

ME, ECE, IE Capstone Design Programs

Team #19: IEEE Region 5 Robotics Competition

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Background

- Every year IEEE hosts a robotics competition
- The competition was held in Denver, CO
- The competition required an autonomous robot that:
 - Navigates a "tunnel" with dead ends and obstructions
 - Maps and displays the "tunnel"
 - Investigates "buried caches" to uncover a die face

Robot Specifications

Size	10.5" x 11.5"x 8.5"
Weight	10 lbs
Battery Life	1 hour

Detection

- Wire antenna & EMF detection circuit for tunnel
- Camera for detecting die face
- Ultrasonic sensors for detecting obstructions



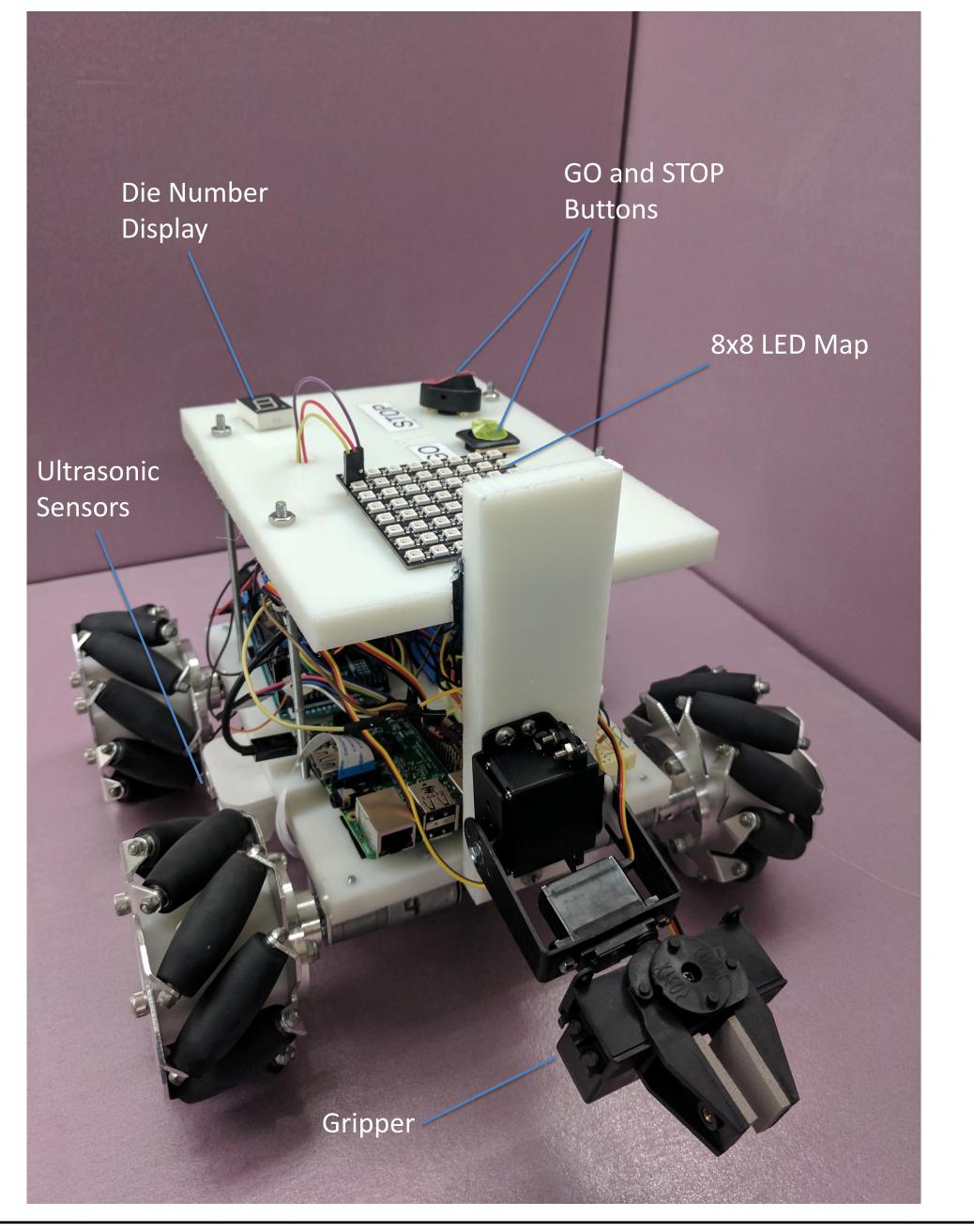
