor: N/A
Difficulty: 3
Time Frame: 8 Hours
Due Date: First Week
As an operator I would like the ability to start and stop any of the belts in the system. I would like it if this feature was available from the user interface.

- First set up the Conveyor Motion package
- Create the Hardware IO package and give it the ability to send signals to the Conveyor Motion package so it can start and stop the motion of the belt.
- Create the User Interface package with the OperatorControls sub package
- Give the OperatorControls package buttons to start and stop belt operation

Story: 2
Order: 1
Predecessor: N/A
Difficulty: 3
Time Frame: 4 Hours
Due Date: First Week
As an operator I want the ability to turn off sorting to any of the bins from the user interface.

- First set up the Robot Kinematics package
- Create the Hardware IO package and give it the ability to send signals to the Robot Kinematics package
- Create the User Interface package with the OperatorControls sub package
- Give the OperatorControls package buttons to start and stop sorting from the robots to the bins

Story: 3
Order: 1
Predecessor: N/A
Difficulty: 2
Time Frame: 4 Hours
Due Date: First Week
As a technician I want the ability to view current alarms from a user friendly interface.

- Create the Diagnostics display package and route all alarms received from the system to variables contained in the package
- Create the User Interface package with the ability to navigate to a Diagnostic page that would give information about current alarms populated with data from the Diagnostics Display package

Story: 4
Order: 2
Predecessor: 5
Difficulty: 2
Time Frame: 10 Hours
Due Date: Second Week
As a facility supervisor I want the ability to view reports on sorting statistics for different time frames (day, week, month, etc).

- First create a database to hold RFID tags and their attributes
- Create the Reporting Display package and give it the ability to query the RFID database and display the requested information
- Create the User Interface package with the ability to navigate to a reports page populated with data from the Reporting Display package

Story: 5
Order: 1
Predecessor: N/A
Difficulty: 2
Time Frame: 8 Hours
Due Date: First Week
As an operator I want the ability to add and remove recyclable types from the database, preferably using a user friendly interface.

- First create a database to hold RFID tags and their attributes
- Create the Operator Controls package and give it the ability to query the RFID database and display the requested information
- Create the User Interface package with the ability to navigate to a database editing page populated with data from the Operator Controls package

Story: 6
Order: 2
Predecessor: 5
Difficulty: 3
Time Frame: 10 Hours
Due Date: Second Week
As a member of the public, I want to be able to view reports on sorting statistics from any web-connected PC so I don't have to go to the sorting facility to see them.

- First create a database to hold RFID tags and their attributes
- Create the Reporting Display package and give it the ability to query the RFID database
- Create a web page with space to display reports and sorting statistics based on city/county/district
- Populate the web page with data from the Reporting Display package

Story: 7
Order: 2
Predecessor: 5
Difficulty: 3
Time Frame: 10 Hours
Due Date: Second Week
As a member of the public, I want access to data showing how much of the waste through the recycling facility is tagged so that I can have data to help shape recycling policies.

- First create a database to hold RFID tags and their attributes
- Record tagged/untagged sensor data in the database
- Create the Reporting Display package and give it the ability to query the RFID database
- Create a web page with space to display reports on tagged vs untagged recyclables based on city/county/district
- Populate the web page with data from the Reporting Display package

Story: 8
Order: 1
Predecessor: N/A
Difficulty: 3
Due Date: Not Implemented
As the operator of the sorting facility, I want the sorting machine to distinguish tagged recyclables from other waste so that I can use fewer people to hand-sort.

