University of Houston
College of Technology
Senior Project Presentation
ELET 4308/4208 Section 1
Fall 2008

Secure Remote Mail Unit and Notification System
Se.R.M.U.N.S.

Bryce Hadley, Christopher Stevenson, Kingsley Ekine
Team 10 A.K.A "TEAM EXTREME"

Advisor : Dr. Farrokh Attarzadeh

Team Members

- Bryce Hadley – Team Leader
- Kingsley Ekine - Programmer
- Christopher Stevenson – Hardware & Testing

Project Background - Problem

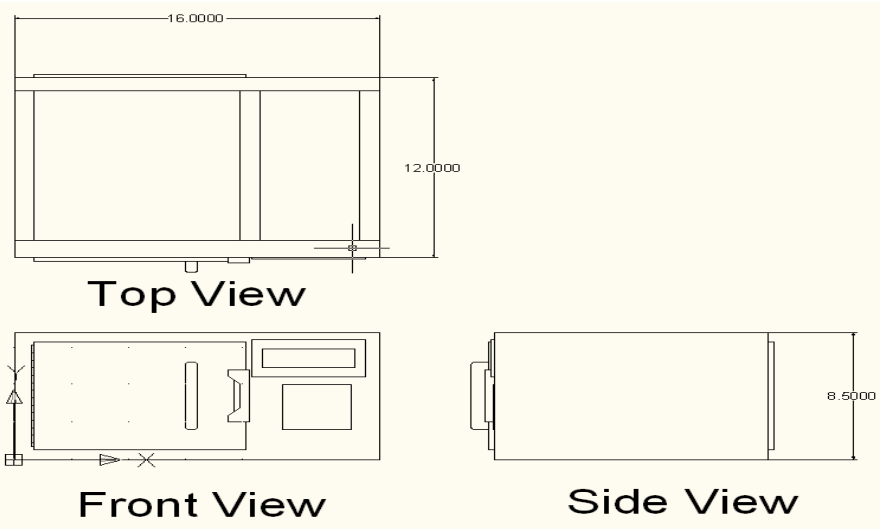
- Real world problems
  - How can someone check their mail in a remote location?
  - Can we provide a security enhanced option to a user?

Problem Background – Target Users

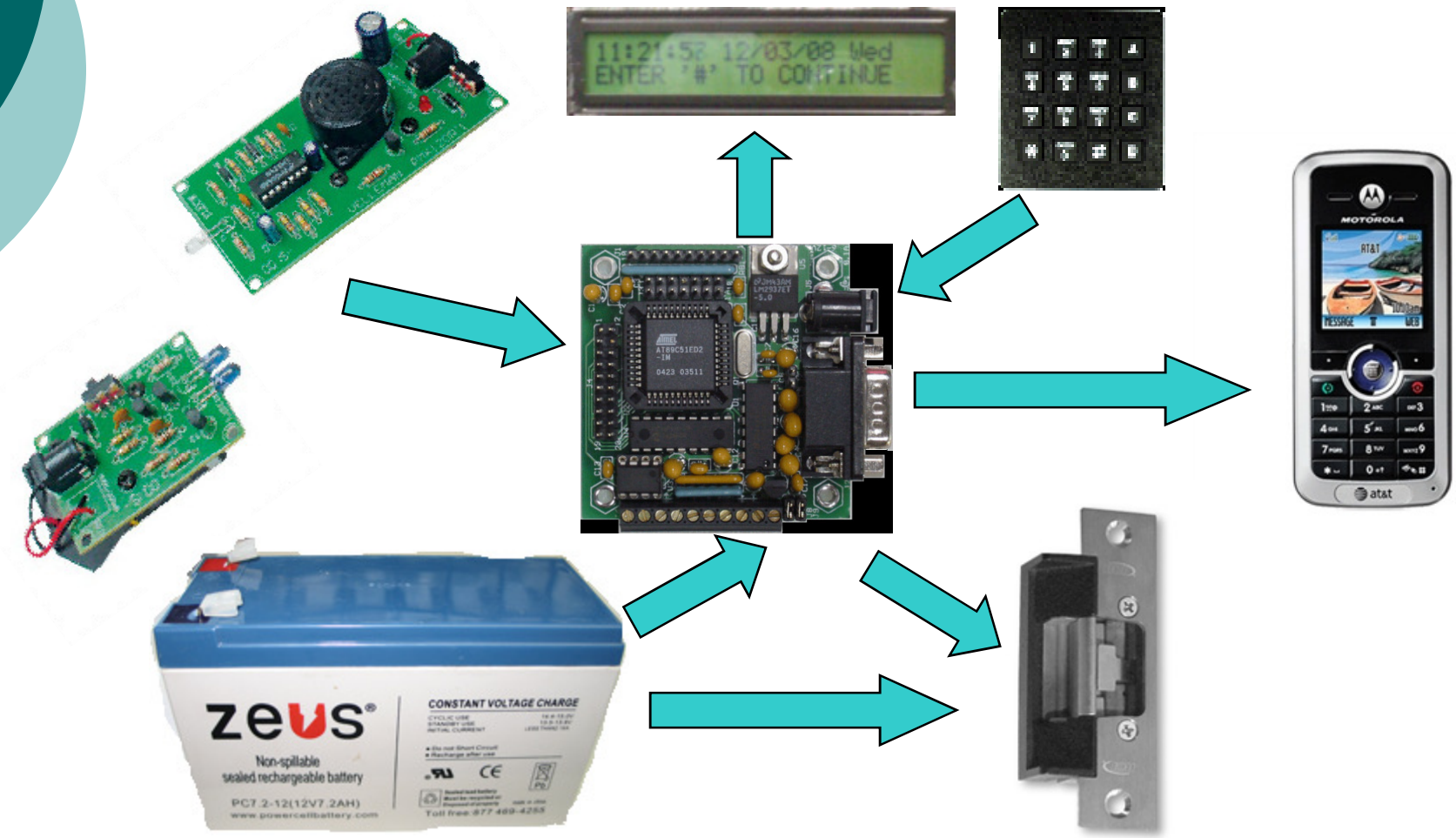
- People who want/use remote mailing
  - P.O. Box location users
  - Rural mailboxes
  - Central neighborhood mailboxes