Ping))) Ultrasonic

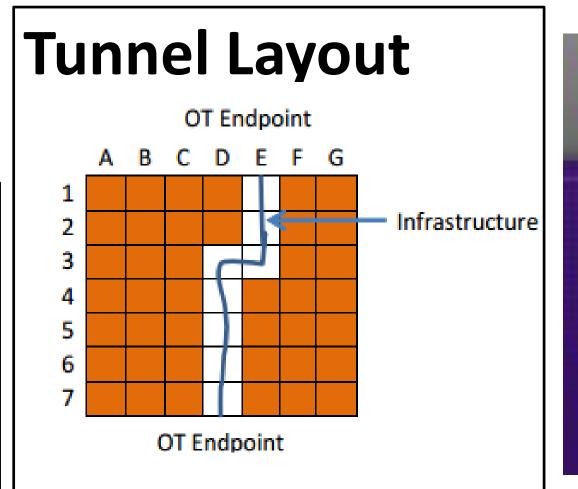
Distance Sensor



Raspberry Pi Image Sensor

Prototype

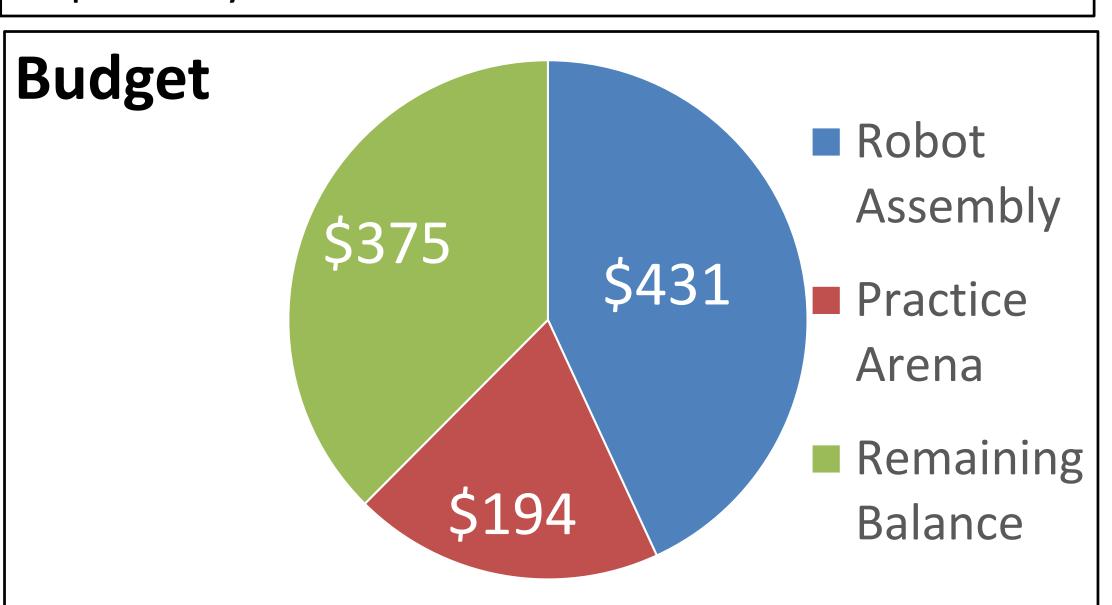






Power System

- 2x 12V 4.8Ah Lithiumion Battery
- 12 V, 6 V, 5 V Voltage Regulation
- Segmented motor power system



Control Hardware

- Raspberry Pi 2 B To handle die display, camera, & gripper
- Arduino Mega To handle sensor input, map display, & motor control





Arduino Mega

Raspberry Pi 2 B

Project Timeline

10/4/16 Concept
Generation

10/17/16 Concept Analysis

11/5/16 Embodiment January-17
Arena
Building

February-17 Parts Testing

March-17 Robot Assembly

4/1/17 Competition

Sponsors: Professor Gabriel DeSouza

Advisers: Dr. Manal Abdelwahab