L.A.W.N. Mower

(Local Area Wireless Network)

Team 8

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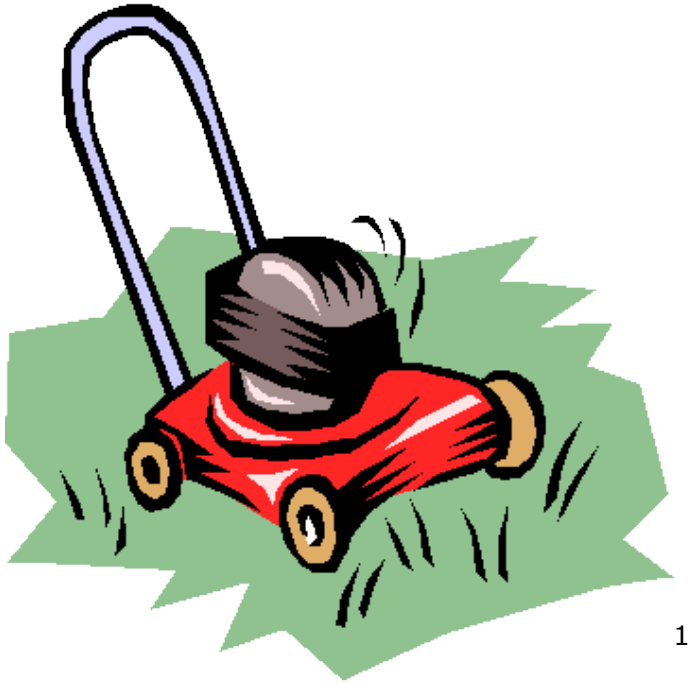
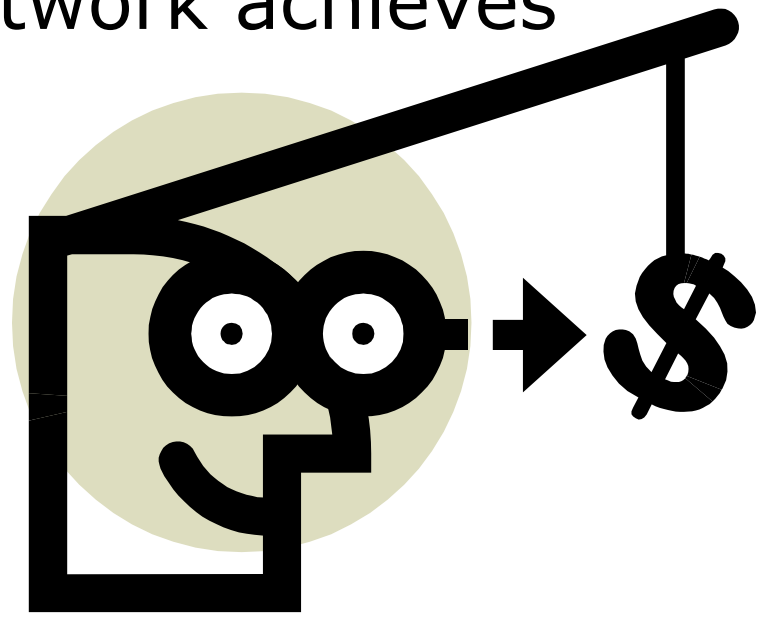


Motivation

- To design an alternative to lawn mowing for
  - Physically impaired
  - Recreational purpose
  - Entertainment
- Local Area Wireless Network achieves
  - Simplicity in design
  - Inexpensive alternative
  - User friendly



Objectives

- Design remotely operated lawn mower for everyday use
- Mimic video game
  - Uses a Graphical User Interface on laptop for simplicity and familiarity

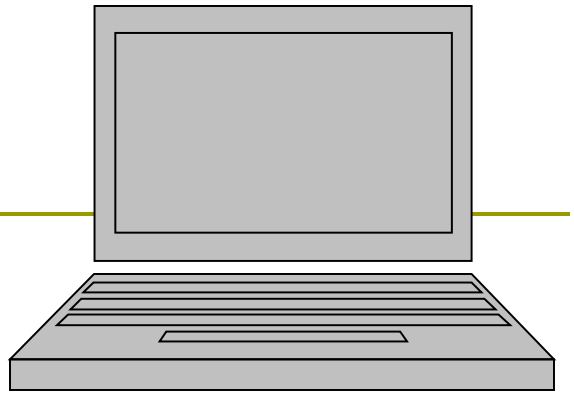
Operation

- Master and slave computers initialize to each other
- Slave computer establishes connection with microcontroller
- Master computer controls GUI running on slave computer
- Microcontroller receives commands and activates motor at desired speed
- Web cam sends video through slave computer to master computer

