

A New Obstacle-Avoiding, Light-Seeking Mobile Robot using a PLC

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CS/EGR333

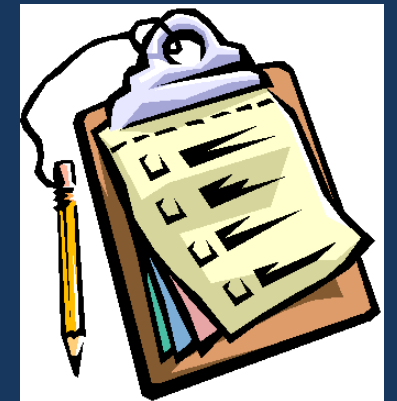




Agenda



- Initial and Simulated Designs
- Design Schematic
- Robot Analysis
- Simulation
- Alternative Control Scheme
- Questions





Initial Designs

- Remote Control Car
- Liquid Level Controller
- Touch Sensing Dispenser
- Touch Sense Door Opener
- Motion Detector Light Switch
- Household Environment Control
- Power Drain Save
- Auto Fire Reaction
- Motion Sensor Lights
- Sprinkler System Control
- Assistive Technology PLC
- PLC for Remote Villages
- Marine Biology PLC
- Smart House PLC
- PLC for Power Plants

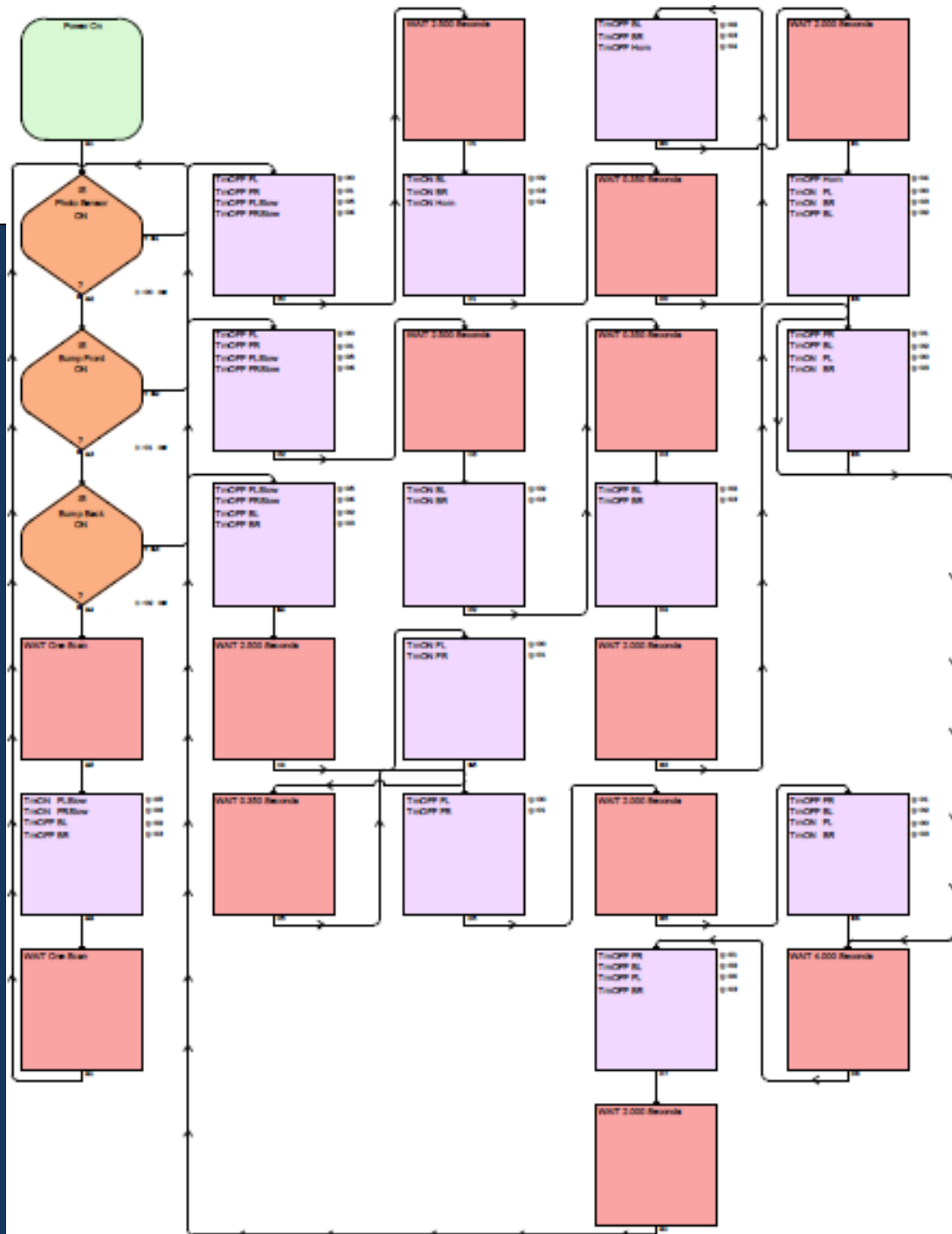




Designs Simulated

- 1) Remote Control Car