- Create all packages pertaining sensors, conveyors, robots and the sorting gate
- Create a hardware IO package and RFID database
- Set up a server and allow it to interface and control all of these packages

Story: 9
Order: 1
Predecessor: N/A
Difficulty: 1
Due Date: Not Implemented
As a member of the public, I want an easily understood infographic detailing what materials are recyclable and examples of everyday products

- Collect information on what brands/types of products have RFID chips
- Create a website for the public about RFID recyclable sorting technology
- Publish information on the website

Story: 10
Order: 2
Predecessor: 5
Difficulty: 3
Due Date: Not Implemented
As a supervisor, I want the ability to easily track what changes have been made to the database and by whom those changes were made

- First create a database to hold RFID tags and their attributes
- Create the Operator Controls package and give it the ability to query the RFID database and display the requested information
- Create the User Interface package with the ability to navigate to a database editing page populated with data from the Operator Controls package
- Create a Login package and track logins and corresponding changes in the database
- Create the Main Display Page package with a supervisor sub page and populate it with information about changes made to the DB

Story: 11
Order: 1
Predecessor: N/A
Difficulty: ?
Due Date: Not Implemented
As an IT professional I want to be sure that all of the data is secure and that critical systems are not accessible from outside the facility

- Find network firewall vendor.
- Implement vendor firewall to block any anyone without permission from accessing critical systems

Story: 12
Order: 2
Predecessor: 8
Difficulty: 4
Due Date: Not Implemented
As a technician I want to be able to disable and depower individual stations for maintenance without shutting down the entire line

Story: 13
Order: 2
Predecessor: 3
Difficulty: 1
Due Date: Not Implemented
As a technician I want to be able to track data from actuators to be able to identify potential failures and make repairs before shutting the line down

- Create the Diagnostics display package and route all alarms received from the system to variables contained in the package
- Create the User Interface package with the ability to navigate to a Diagnostic page that would give information about current alarms populated with data from the Diagnostics Display package

Story: 14
Order: 1
Predecessor: N/A
Difficulty: 3
Time Frame: 6 Hours
Due Date: First Week
As an operator I would like a warning if any of the sorting bins are nearing capacity so it can be emptied or a replacement prepared

- Create a Load Sensor package
- Create the Hardware IO package and give it the ability to monitor data from the Load Sensors package
- Create the User Interface package and with the OperatorControls sub package
- Give the Operator Controls page of the user interface a section to display warnings and logic to display such a warning if a bin is nearing its maximum capacity

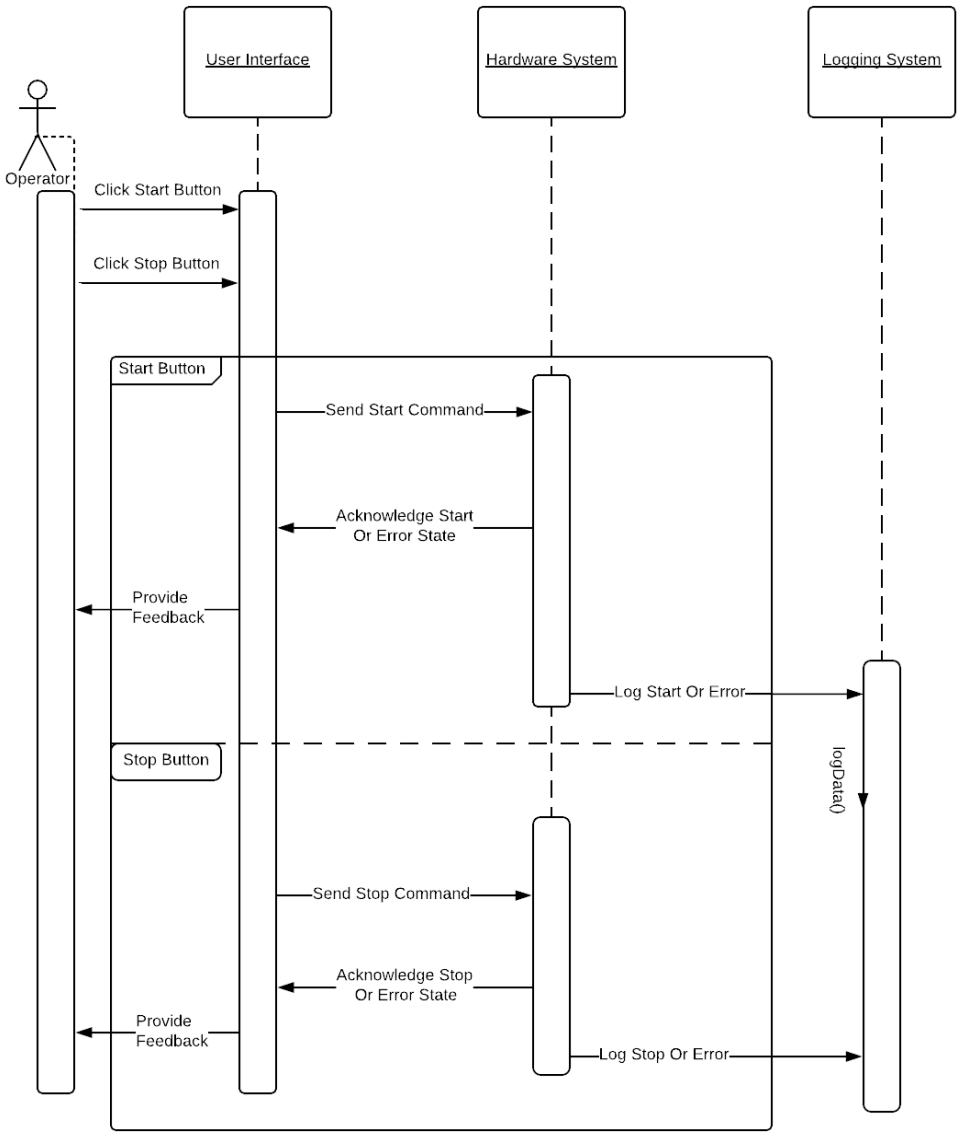
Story: 15
Order: 2
Predecessor: 2,5
Difficulty: 3
Time Frame: 7 Hours
Due Date: Second Week