Design

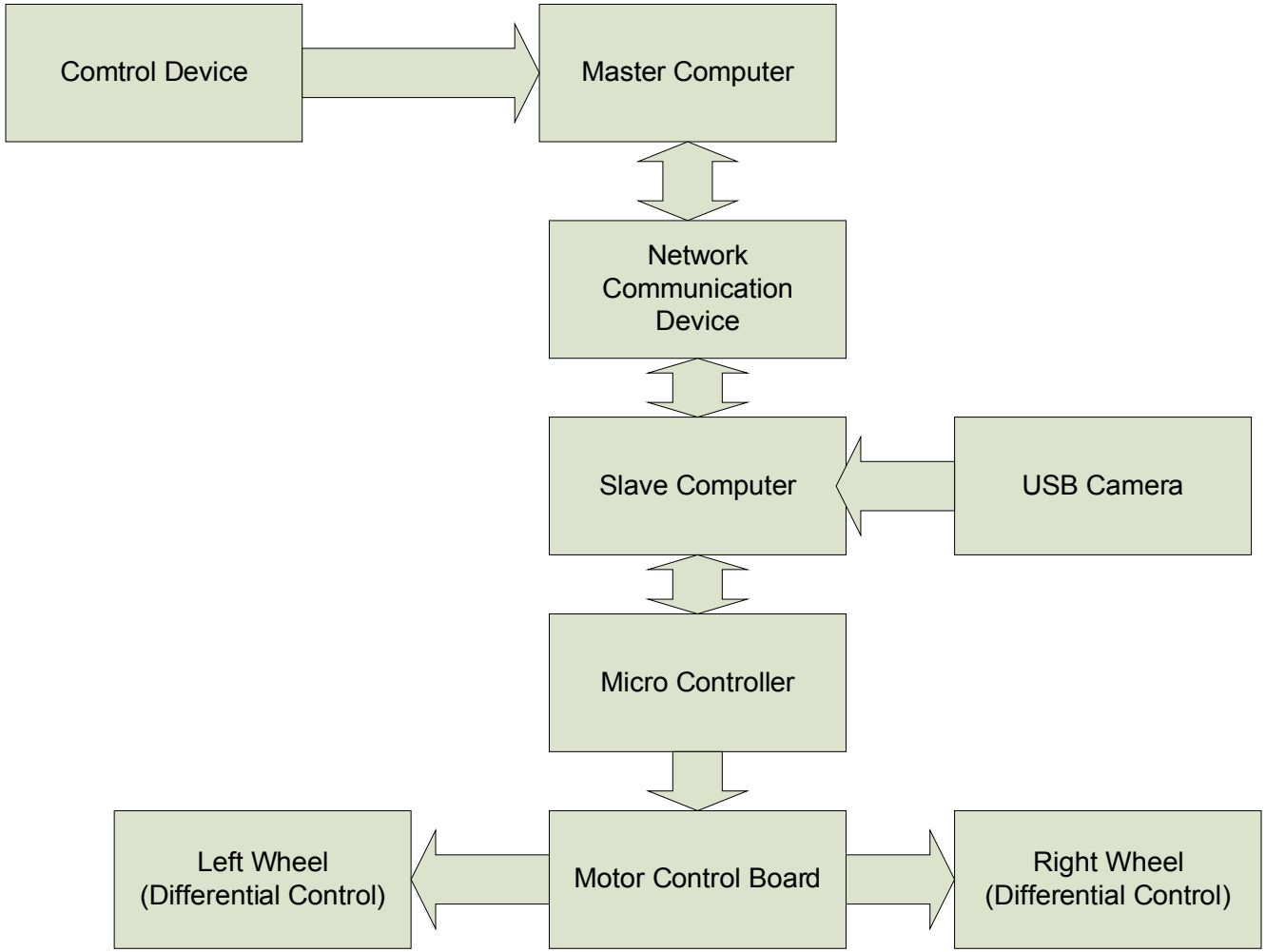
- Lawnmower
  - 8051 Microcontroller Controls motor speed and direction
  - 2 gear box motors drive the system
  - On board laptop links user to microcontroller through remote desktop
  - Laptop, microcontroller, and batteries mounted on wooden frame