- 2) Touch Sense Door Opener
- 3) Power Drain Save
- 4) Combination of 1, 2 and 3

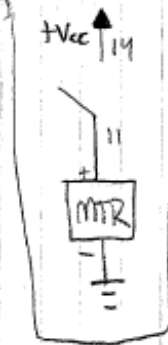




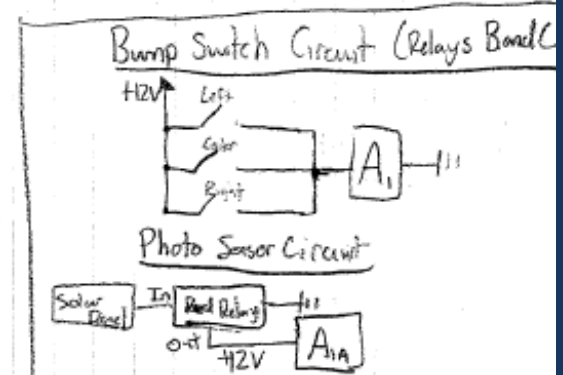
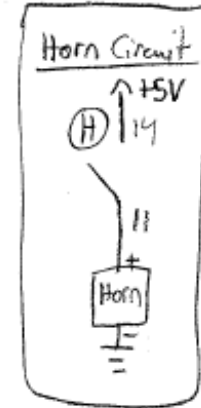
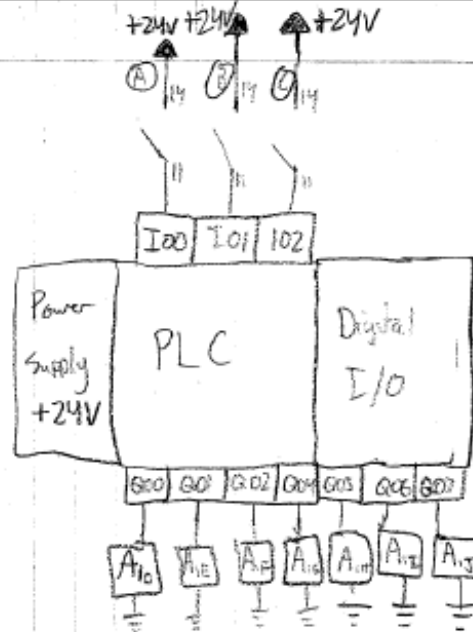


Design Schematic

- Relays D-G operate Each wheel motor at +12V.
- Relays I and J operate Front motors at a variable voltage tuned by a potentiometer.
- All circuits are the same other than input voltage



Power Supply is used to Power the PLC and provide +24V, +12V, +5V and a variable voltage rail using Voltage regulators.





Robot Analysis

- 4 Wheeled Robots – difficult to achieve ZTR
- Controllability vs Manuverability
- Need High Torque Motors– Slid/Skip
- Slid/Skip difficult with high friction



