Odometry

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Odometry

1 Introduction

Odometry is a complicated topic. It had a long past and will have a long future. From a long time ago it has helped people. In the future and the present it helps with robots by making them more accurate. It is a type of programming that many do in Botball. The programming is easier and somewhat accurate. Odometry is an important concept in Botball.

2 Background

Odometry has improved over time. Like most things, we have gotten more advanced with it. Starting simple it grew to be more and more complicated.

2.1 The past

Odometry was directly linked to odometers. An odometer is an instrument that measures distance, which is what odometry, was limited to. The odometer was started by a Roman architect and engineer named Vitruvius. His idea was to mount a large wheel, which he knew the circumference of, in a small frame, when it was pushed along the ground it automatically dropped a pebble into a container each time the wheel made a full circle, which gave a measure of how much distance had been traveled. It was the first odometer. You could figure out distance using this device, however only simple directions could be used.

2.2 Progress

Odometry has improved from Vitruvius' devise. He only started the chain reaction of improvements. Odometers were used for many different things including ships and carriages. In 1854, Samuel McKeen designed another early version of the odometer. His innovation was attached to the side of a carriage and measured the miles. Slowly all the improvements added up and we got to the modern day odometer.

2.3 The Present

Today, you can find odometers and odometry in almost anything. We use GPS's in our cars, vacuum cleaners, basically anything that moves on its own. Odometry has improved too.

3 Use of Odometry in Botball

When you are programming, it takes a long time to get your robot to go an exact distance. That's why we make robot libraries. They how to move a perfect amount, how to make a robot go an exact distance or turn precise degrees. You can use odometry to get this to happen. This is helpful because when your programming it takes forever to get your robot to the perfect spot, it's always a little too much to the right or too much too the left.

4 Odometry

Now that we know the use and the background info, we can get into how it works. The main way is to use encoders. However, even in encoders, there are different types.

5 Encoders

An encoder is a device that converts data from one system of communication to another. There are 2 types of encoders BEMF and slot encoders.

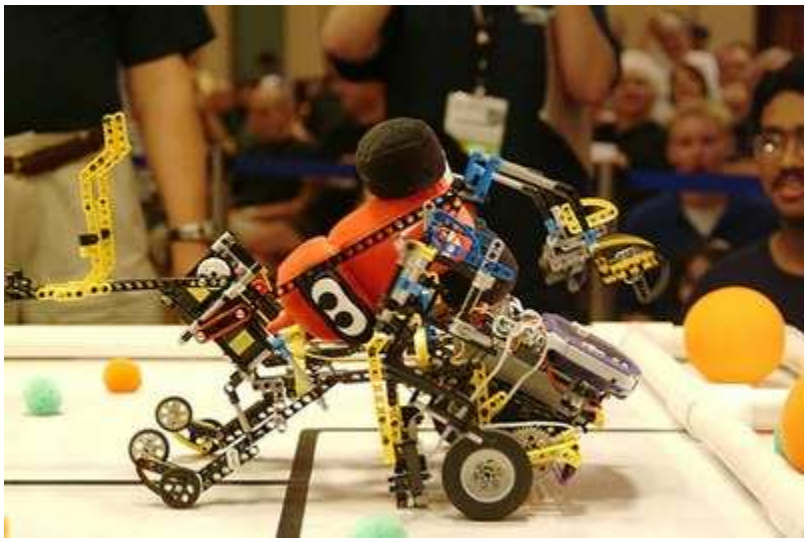
5.1 BEMF Encoders

BEMF stands for Back Electro Motive Force. It uses the power to tell how far you have gone. After you have gone the distance you wanted to go, it measures the battery power. This is effective on flat ground. It is accurate but complicated.

5.2 Slot Encoders

Slot encoders are more like the odometer Vitruvius created. They use the amount of times the wheels rotate to determine distance. For example the tick system is part. This is fairly simple and somewhat accurate. It uses the number of ticks to measure distance. Our team uses this method.

Pictures



This is a team that has Botguy. They needed programming to get to Botguy get him and bring him back. With the encoders it would take less time to figure out each move.

This team is not happy with their results. Their programming was not entirely accurate. Using encoders would make the robot more reliable.

6 Conclusion

Odometry is a complicated subject. It has many parts and pieces. Although it has evolved throughout the years, you can still see the similarities between the 1st and the most current odometer. However the evolution is not complete, the odometer will continue to get better and more advanced.

2 Submission Options

Follow the submission guidelines below:

1. .pdf – Adobe Acrobat. This is the preferred format. Be sure to include all fonts when you are creating your pfd file. Word documents and other file formats may not be used without prior approval by KIPR.

2. Your paper must be 6 pages or less and please do not number your pages.

3. Use Times New Roman font, 12 point type and 1" margins.

4. Your paper should be submitted online as per the instructions on the call for papers website. Please review the submission guidelines carefully.

References

[1] http://inventors.about.com/library/inventors/bl_Odometer.html

[2] Katy Seloff, How I Used Math In Botball: An Introduction To Odometry.

[3] http://www.acroname.com/robotics/info/articles/back-emf/back-emf.html