SENSORS

Your mouse is going to need sensors to tell it about itself and its environment. Odometyr is tabout how far the mouse has travelled.Open loop control is used with stepper motors. DC motors can take advantage of more sophisticated closed-loop control systems

Sensing Strategies:

Sideways and front looking distance measurement

Sideways and front looking wall presence measurement

Down looking wings sensors

Combination of above

Best Choice:

Sideways and front looking wall presence measurement.

Placement and no of sensors

Wall sensors are used to detect the presence or absence of walls and to verify your position in the maze. They will also be important in ensuring that the mouse maintains an appropriate path without hitting any walls. For wall sensors, it may be more important to have good repeatability that absolute accuracy. The key is to avoid hitting anything. Thus it does not matter as much if you run with a small error as long it does not grow.

It is important to make sure that you place wall sensors well in front of the driving walls, or at least, the centre of rotation of your mouse. The greater this distance, the better your ability to maintain a straight course down the centre of the maze cells.

You will want to sample the sensors constantly while the pose is moving for good positional control. There are some key places/time for sampling. Detecting the existence of walls for mapping might be best done in the middle of a cell while positional sensing may be best done at the end or edge of a cell as there will not be a wall in every cell.

Sensors that look down over the walls may be designed to look for walls in adjacent cells as you pass a post. Done reliably, this could seriously reduce the need to run aound map building.

Forward looking sensors are essential to allow you to detect walls before you run into them. You will need to wirk out forward position sensing and speed so that, while exploring, you dont go so fast that you are unable to stop when a wall is detected. Forward sensors also give you a positive positional reference for calibrating sensors. As you approach a wall, you can creep up to it until a known position is reached. This should represent a multiple of 180mm from the last starting point regardless of what your wheel sensors say.

There may be some advantage to having two sets of forward sensors as they not only provide some redundancy but can be used to detect offset errors.

If you want to be able to run down diagonals you will have to be sure that your sensors are up to it. Side-looking sensors will be less effective when looking at posts at an angle. Top-down sensors need to be able to detect over a much greater range of distances.

IR SENSOR:

A Passive InfraRed sensor (PIR sensor) is an electronic device which measures infrared light radiating from objects in its field of view. PIR sensors are often used in the construction of PIR-based motion detectors (see below). Apparent motion is detected when an infrared source with one temperature, such as a human, passes in front of an infrared source with another temperature, such as a wall.[1]

All objects emit what is known as black body radiation. This energy is invisible to the human eye but can be detected by electronic devices designed for such a purpose. The term passive in this instance means the PIR sensor does not emit energy of any type but merely passively accepts incoming infrared radiation.

ULTRA SENSOR:

Ultrasonic sensors (also known as transducers when they both send and receive) work on a principle similar to radar or sonar which evaluate attributes of a target by interpreting the echoes from radio or sound waves respectively. Ultrasonic sensors generate high frequency sound waves and evaluate the echo which is received back by the sensor. Sensors calculate the time interval between sending the signal and receiving the echo to determine the distance to an object.

This technology can be used for measuring: wind speed and direction (anemometer), fullness of a tank, and speed through air or water. For measuring speed or direction a device uses multiple detectors and calculates the speed from the relative distances to particulates in the air or water. To measure the amount of liquid in a tank, the sensor measures the distance to the surface of the fluid. Further applications include: humidifiers, sonar, medical ultrasonography, burglar alarms, and non-destructive testing.

Systems typically use a transducer which generates sound waves in the ultrasonic range, above 20,000 hertz, by turning electrical energy into sound, then upon receiving the echo turn the sound waves into electrical energy which can be measured and displayed.