UNIVERSITY OF HOUSTON
COLLEGE OF TECHNOLOGY
DEPARTMENT OF ENGINEERING TECHNOLOGY
COMPUTER ENGINEERING TECHNOLOGY PROGRAM
ELET 4308/4208

Senior Project Final Presentation
SMART JACK

Fall 2006
November 30, 2006

Team # 1
Team Members:

Areeb Tanvir
Christopher Johnson
Dustin Washington
Nnaemeka Onuba
Timothy Marinos

Project Advisor:

Dr. Farrokh Attarzadeh

Presentation Outline

- Introduction
- Background
- Product Requirements
  - Timothy Marinos
- Design Alternatives
  - Dustin Washington
- Design Specifications
  - Nnaemeka Onuba
- Design Construction
  - Areeb Tanvir
- Costs Analysis
  - Christopher Johnson
- Conclusion
  - Areeb Tanvir

Introduction

- Objective
  - To implement a jack that is fully automated with a two button system.
- How does the Smart Jack work?
  - Uses one button to ascend and another to descend
  - Has infrared sensor to indicate when the lifting motion will stop
  - Uses 8051 microcontroller to synchronize all of the components together within the programming code
- Society will benefit from the Smart Jack
  - Anyone will be able to change their tire
  - Two button solution makes the process simple
  - Infrared signal indicates when it is safe to remove the tire

Background

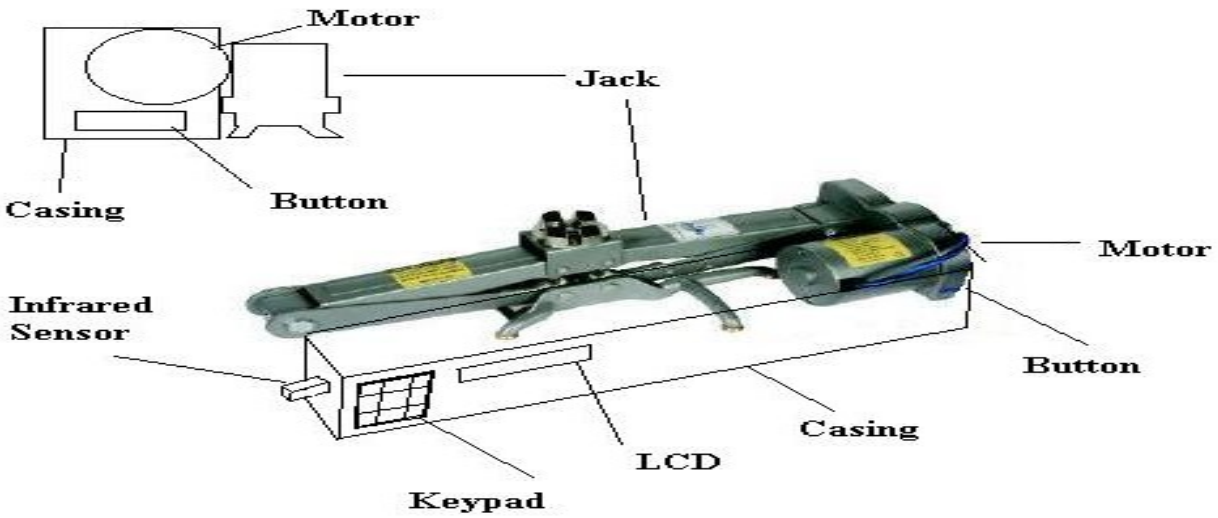
- Motivation
  - Changes in industry direction
  - Feasibility
  - Practicality
- Applications and Benefit
  - Simple and easy to use
  - Affordable
  - safe

Product Requirements

- Hardware
  - 12 V DC power supply (battery)
  - Heavy duty 10-amp motor
  - Infrared proximity sensor
  - LK202-25 LCD display
  - Mini Max 8051 microcontroller
  - Steel car jack frame
  - Metal Casing (for microcontroller, LCD, and keypad)
  - Keypad
- Software
  - Micro C
- Target Cost
  - Production
  - Retail

Design Alternatives
-Previous Design-

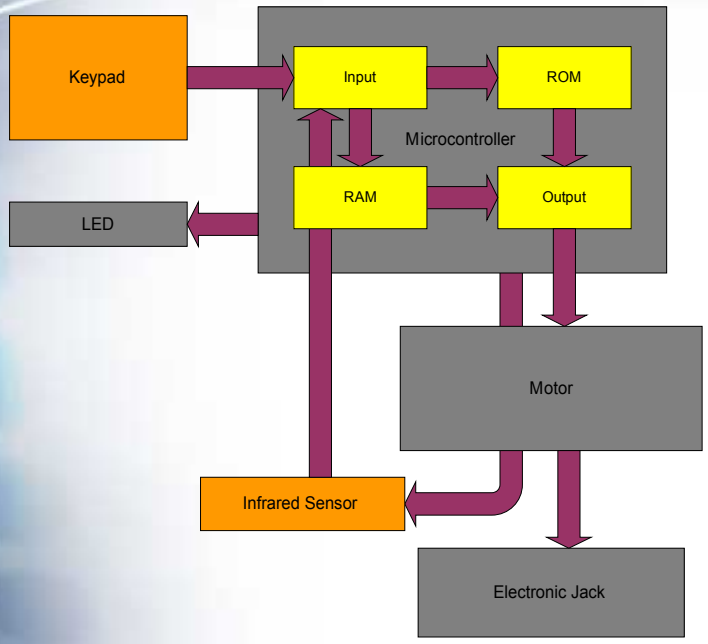
- Design of the Jack at the time of the proposal
- Jack was built into the box
- Button was separate from the keypad