As a supervisor I would like to be able to be notified when the volume of material on the conveyor reaches a certain threshold of tagged versus untagged waste so I can ensure there is enough staff on duty to handle the load

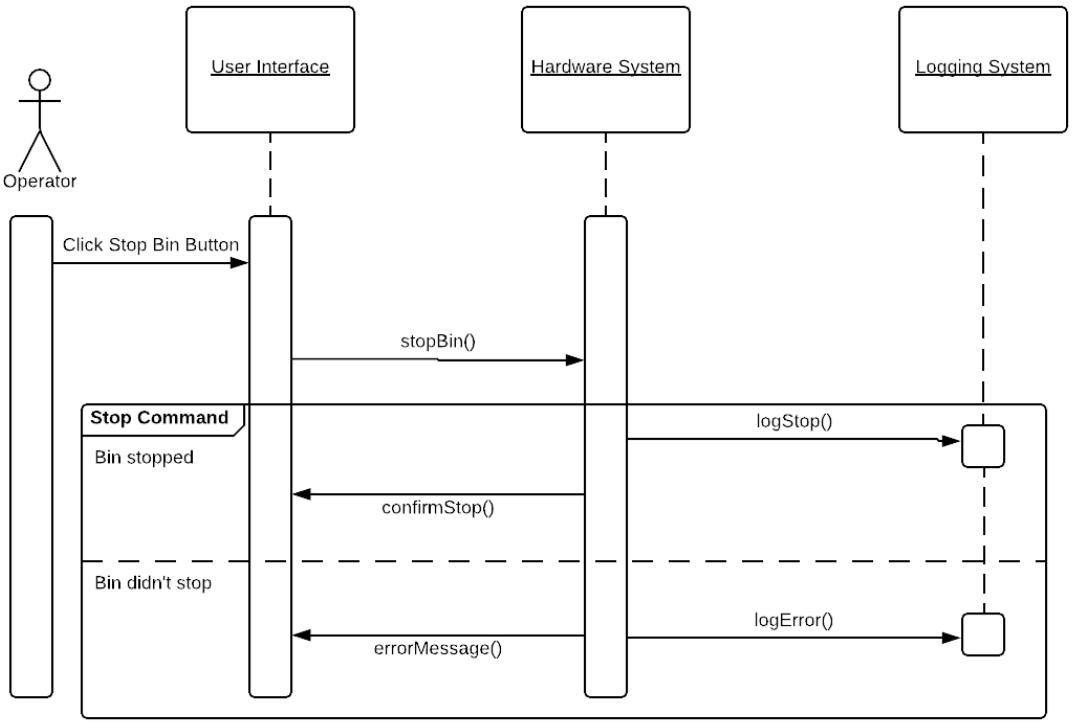
- First create a database to hold RFID tags and their attributes
- Record tagged/untagged sensor data in the database
- Create the Reporting Display package and give it the ability to query the RFID database
- Create the User Interface package and on the supervisor subpage create an alerts section
- Based on how many workers are clocked in and past data send an alert to the supervisors page to bring on more staff or slow belt movement