Solution – Se.R.M.U.N.S.

- It will provide
  - Mail Identification
  - Remote Notification
  - Security Integrated Aspects



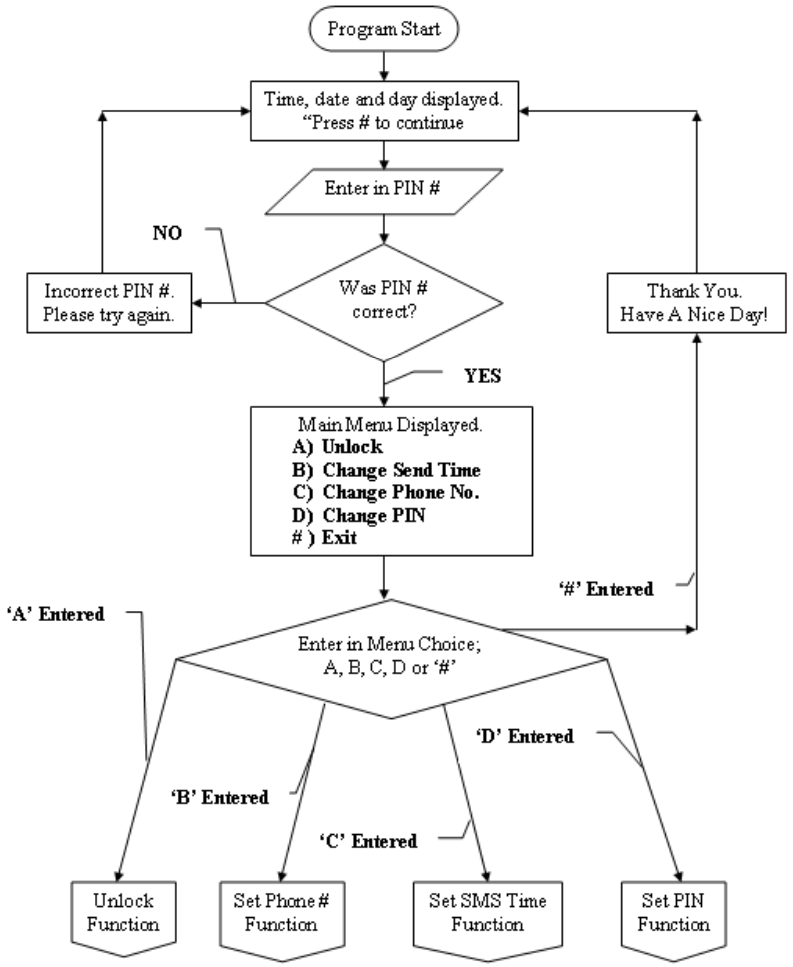
Se.R.M.U.N.S. - Hardware

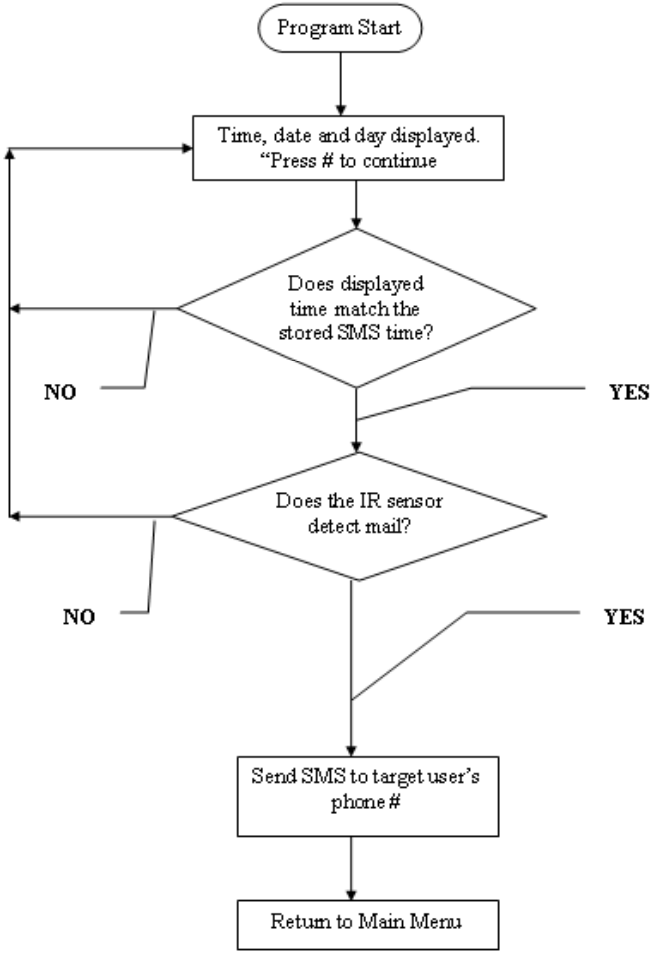


