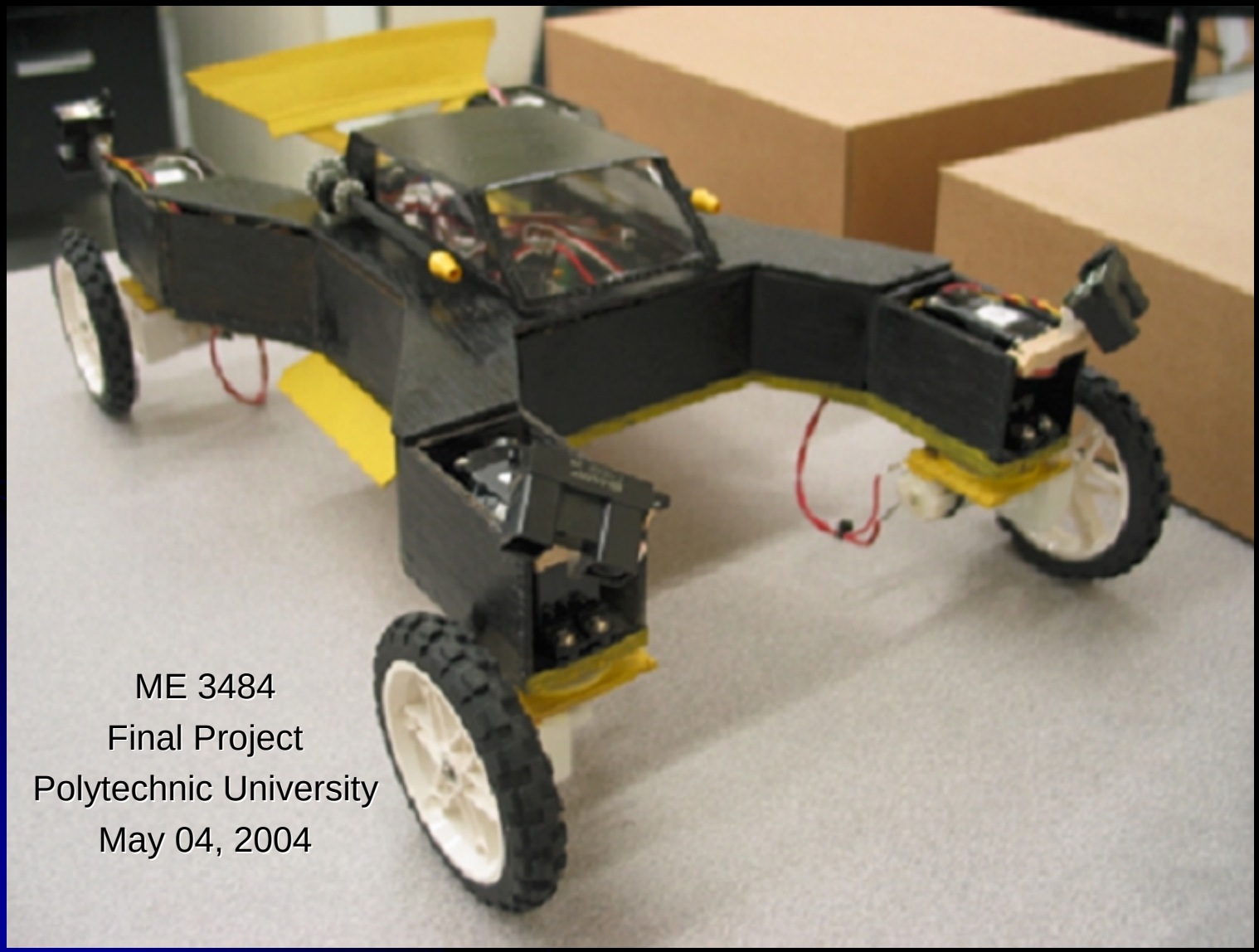
Type X



ME 3484
Final Project
Polytechnic University
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TEAM 1