Design (continued)



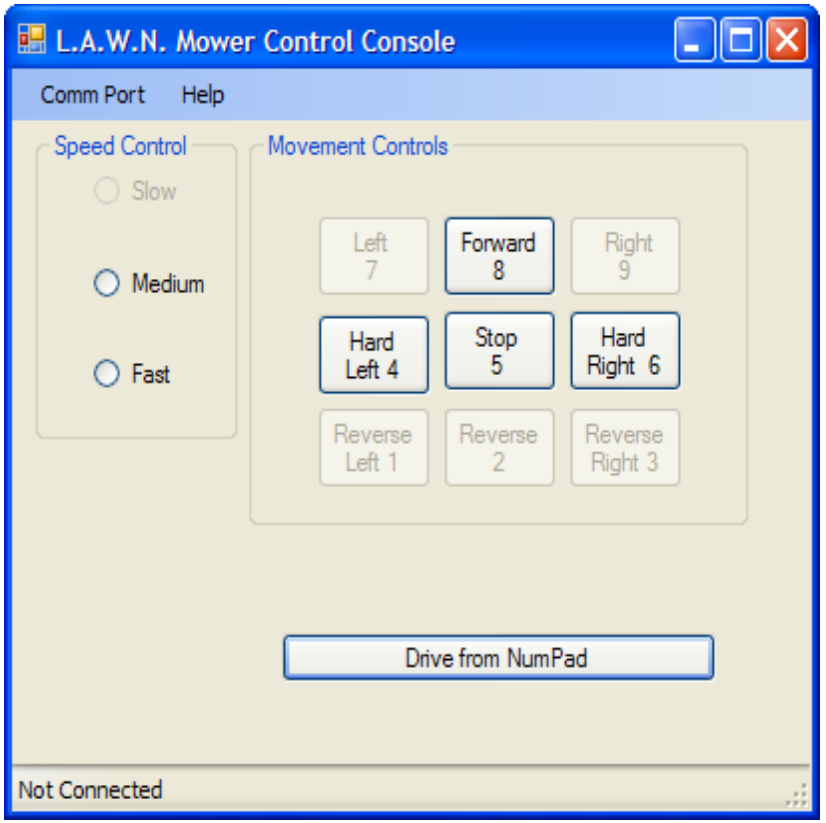
- Slave Computer
  - Receives commands from master computer and relays information to microcontroller through GUI
  - Wireless network cards allow computers to communicate
  - Web camera sends visual feedback to master computer through slave computer