Se.R.M.U.N.S. – Project Build

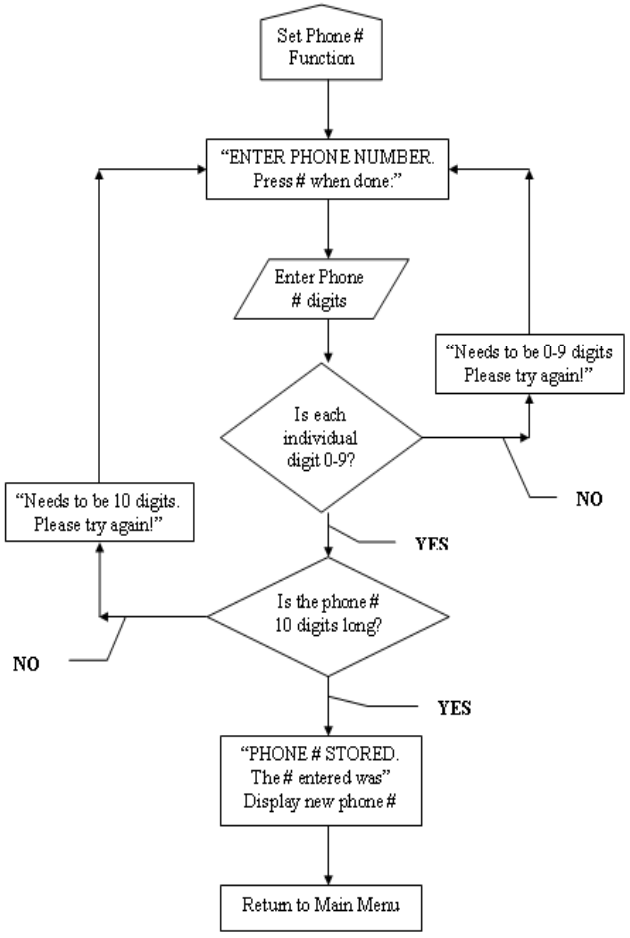
- Occurred in Phases
  - Programming
  - Electrical Circuit Construction
    - IR Light Barrier Kit
    - Relay Circuit
    - Power Source
  - Housing Construction