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Overview

- Proposal
- Problems and Solutions
- Features
- Project Specifications
- Assumptions and Limitations
- Design Process
- Block Diagram
- Circuit Diagram
- Computer Code
- Demo
- Cost Estimate
- Future Improvements
- Conclusion
- Special Thanks & Acknowledgements

Proposal

- A transformable vehicle that could alter its wheel position in order to navigate around difficult situations
- Designed to be used in a rough terrain environment
- Advantageous in civilian as well as military applications

Problem I

- Wide body vehicles can have difficulty crossing narrow bridges

- Military vehicles and tanks need wider bridges to get across

Solution I

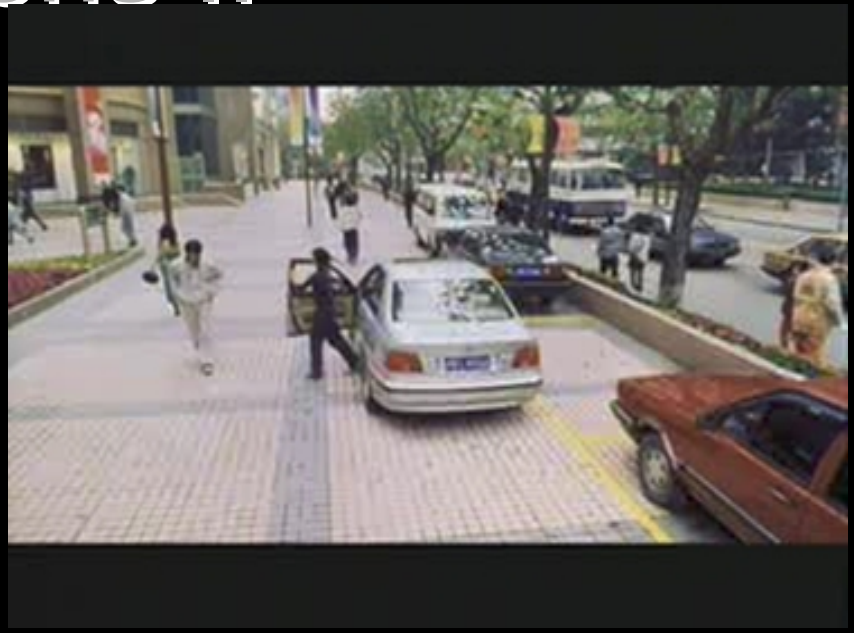
- Reduce the width of the wheels
- Alter wheel position by rotating 180 degrees
- Wide body vehicle can now cross a narrower bridge.

Problem II

- Parking in cities can be a hassle

- Parallel parking is complicated

Solutions II



- Minimize the size of the vehicle
- Park at a different location
- Valet parking

Solutions II

- Wheels would turn 90 degrees
- Vehicle eliminates the need for parallel parking
- Vehicle can be prevented from being stolen

Features

- A military vehicle that alters wheel position to fit through narrow roads or bridges.
- Rotate wheels 90 degrees to eliminate the need to parallel park.
- Presents new safety feature to assure theft prevention.
- Master switch for emergency shutoff

Project Specifications I (Hardware)

- BS2 and Board of Education
- 4 high torque servos
- 4 DC motor
- 2 motor controller
- 2 push button
- At least 3 IR sensor
- LED (optional)

