Snow Shoveling Robot

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Overview

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  - Proposed Solution
- Limitations
- Specification
- Engineering Design
  - Mechanical Design
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Objective

General:
• To shovel and remove snow from the sidewalk with the utmost efficiency and minimum human intervention and labor

Additional:
• To create a walkway path and dispense salt in order to prevent snow/ice buildup
Introduction

Problem Statement

• Walking on Snow and Ice can be very dangerous

• Manual Snow Shoveling can be very painful

Many medical side-effects:
- Increase Blood Pressure + Heart Rate
- Back Pain + Muscle Strain
- Promotes blood clotting + Sudden Heart Attack

• “One study estimated as many as 1200 heart related deaths yearly during and after major snowstorms”

-Eyewitness News

(http://abclocal.go.com/wabc/story?section=health&id=3902666)
Introduction

Proposed Solution

- An autonomous snow shoveling device to remove snow with minimum human labor

Before

After
Introduction

Proposed Solution

• Benefits of our autonomous snow shoveling device:
  – No human labor required
  – Performs task with minimum supervision
  – Creates a walkway path for pedestrians
  – Prevents snow/ice buildup from salt
Limitations

- Restricted to user input
- Straight and flat pavement
- Stops when device detects obstacle
- Stops when salt level is low
Specifications

- Basic Stamp II
  - (Board of Education)
- 3 Servo Motors
- IR (Infrared) Sensor
- 1 Photo resistors
- Compass
- Limit Switch
- Push Buttons
- Piezo Speaker
- Red LED
Selection of Sensors

- **Basic Stamp (Microcontroller):**
  - Read sensor signals, process data, control output devices

- **Servomotors:**
  - Power source for mobility/Control output rate of salt

- **Infrared Sensor:**
  - Detect obstacles and impediments

- **Photo resistor:**
  - Detect amount of salt in dispenser

- **Compass:**
  - Ensures movement on a straight path

- **Limit Switch:**
  - Measure distance traveled
Engineering Design
Mechanical Structure
Snow Shovel
Engineering Design
Mechanical Structure
Treads/
Engineering Design

Motor Circuits

Left Motor

Servomotor

Right Motor
Engineering Design
Sensor Circuits

Compass

Infrared Sensor
Engineering Design

Sensor Circuits

Salt Sensor

Limit Switch

Photoresistor

+5V

1kΩ

Vss
Engineering Design

User Interactives

Push Buttons

Piezo Speaker

Red LED
Engineering Design

Coding Aspect

[Hyperlink]
## Prototype Cost

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Conclusion

Summary

• **Snow Shoveling Robot**
  - Most efficient method of removing snow without labor
  - Creates a safe travel path
  - Inexpensive device
  - User Friendly
  - Capable for upgrades & modifications (open slots for new sensors)
Conclusion

Improvements

- Orientation of Basic Stamp to accommodate larger volume of salt
- More powerful motors
- Ability to remove snow on inclined surfaces
- Ability to bypass obstacles and impediments
- Treads made of Rubber
References

- http://www.parallax.com
- http://www.vexlabs.com
- http://www.acronym.com