2.2 Week One User Story UML Sequence Diagrams

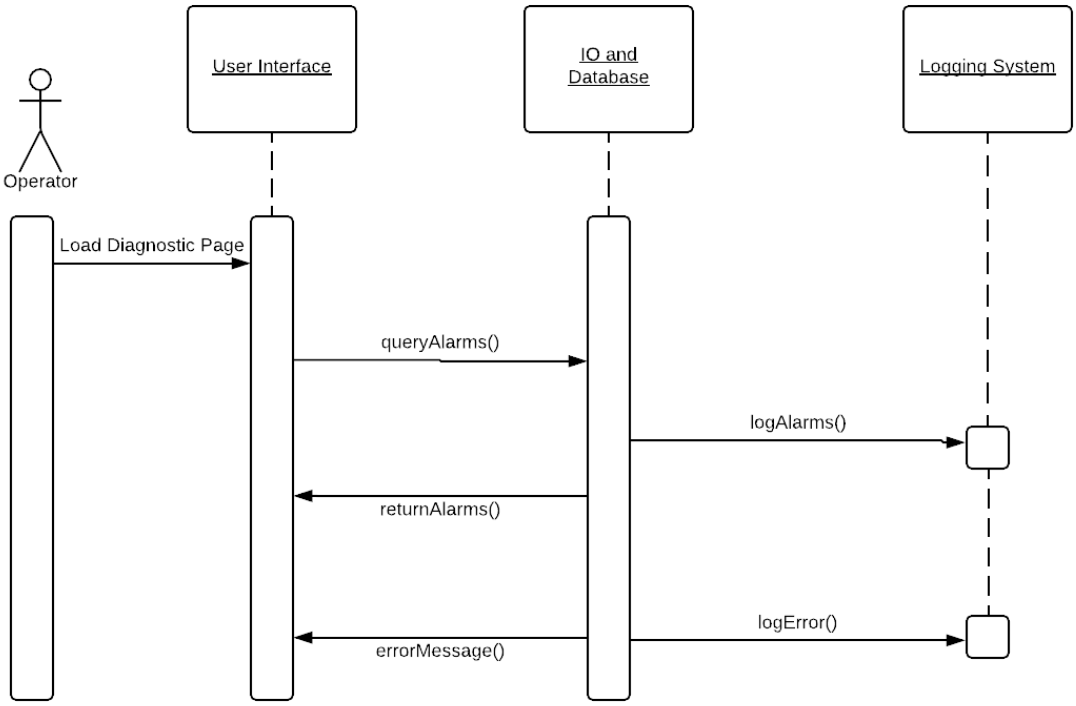
User Story 1 Sequence Diagram (Figure 2.2a)