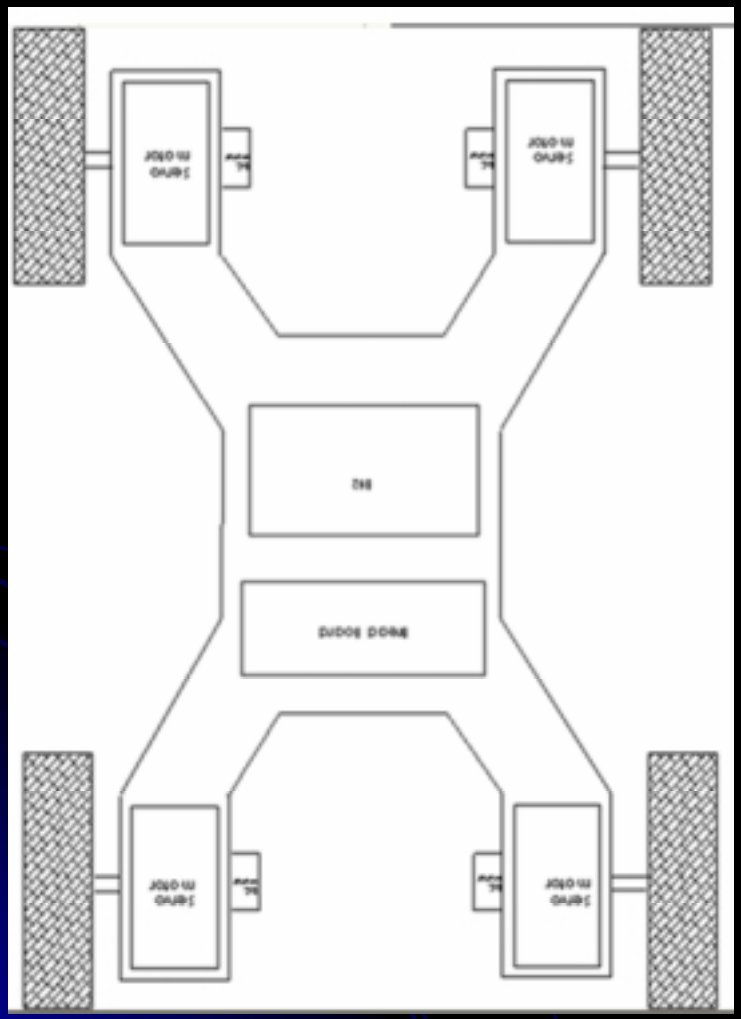
Limitations and Assumptions

- A driver is required to operate the vehicle

  - Driver makes the decision to park or to alter wheel position.
- Obstacles must be large enough to be detected by the IR sensors.
- Sensors can be replaced.

