Comparison of the Create and Kobuki Mobile Platforms

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Abstract

The iRobot Create has been a popular mobile platform in robotics education. This is due to its affordability and potential for expandability. Recently, the Kobuki, a new robotic platform from Yujin Robot, has reached the market and has become the mobile base for the TurtleBot 2 from Willow Garage, a personal robot kit using the ROS open source framework. In this project we developed a Kobuki driver for Tekkotsu, another open source framework designed specifically for robotics education. This allowed us to compare the Kobuki and Create platforms' accuracy and repeatability of trajectories.

Platforms Overview

Kobuki   Create

Features

Kobuki
- User Buttons (3)
- LEDs (2 bicolor)
- Wheels (2)
- Wheel Drop Sensors (2)
- Bump Sensors (3)
- Cliff Sensors (3)
- Accelerometer
- 3 Axis Gyro
- Max Speed: 700 mm/sec 180 deg/sec
- High Resolution Wheel Encoders (11.7 ticks/mm)
- Power Pickoffs: 3.3V, 5V and 12V
- Price: $350

Create
- User Buttons (2)
- LEDs (2 + 1 bicolor)
- Wheels (2)
- Wheel Drop Sensors (2)
- Bump Sensors (2)
- Cliff Sensors (4)
- IR Wall Sensor
- Omnidirectional IR Transceiver
- Bluetooth Module (optional, sold separately)
- Max Speed: 500 mm/sec
- Price: $220

Platform Movement Control

Kobuki
- Movement is controlled by setting a speed and a radius

Create
- Movement is controlled by setting a speed for each wheel motor

Odometry

Kobuki
- Provides a raw encoder value for each wheel (0.14 deg/tick)
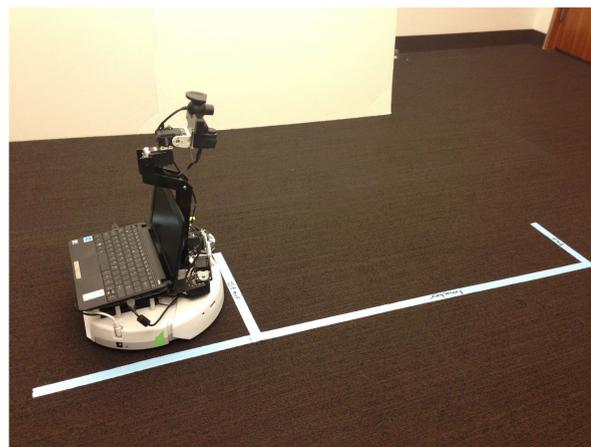- Odometry must be done in software

Create
- Odometry done on board
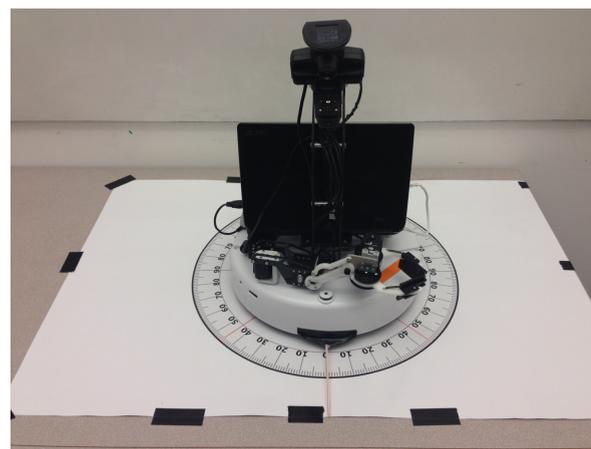- Reports cumulative distance traveled and degrees of turn

Methodology

- A Kobuki driver was implemented for Tekkotsu
- There were 10 runs conducted for each of eight trajectories shown in the table at right.

Forward

Turn

Results

Kobuki

Trajectory	Median	Standard Deviation
Forward 1000 mm	996.50	1.78
Forward 2000 mm	1995.50	1.57
Left Turn 30°	29	0.48
Right Turn 30°	31	0.74
Left Turn 90°	89	0.67
Right Turn 90°	89	1.43
Left Turn 180°	179	0.52
Right Turn 180°	179	0.63

Create

Trajectory	Median	Standard Deviation
Forward 1000 mm	979	10.20
Forward 2000 mm	1949	9.38
Left Turn 30°	31	1.58
Right Turn 30°	31	0.74
Left Turn 90°	91	1.25
Right Turn 90°	89	1.43
Left Turn 180°	180.50	2.21
Right Turn 180°	179	1.20

Conclusion

Our results show that the Kobuki is significantly more accurate and consistent than the Create. For the 1000 mm and 2000 mm trajectories the Kobuki undershot by 4 ± 1.65 mm. Turning, the Kobuki usually undershot by 1 degree. The Create undershot an average of 41 ± 10 mm. For turns, on average the Create was comparable to the Kobuki, but the standard deviation was higher. Thus, the Kobuki could be an attractive replacement mobile base for the Calliope, the standard Tekkotsu platform.

Acknowledgements

www.Tekkotsu.org   NSF   Universidad del TURABO