Hardware Block Diagram

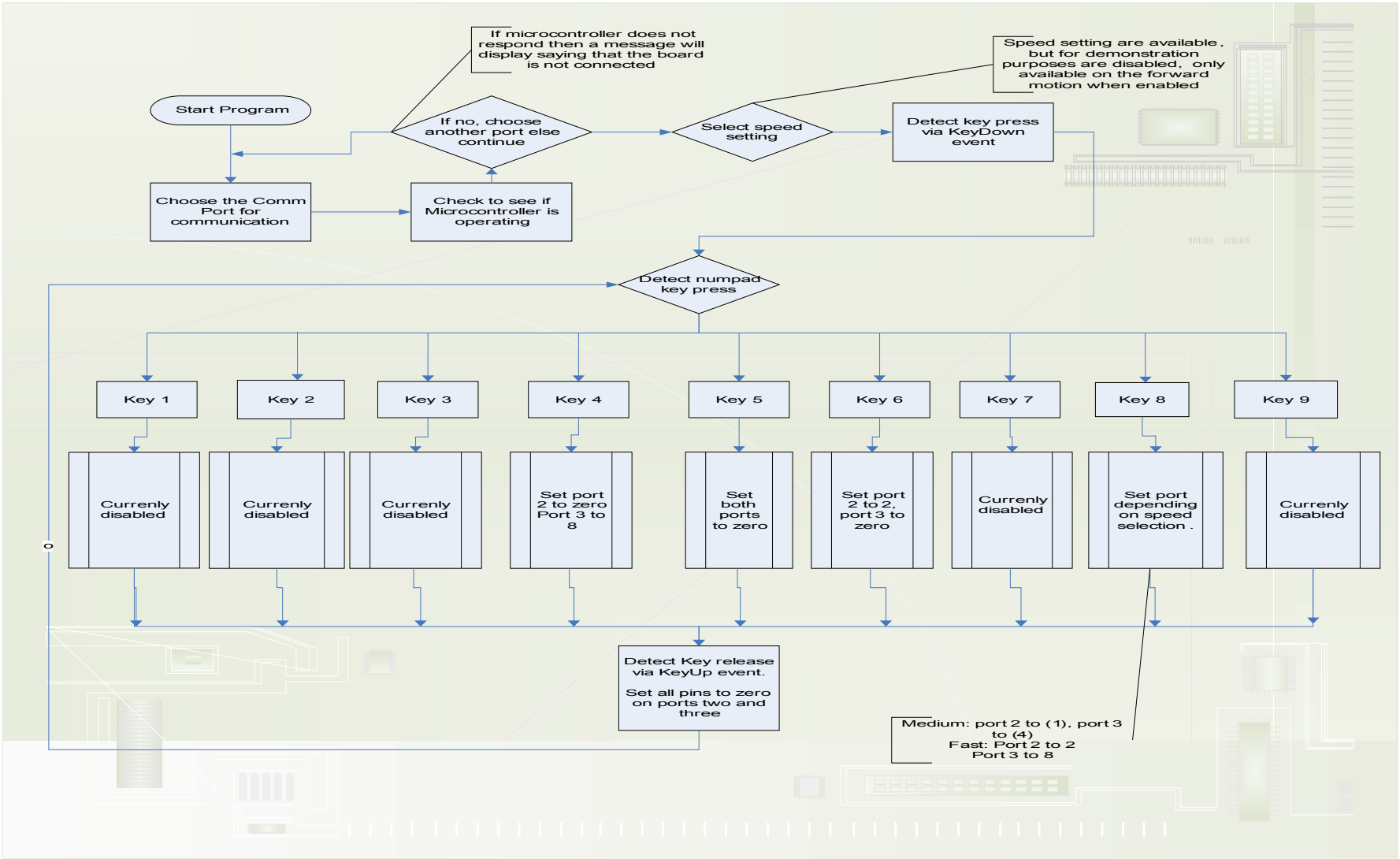


Software

- GUI
  - Programmed in Visual C++
  - Restricted buttons control movement and speed
- Microcontroller
  - Hex code provided by BiPOM as server interface



Software Flowchart



Software BiPOM API Flowchart

- BiPOM API converts language of choice into a code compatible with microcontroller
- Physical link is required for particular program