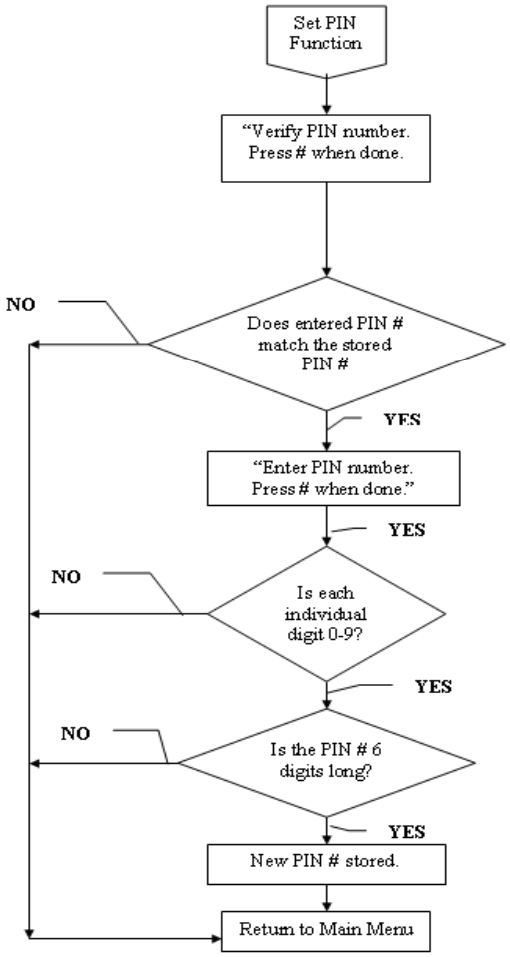
Se.R.M.U.N.S. - Software

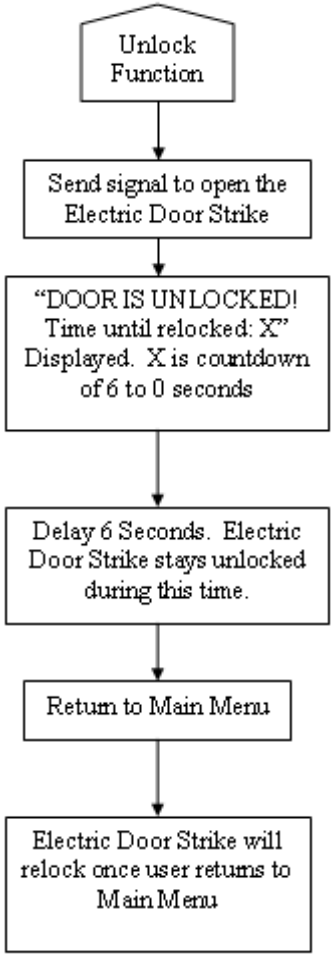




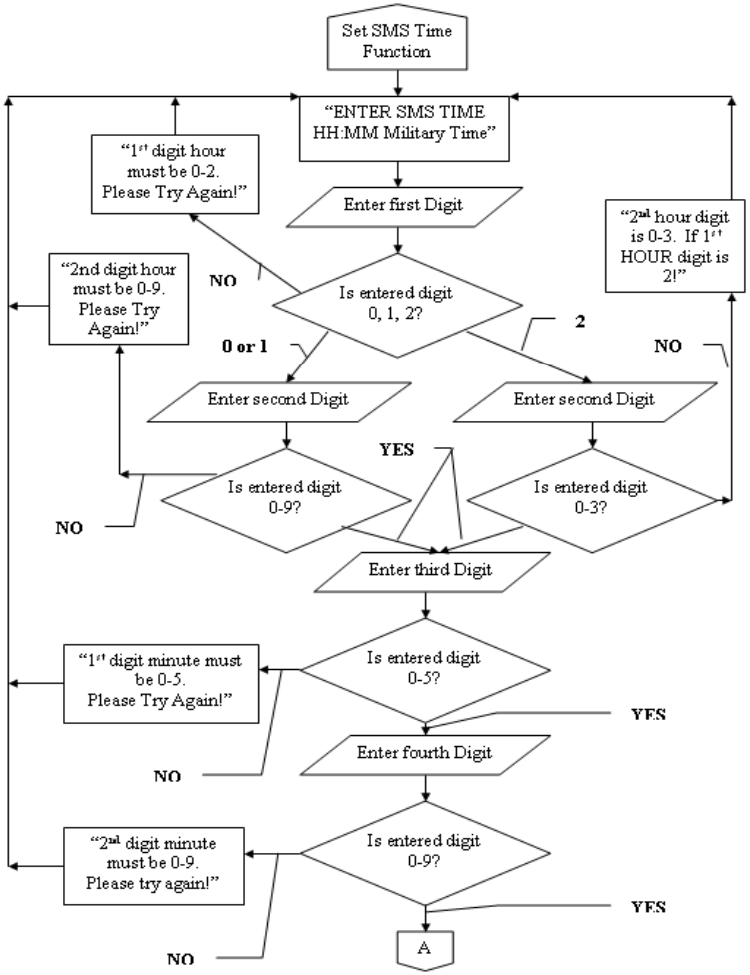
Se.R.M.U.N.S. - Software

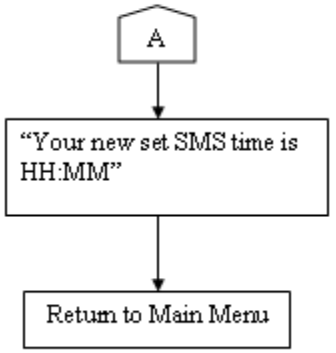




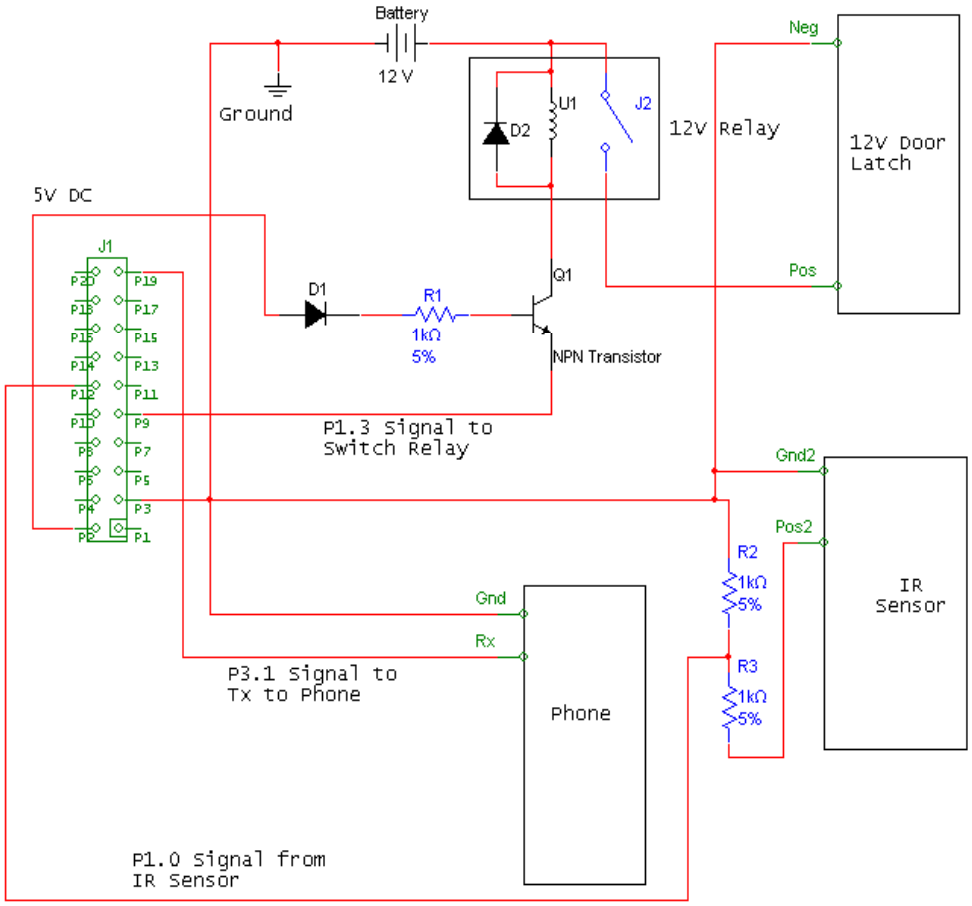


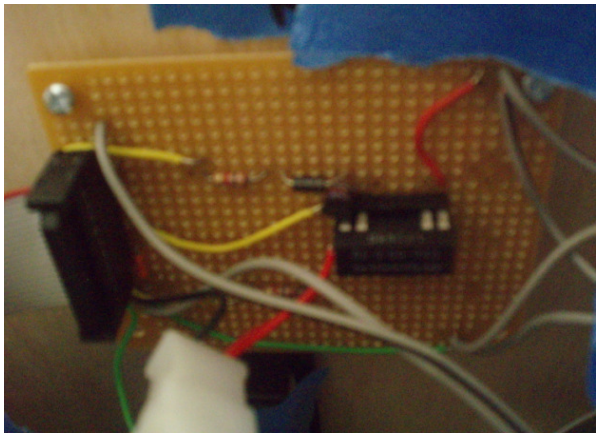
Se.R.M.U.N.S. - Software



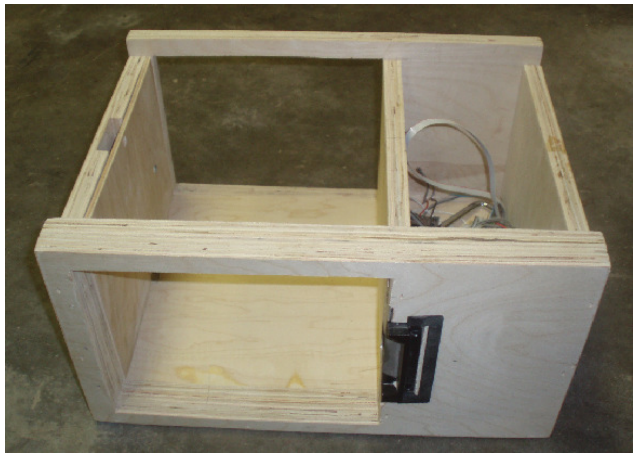


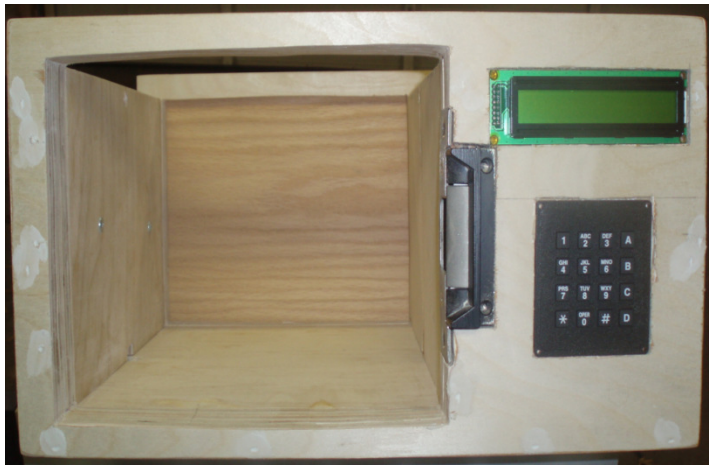
Se.R.M.U.N.S. – Circuit Construction





Se.R.M.U.N.S. – Housing Construction





Se.R.M.U.N.S. - Testing

- Programming
- Hardware
  - Circuitry
    - IR Light Sensor
    - Relay Circuit
    - Phone Connection
  - Electric Door Strike

Se.R.M.U.N.S. – Project Results

- The project worked as planned
- The project was able to
  - Detect Mail
  - Send An SMS To A Target User
  - Provide Security Measures
    - Physical
    - Logic/Programming

What Could The Team Do Differently?

- Perform More Thorough Research On
  - Hardware
  - Necessary Programming

Se.R.M.U.N.S. – Possible Changes

- More IR Light Sensors
  - Will Eliminate Dead Zones
- Metal Housing For The Unit
- Contact Sensor
- Higher Quality Components
- Solar Panel Battery Charger
- Possible RFID Integration