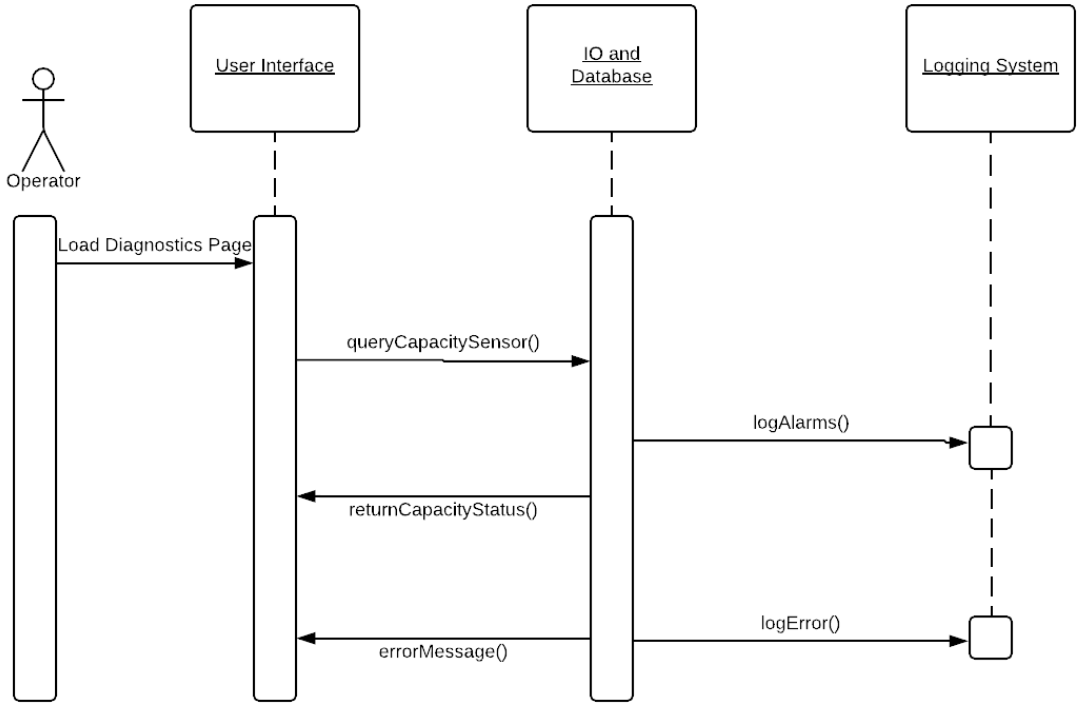
User Story 2 Sequence Diagram (Figure 2.2b)



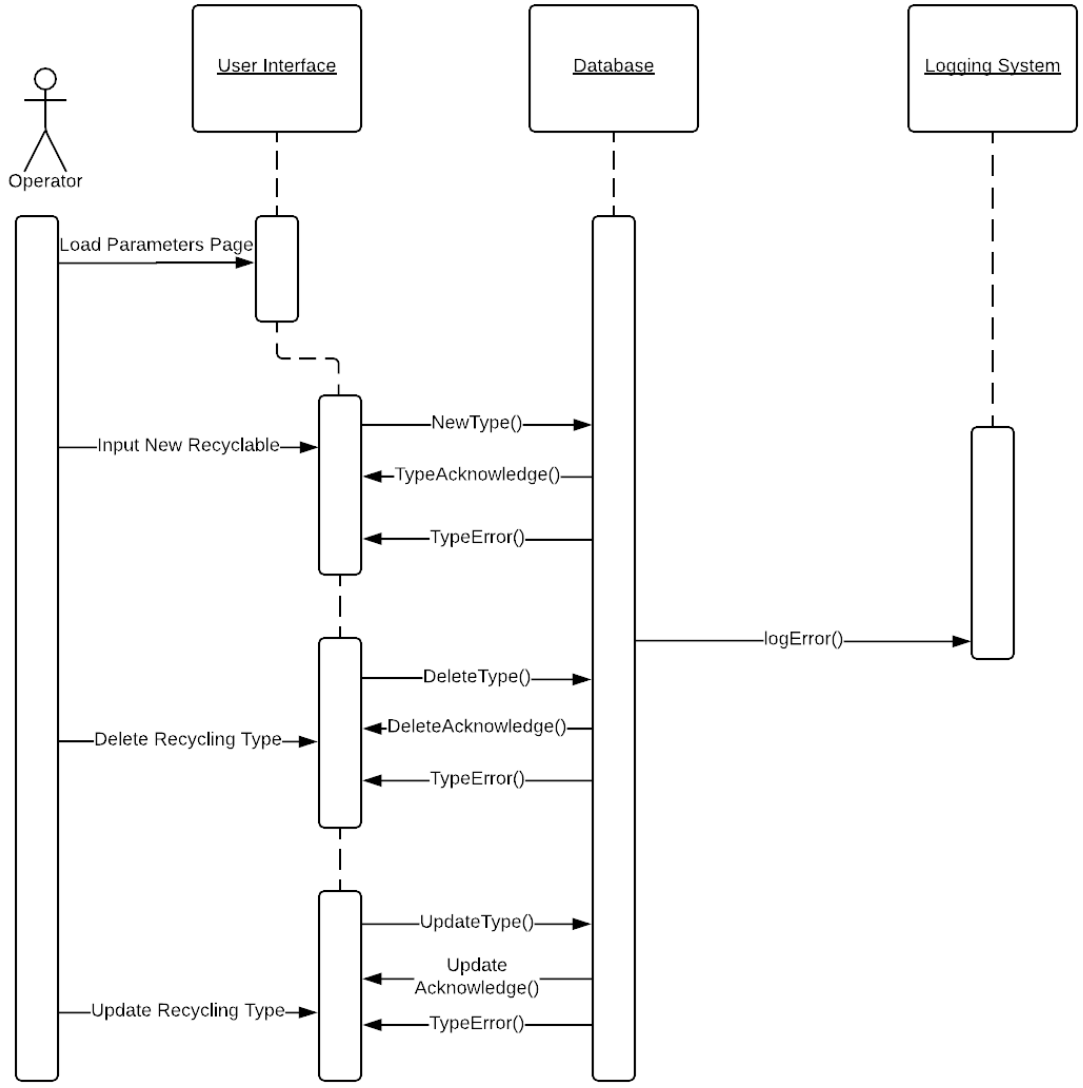
User Story 3 Sequence Diagram (Figure 2.2c)