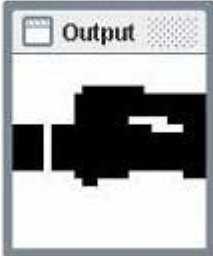


Simulation Using Simbad

Simbad - version 1.3

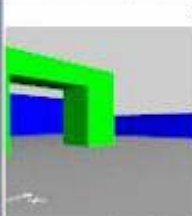
Examples

Output



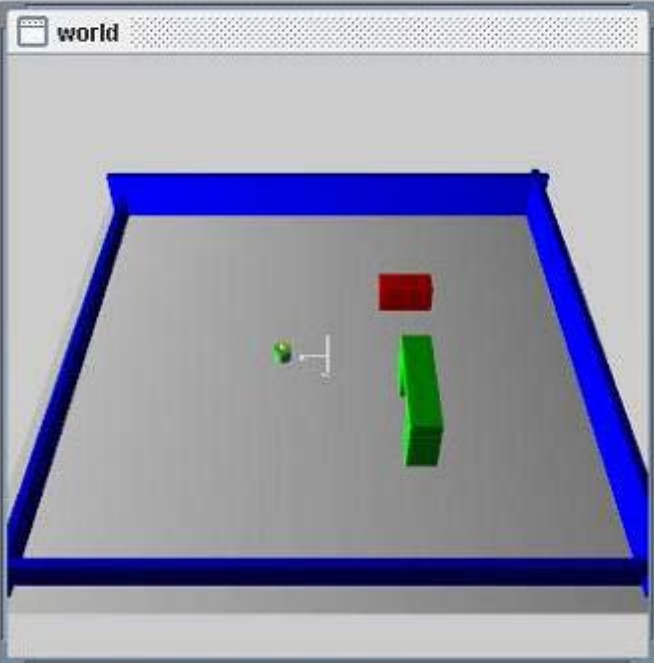
DemoRobot Inspector

Camera



```
class = simbad.demo.ImagerDemo$Demo
name = DemoRobot
fps instant = +20.000
fps total = +18.876
counter = 1945
lifetime = +97.250 s
collision = false
kinematic = DefaultKinematic
rotVelocity = -0.642 rad/s
transVelocity = +0.500 m/s
x = +0.100 m
y = +0.250 m
z = +1.629 m
odometer = +48.625 m
```

world



Control

View From: top side

Follow: far near side

Simulator

run pause reset restart step

Time Factor 0.2 0.5 1.0 5.0 10.0 20.0



Alternative Control Scheme

LabVIEW

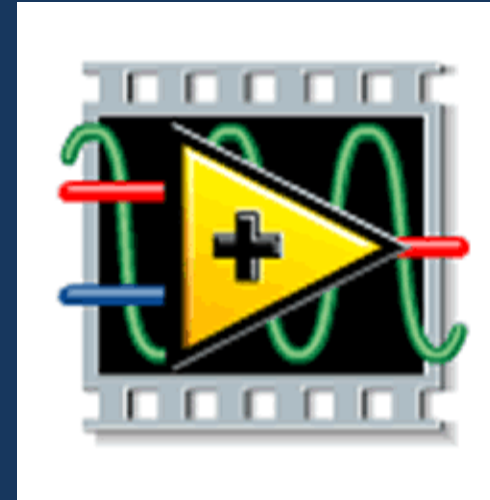
Pros:

- Very powerful program with a lot of options
- Would allow us to implement all of our designs easily and effectively
- Would allow us to implement other possible designs/features

Cons:

- Would require a laptop able to run LabVIEW
- Not enough space
- Plexi-glass base could not support weight
- Current motors could not move with
- Unnecessarily sophisticated for our robot

Assessment: Therefore, LabVIEW would not be very feasible.





Alternative Control Scheme

Microcontroller

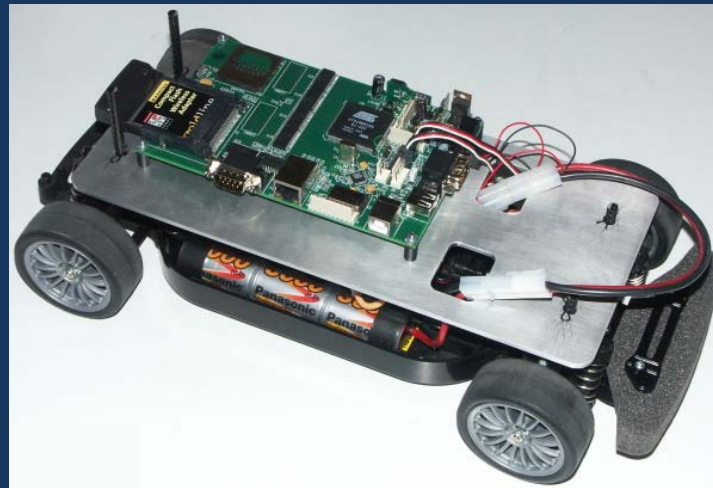
Pros:

- Simple coding would cover all the current features of the robot
- Can perform more complicated tasks and calculations

Cons:

- Microcontroller is slightly more complicated than the PLC

Assessment: The microcontroller is a practical alternative for the PLC in regards to the robot.





Search Algorithm Simulation

Thank You For Your Attention
Any Questions?