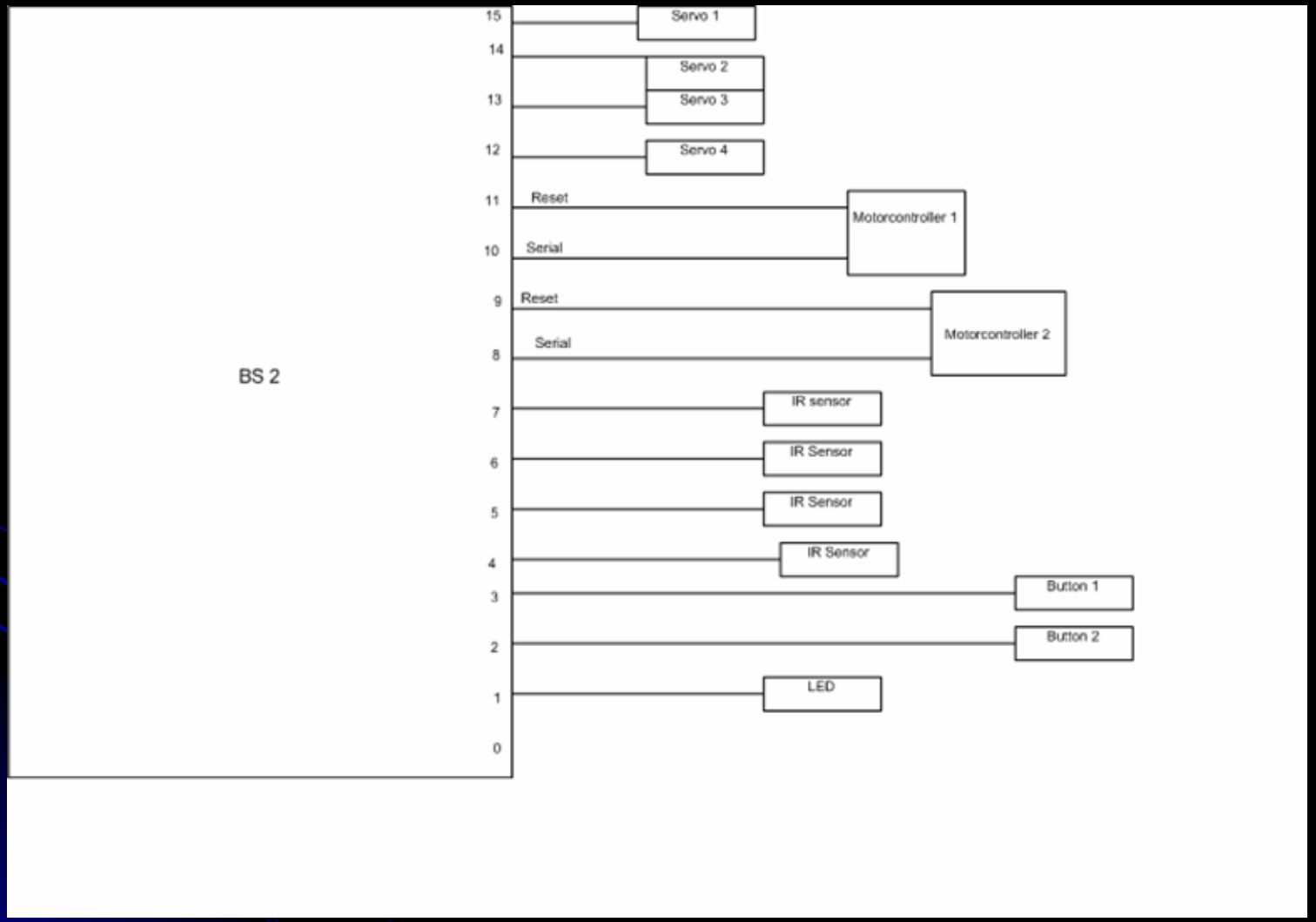
  - Sonar, Proximity, Camera, etc.
- Speed is constant.