User Story 14 Sequence Diagram (Figure 2.2d)



User Story 5 Sequence Diagram (Figure 2.2e)



3. Week One Implementation Plan

3.1 User Story Week One Work Allocation

Given that the majority of the user stories rely on the database system being implemented in order for them to function, early in the week 5/28/2018 the group will get together and design the database schema. After the database has been developed and implement, the user stories will be divided among pairs in the following scheme.

User Story One:

This user story will be pair programmed by Caleb Scott and Noah Beach. The task will be broken into the following steps:

- Setup database communication (5/28)
- Design user interface (5/29)
- Connect interface objects to simulated hardware (5/31)
- Log interface object access or error message(s) (6/1)

User Story Two:

This user story will be pair programmed by Emmet Cooke and Kevin Christensen. The task will be broken into the following steps:

- Setup database communication (5/28)
- Design user interface (5/30)
- Connect interface objects to simulated hardware (5/31)
- Log interface object access or error message(s) (6/2)

User Story Three:

This user story will be pair programmed by Jacob Leno and Noah Beach. The task will be broken into the following steps:

- Setup database communication (5/28)
- Design user interface (5/30)
- Connect interface objects to simulated hardware (5/31)
- Log interface object access or error message(s) (6/2)

User Story Five:

This user story will be pair programmed by Caleb Scott and Emmet Cooke. The task will be broken into the following steps:

- Setup database communication (5/28)
- Design user interface (5/29)
    - Design Insert Interface
    - Design Delete Interface
    - Design Update Interface
- Write SQL Queries (5/31)
    - Write Insert Query
    - Write Delete Query
    - Write Update Query
- Log interface object access or error message(s) (6/2)

User Story Fourteen:

This user story will be pair programmed by Jacob Leno and Kevin Christensen. The task will be broken into the following steps:

- Setup database communication (5/28)
- Design user interface (5/30)
- Connect interface objects to simulated hardware (5/31)
- Log interface object access or error message(s) (6/2)

4. Customer Interaction

4.1 Customer Communication and Interaction

The group reached out to the customer during the week of May 13th. The customer told the group that she would be traveling during the week of the 20th but would be available on the 24th or 25th. When we immediately tried to schedule a meeting to sit down and discuss user stories for the 24th, the customer informed us she was no longer available on that day. Since the only day available was the 25th (Friday) we decided to move forward without the customer's input this week.