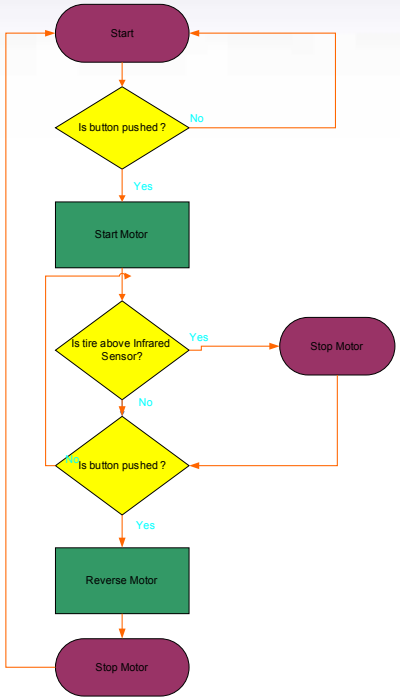
Design Alternatives (cont.) –Current Design-

- Casing is separate from the Jack
- Controls are housed on the casing
- Addition of a kill switch

Design Specifications



Hardware Flowchart

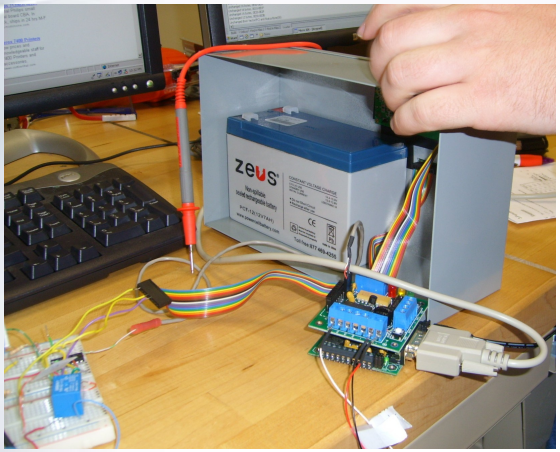


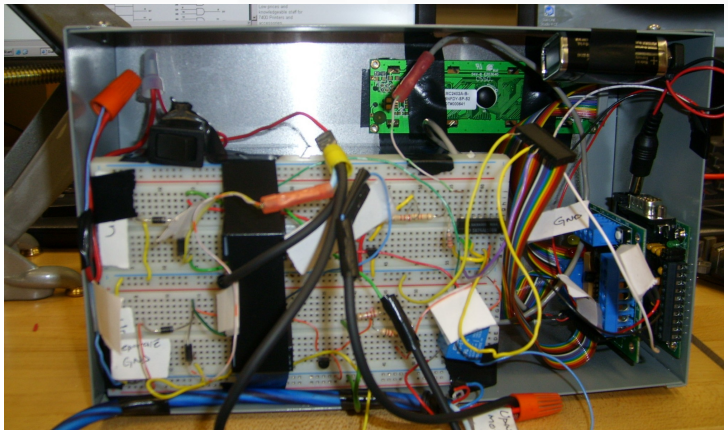
Software Flowchart

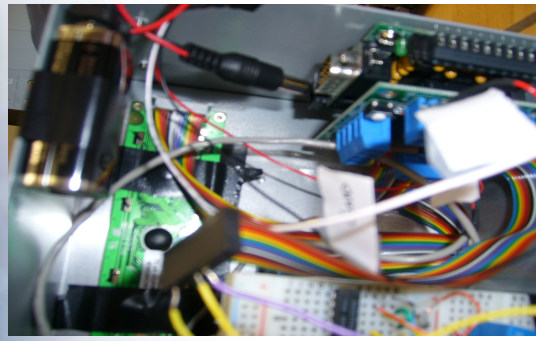
Design Specifications (cont.)

- Jack must lift 2 tons (~4000lbs) max
- Sensor must detect
- Maximum power rating
- Maximum weight of assembly

Design Construction







Cost Analysis

Parts	Estimated Cost
Metal Case	$21.64
8051 Microcontroller, LCD, Keypad	$169.00
IR Sensor (2x)	$24.36 ($12.18 ea.)
12V DC Battery	$16.50
Electric Jack w/motor	$64.99
IR Sensor Cable (2x)	$7.89 ($3.99 ea.)
9 V Battery	$5.00
Jack to 9V Clip	$1.50
Lab equipment	Donated
Breadboard	$6.00
Single pole Bidirectional Relay (2x)	$5.00 (2.50 ea.)
4 and Dual input Gate	$1.25
Diodes and Resistors	Donated
TOTAL	**$323.13**

Cost Analysis (cont.)

Labor	Hrs/week	Pay rate 30/hr.@ 17wks	Total price
5 people	14 hrs/wk	$7,140.00	$ 35,700.00
Amount per person each week	$1,050	$1,050	$ 5,250.00
Tools cost	$ 125.99	$ 125.99	$ 125.99
Material Costs	$ 159.99	$ 159.99	$ 159.99
Service	$ 120.00	$ 120.00	$ 120.00
Grand Total			$ 41,355. 98

Conclusion

- Problems and Solutions
  - The nature of the GP2D15 IR Sensor provided a weak signal for its application
  - This factor causes a glitch in the lifting and descending processes of the jack
  - The team resorted to using the sensor because of time and monetary constraints
- Future design suggestions for the Smart Jack
  - Design a smaller box utilizing a smaller 12V battery
  - Make the box either wireless or attached to the jack itself
  - Use a more powerful and expensive IR sensor