Se.R.M.U.N.S. - Cost

Table 1 : Purchased material cost			
Item	**Qty**	**Actual Cost**	**Final Cost**
MINI-MAX/51-C2	1	$69.00	$69.00
LCD (24x2)	1	$24.00	$24.00
Keypad (4x4)	1	$24.00	$24.00
Male to Male DB-9 Serial Cable	1	$1.95	$1.95
Motorola C168i	1	$14.87	$14.87
AT&T "Pay As You Go" Card	1	$14.94	$14.94
MMC-RTC-1	1	$49.00	$49.00
HES Electric Strike 5000	1	$69.50	$69.50
HES 501-Face Plate	1	$9.60	$9.60
IR Light Barrier Kit	1	$12.50	$12.50
20 pin IDS Female Connectors	4	$1.50	$6.00
2 ft 20 Pin Ribbon Wire	2	$0.20	$0.40
Zeus Battery - 12v 1.3Ah	1	$15.95	$15.95
R56-5D.5-12 Relay 500mA 12v	1	$7.85	$7.85
PERF Board 2 1/2 x 3 1/8"	1	$1.50	$1.50
Connector DC 2.1x5.5x9mm Plug	1	$2.00	$2.00
Relay	1	$2.95	$2.95
14 Pin Male to Male Connectors	2	$0.35	$0.70
Hardware Connector Pins	5	$0.10	$0.50
Sub Totals		N/A	$327.21
Tax (8.25%)		N/A	$9.00
Total		N/A	$336.21

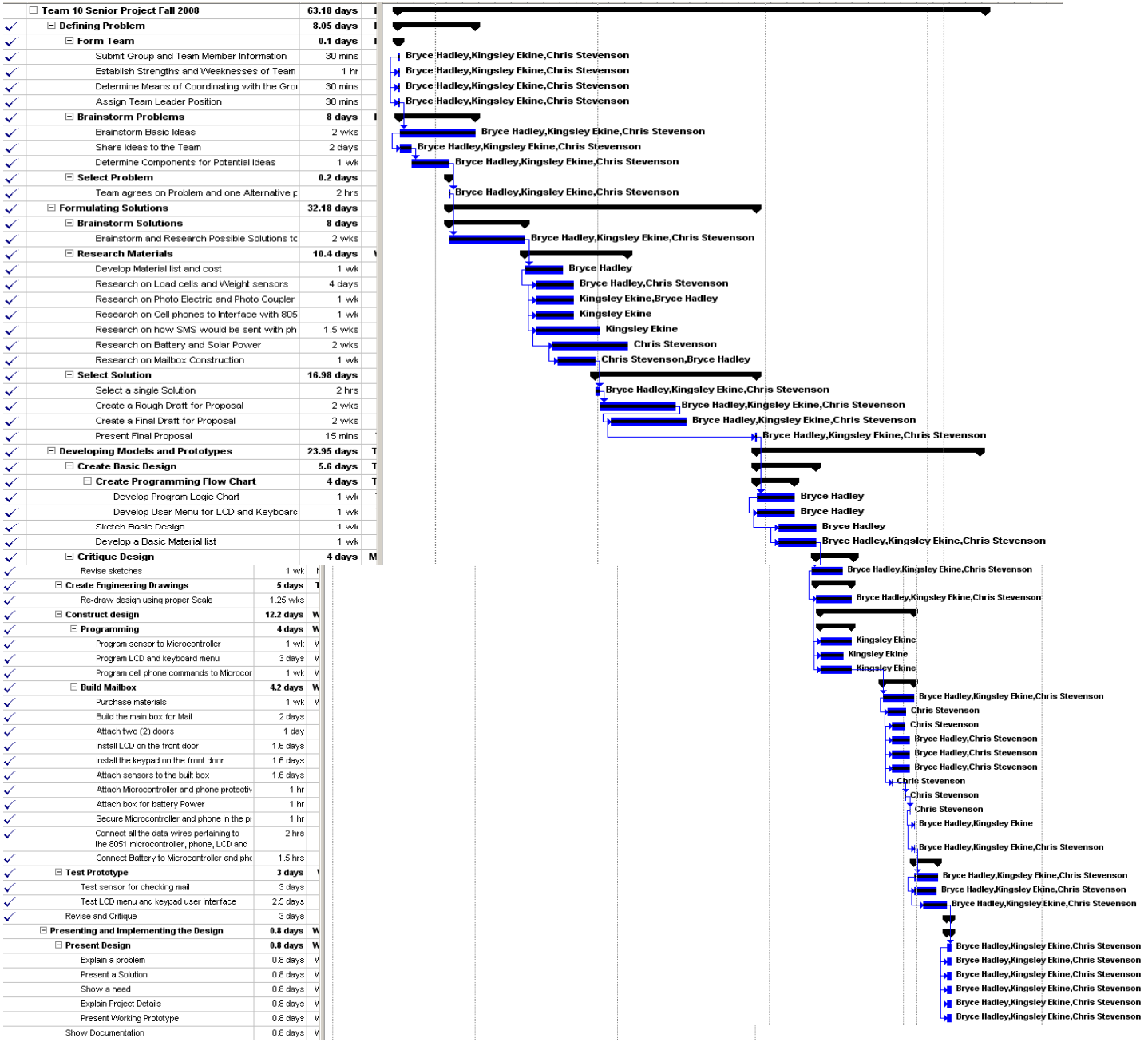
Se.R.M.U.N.S. – Cost Cont.