Design Process

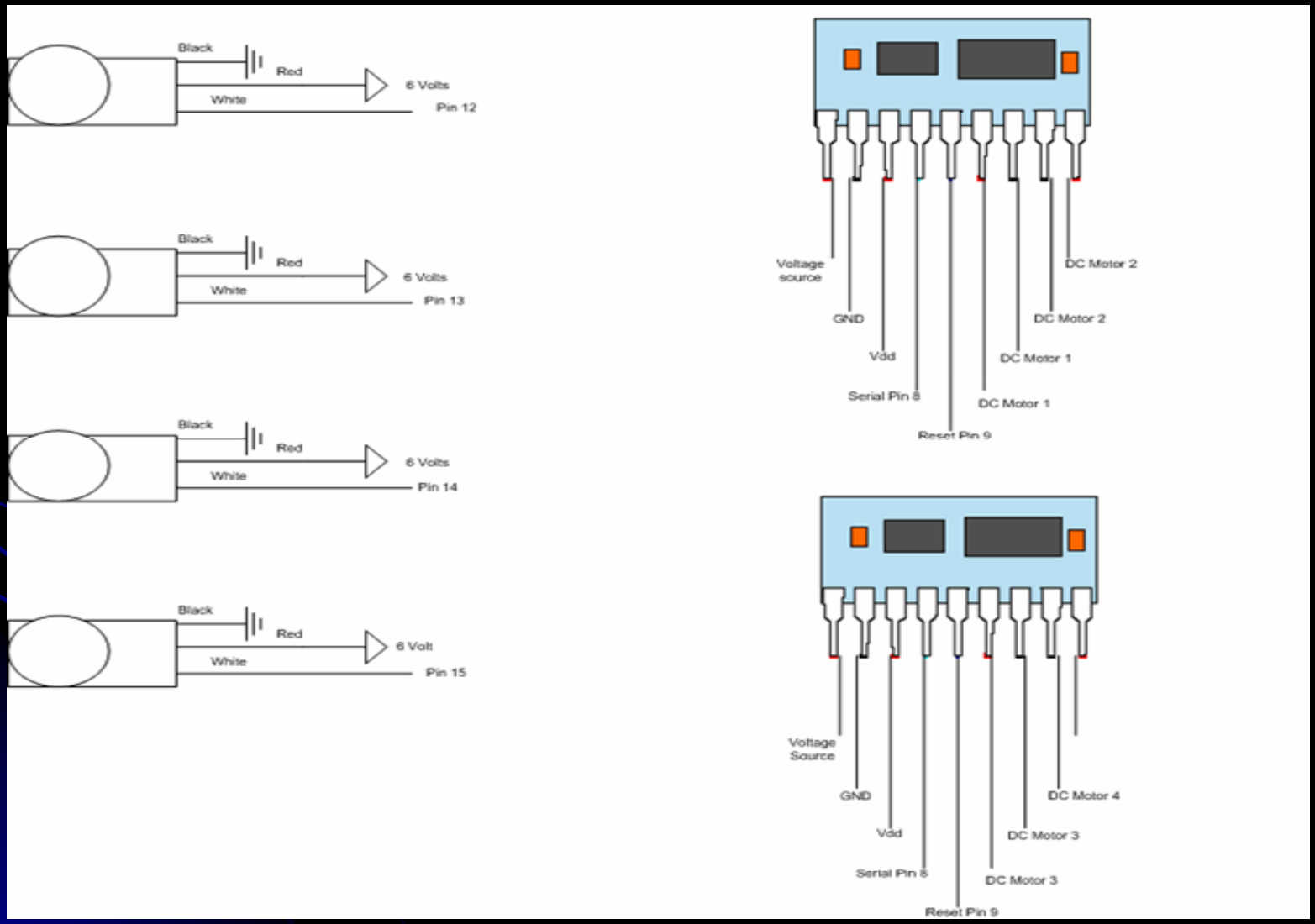


- Design & build the Chassis
- Paint
- Mount Servos
- Mount DC Motors
- Wire circuitry
- Basic Stamp Code
- Testing