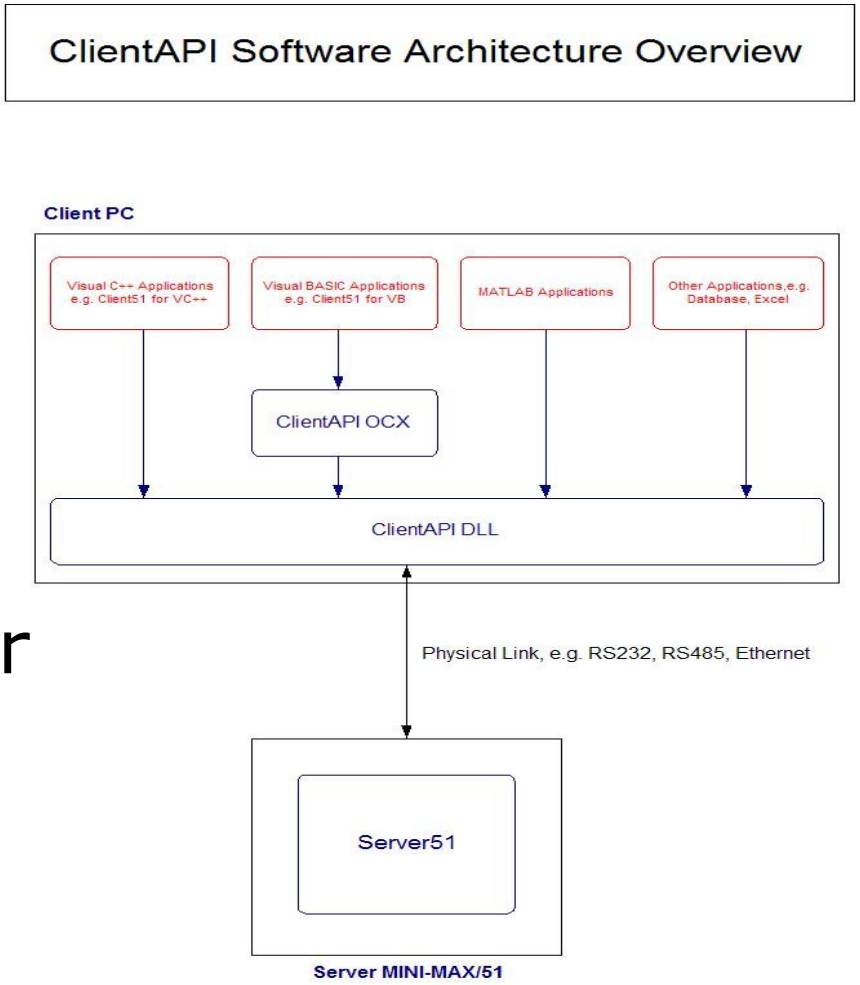
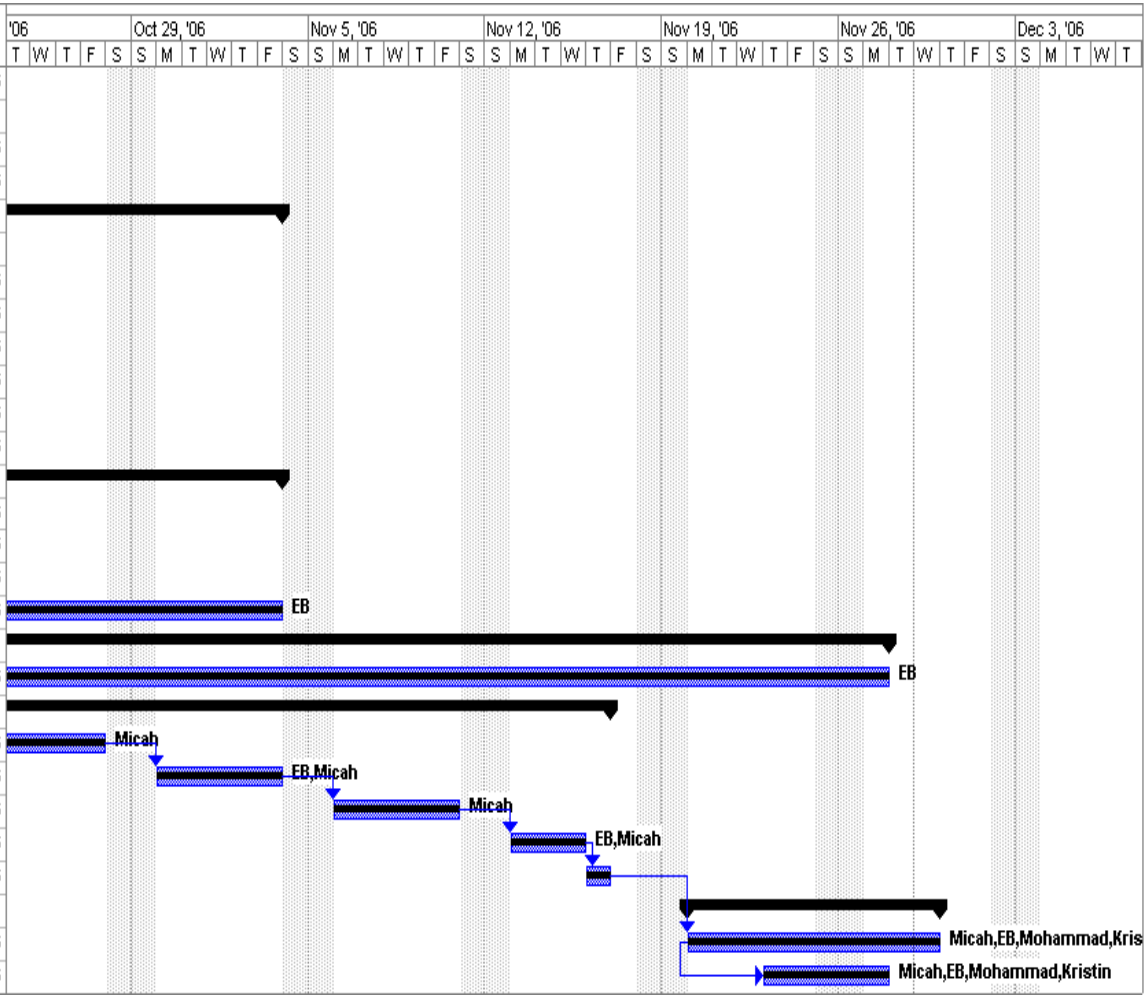