Table 2 : Donated material cost			
Item	**Qty**	**Actual Cost**	**Final Cost**
4' x 8' x 3/4" Plywood	1	$12.38	Donated
Chrome Hinge	1	$1.79	Donated
Chrome Handles	2	$3.98	Donated
Keyed Lock	1	$1.99	Donated
Glue	1	$3.17	Donated
Box of Screws	1	$5.94	Donated
Paint	2	$9.54	Donated
MMC Card	1	$10.00	Donated
Nails	1	$10.00	Donated
Sub Totals		$53.00	
Tax (8.25%)		$4.37	
Total		$57.37	

Se.R.M.U.N.S. – Time Use

Table 3 : Labor cost			
Processes	**Actual Hr**	**Cost per Hr**	**Estimated Salary**
Bryce Hadley	153	$40.00	$15,300.00
Kingsley Ekine	154	$40.00	$15,400.00
Chris Stevenson	157	$40.00	$15,700.00
Total	**464**	**$120.00**	**$46,400.00**

Estimated Salary = Actual Hrs x Cost per Hr x 2.5


Team 10 Senior Project Fall 2008 63.18 days
Defining Problem 8.05 days
Form Team 0.1 days
Submit Group and Team Member Information 30 mins
Establish Strengths and Weaknesses of Team 1 hr
Determine Means of Coordinating with the Gro 30 mins
Assign Team Leader Position 30 mins
Brainstorm Problems 8 days
Brainstorm Basic Ideas 2 wks
Share Ideas to the Team 2 days
Determine Components for Potential Ideas 1 wk
Select Problem 0.2 days
Team agrees on Problem and one Alternative p 2 hrs
Formulating Solutions 32.18 days
Brainstorm Solutions 8 days
Brainstorm and Research Possible Solutions to 2 wks
Research Materials 10.4 days
Develop Material list and cost 1 wk
Research on Load cells and Weight sensors 4 days
Research on Photo Electric and Photo Coupler 1 wk
Research on Cell phones to Interface with 805 1 wk
Research on how SMS would be sent with ph 1.5 wks
Research on Battery and Solar Power 2 wks
Research on Mailbox Construction 1 wk
Select Solution 16.98 days
Select a single Solution 2 hrs
Create a Rough Draft for Proposal 2 wks
Create a Final Draft for Proposal 2 wks
Present Final Proposal 15 mins
Developing Models and Prototypes 23.95 days
Create Basic Design 5.6 days
Create Programming Flow Chart 4 days
Develop Program Logic Chart 1 wk
Develop User Menu for LCD and Keyboard 1 wk
Sketch Basic Design 1 wk
Develop a Basic Material list 1 wk
Critique Design 4 days
Revise sketches 1 wk
Create Engineering Drawings 5 days
Re-draw design using proper Scale 1.25 wks
Construct design 12.2 days
Programming 4 days
Program sensor to Microcontroller 1 wk
Program LCD and keyboard menu 3 days
Program cell phone commands to Microcor 1 wk
Build Mailbox 4.2 days
Purchase materials 1 wk
Build the main box for Mail 2 days
Attach two (2) doors 1 day
Install LCD on the front door 1.6 days
Install the keypad on the front door 1.6 days
Attach sensors to the built box 1.6 days
Attach Microcontroller and phone protectiv 1 hr
Attach box for battery Power 1 hr
Secure Microcontroller and phone in the pr 1 hr
Connect all the data wires pertaining to the 8051 microcontroller, phone, LCD and 2 hrs
Connect Battery to Microcontroller and pho 1.5 hrs
Test Prototype 3 days
Test sensor for checking mail 3 days
Test LCD menu and keypad user interface 2.5 days
Revise and Critique 3 days
Presenting and Implementing the Design 0.8 days
Present Design 0.8 days
Explain a problem 0.8 days
Present a Solution 0.8 days
Show a need 0.8 days
Explain Project Details 0.8 days
Present Working Prototype 0.8 days
Show Documentation 0.8 days
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Questions?

Thank You!