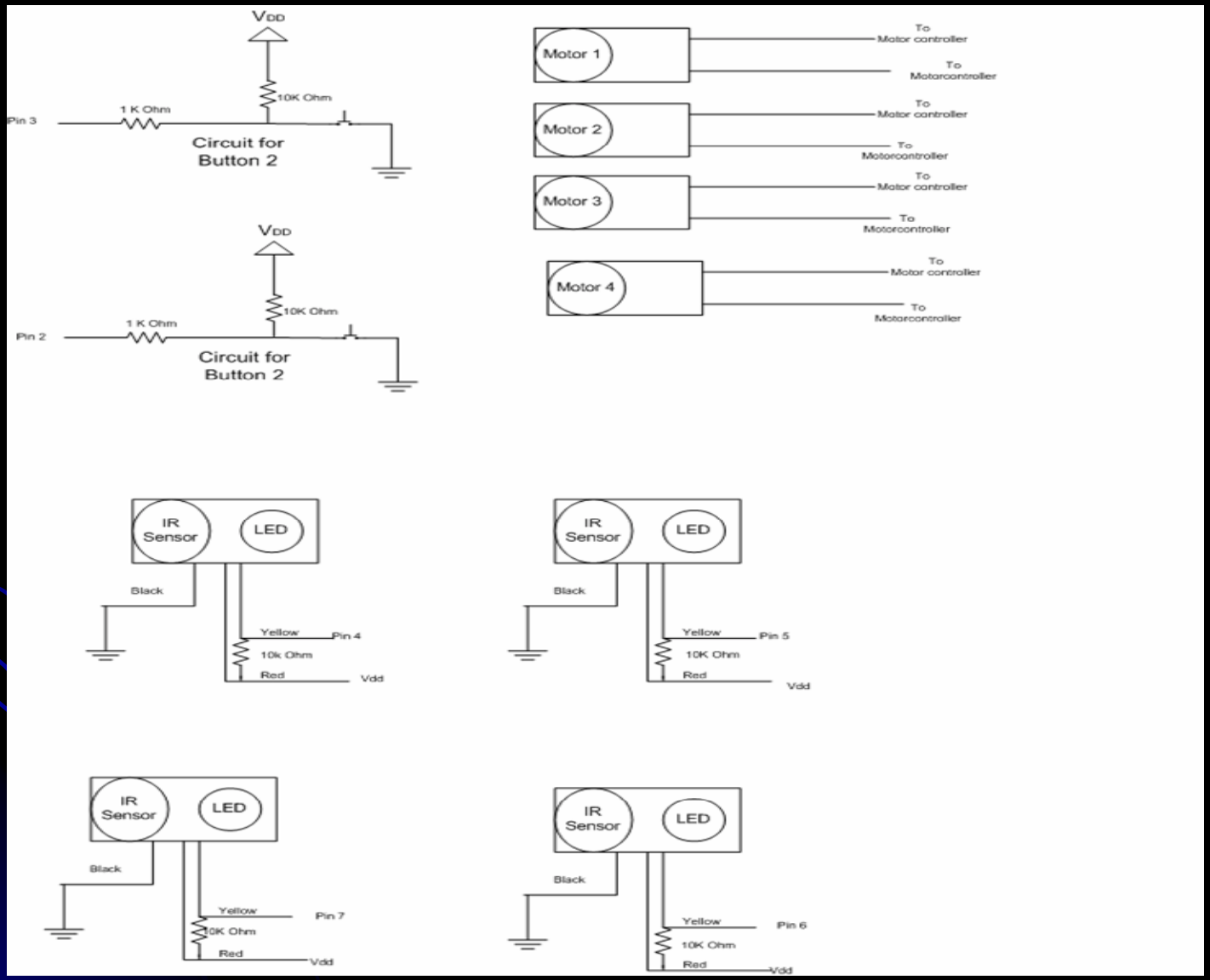
Circuit Block Diagram



Circuit Diagram I

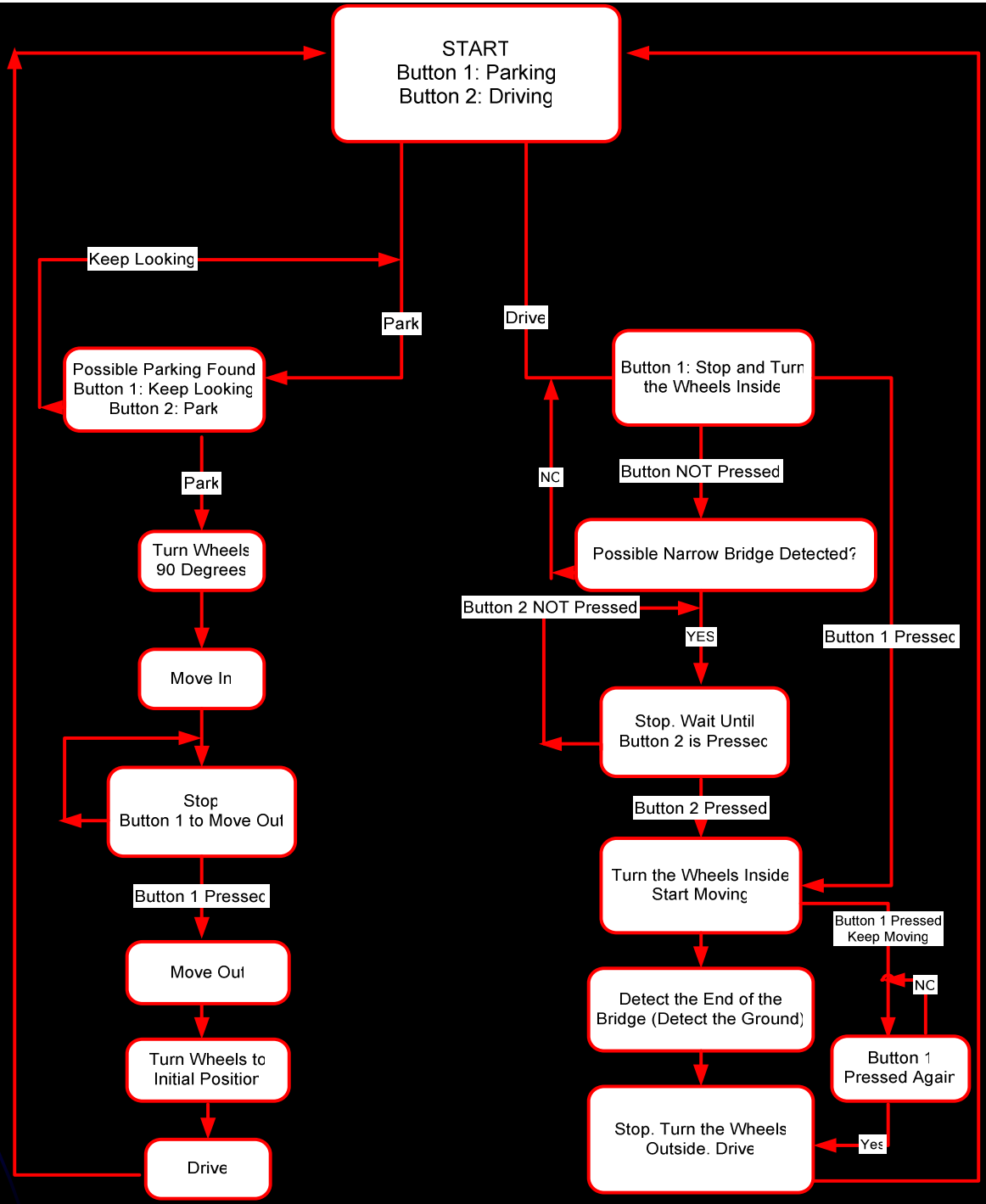


Circuit Diagram II



BS2 Code

Block Diagram



Computer Code

Project.bs2

Bridge Demo

Bridge Demo.AVI

Parallel Parking Demo

Parallel Parking.AVI

Cost Estimate

PART	QUANTITY	PRICE	TOTAL
BS2 and Board of Education Kit	1	$115.00	$115.00
High Torque Servomotors	4	$17.50	$70.00
DC Motors	4	$7.50	$30.00
Motor Controllers	2	$23.00	$46.00
9V Batteries	4	$2.50	$10.00
AA Batteries	4	$1.00	$4.00
IR Sensors	4	$17.00	$68.00
Vehicle Chassis	N/A	N/A	$15.00
Miscellaneous	N/A	N/A	$20.00
TOTAL			**$378.00+**

Future Improvements

- Place the button outside for better prototype user interface
- Replace current sensors with better sensors
- Eliminate the bread board and solder all connections
- Make it a remote control vehicle

Conclusion

- Servos were able to turn 90-180 degrees and back to its initial position.
- IR sensors detected if enough space was available to park car and to detect if the road narrows
- Defective motor controllers prevented the DC motors to drive the vehicle

Special Thanks and Acknowledgement

- ME 3484, Mechatronics 1: Faculty, Staff, and Students
- www.pololu.com for technical support
- www.acroname.com for IR sensor schematic
- www.ebaumsworld.com for video clip
- Alessandro Betti, Technician