Figure provided by www.BiPOM.com

Schedule – Project Completed

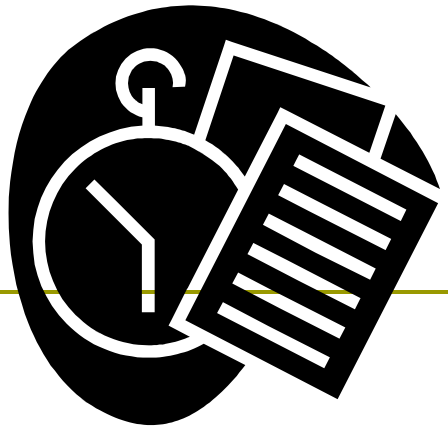
ID	Task Name	Duration	Start	Finish
7	Choose Final Idea	1 wk	Tue 9/12/06	Tue 9/19/06
8	**Proposal**	**6.78 days**	**Tue 9/19/06**	**Thu 9/28/06**
9	Write Proposal	1 wk	Tue 9/19/06	Tue 9/26/06
10	Present Proposal	15 mins	Thu 9/28/06	Thu 9/28/06
11	**Design**	**26.97 days**	**Thu 9/28/06**	**Fri 11/3/06**
12	**Initial design**	**4.25 days**	**Thu 9/28/06**	**Wed 10/4/06**
13	Choose Drive System	1 day	Thu 9/28/06	Fri 9/29/06
14	Determine Power Requirments	3 hrs	Fri 9/29/06	Fri 9/29/06
15	Choose Power Source	1 hr	Fri 9/29/06	Fri 9/29/06
16	Choose Material	6 hrs	Fri 9/29/06	Mon 10/2/06
17	Choose Interfaces	2 days	Mon 10/2/06	Wed 10/4/06
18	Finalize Design	1 wk	Wed 10/4/06	Wed 10/11/06
19	**Programming**	**26.5 days**	**Thu 9/28/06**	**Fri 11/3/06**
20	FlowChart	1 day	Thu 9/28/06	Fri 9/29/06
21	Psuedocode	1 day	Fri 9/29/06	Fri 9/29/06
22	Coding for Laptop	3 wks	Mon 10/2/06	Fri 10/20/06
23	Coding for Microcontroller	2 wks	Mon 10/23/06	Fri 11/3/06
24	**Construction**	**36 days**	**Mon 10/9/06**	**Mon 11/27/06**
25	Buy Materials	7.2 wks	Mon 10/9/06	Mon 11/27/06
26	**Build**	**19 days**	**Mon 10/23/06**	**Thu 11/16/06**
27	Install Laptop Interface	1 wk	Mon 10/23/06	Fri 10/27/06
28	Install Motor Interface	1 wk	Mon 10/30/06	Fri 11/3/06
29	Install Motors/drill holes	1 wk	Mon 11/6/06	Fri 11/10/06
30	Install Power Source	3 days	Mon 11/13/06	Wed 11/15/06
31	Install Camera and Mount	1 day	Thu 11/16/06	Thu 11/16/06
32	**Testing**	**8 days**	**Mon 11/20/06**	**Wed 11/29/06**
33	Modify Design	8 days	Mon 11/20/06	Wed 11/29/06
34	Final Presentation	3 days	Thu 11/23/06	Mon 11/27/06



Cost Analysis

- Cost of all parts - $364.81
- Labor Costs - $26,400
  - $30/hour
  - Ebrahim and Micah = 225 hours
    - 225*$30 = $6,750 each
  - Kristin and Mohammad = 215 hours
    - 215*$30 = $6,450 each
- Total Cost - $26,764.81

Verification



- Motors
  - Endurance testing involved motors running at full speed until batteries depleted
  - Ran 6 hours without diminishing performance, indicating batteries last longer than necessary
- Turning radius
  - Approximately 12 feet for 360°
- Reaction time
  - Mower responds 0.1 seconds after user input
- Video
  - Approximate 1 second delay
- Range
  - Depends on router (40 to 100ft for basic router)

Prototype

- Controlled wirelessly through network
- Video observation through web cam
- Steering is controlled using individual motors
- Loss of connectivity disables motors as failsafe

Questions?