**XENTRINOBOT 101**

**Christopher M Coballes**

Hi-Techno Barrio

**PREFACE**

**CHAPTERS**

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**Introductions to Robotics and ROS**

Explanation

Resources Github/Bitbucket

Documentation ROS Wiki

References.

**Download and Installing ROS package**

Testing ROS installations

How to add from source or GitHub

Compiling ROS

ROS protocol and work flow

**Understanding ROS**

ROS Structures

ROS Node, Services and messages

ROS Client and server

Open source ROS

**2WD Differential Drive Robot**

Computing on 2WD Robots

Kinematics

Inverse Kinematics

**Design of 2WD Differential Drive Robot**

Base/Frame CAD

Wheel CAD

Caster Wheel CAD

Sensor /Lidar CAD

**Simulation of 2WD Differential Drive Robot**

URDF

XACRO

CAD Import

**Simulation of 2WD Differtial Drive Robot in Gazebo**

ROS + Gazebo

Gazebo GUI

Gazebo Plugin

Gazebo Physics

**Building a 2WD Differential Drive Robot**

***Software:***

RVIZ

XACRO

GAZEBO

C/C++ /Python

***Hardware:***

Motor plus Encoder

Controller board

Battery

Microcontroller

**ROS Launching Program and Data Structures**

Definition as executions

Launch file and its directory

Launch file and its argument

Launch file and its default settings

**Testing ROS Examples on XentrinoBot -101 assembly**

ROS + Microcontroller

ROS + Motor

ROS + Encoder

ROS + IMU

ROS + Input Control

**Calibration of XentrinoBot 101**

PID

Gyro

Acceleration

Distance

**Running XentrinoBot 101 on ROS**

Running Calibration and Precision on XentrinoBot 101 movements for the 2nd time

Running XentrinoBot 101 Laser Scanner or Sensors

Running XentrinoBot 101 Gmapping

Running XentrinoBot Move Base /Navigation

**Additional XentrinoBot 101 ROS features**

Integrating MacRon Lidar

Integrating Video Camera

XentrinoBot 101 WayPoint Navigation