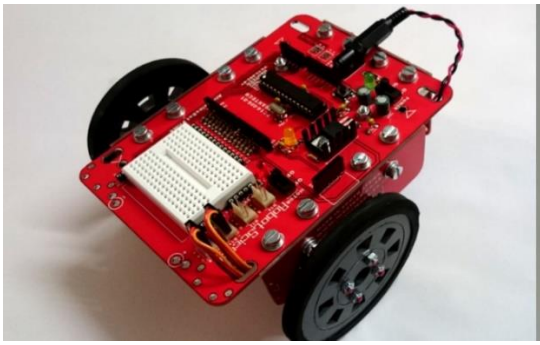
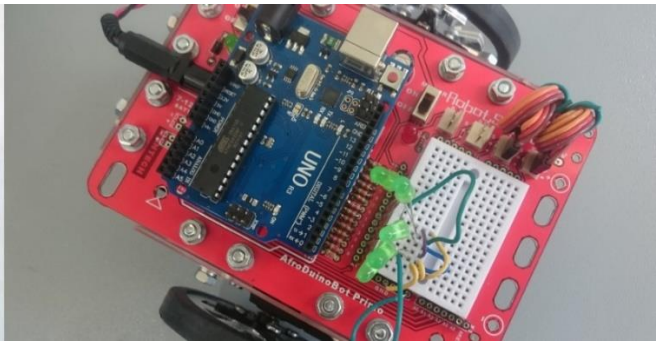
ROBOTICS 101





HANDBOOK 1:

BASIC ELECTRONICS
PROGRAMMING MICROCONTROLLERS
ROBOTICS and MECATRONICS

COACH MICHAEL ETTERSHANK

An introduction to desktop robotics and mecatronics, including how to source the parts required to assemble your first robot, how to solder the electronics and build the chassis, how to write and upload text-based program code, how to wire up and understand sensors, how to build and prepare for robotics competitions and a career in engineering

Title: Robotics 101: Handbook 1

Author: Michael Ettershank

Publisher: Michael Ettershank

Distributor: Mantech.co.za

+27 82 962 2772

info@robotscience.co.za

COPYRIGHT NOTICE

WHISTLEBLOWER POLICY

The age of the internet has seen wholesale copying of entire textbooks, making it very difficult to justify the cost of creating quality training. Copying intellectual property [IP] and copyrighted texts is not a 'victimless crime' as it directly hurts those who create quality content, discouraging development of QUALITY training.

Progressive countries have realised the value of encouraging folks to create quality training, and will award damages and legal costs when the law is broken. If you become aware this work has been copied illegally, please delete it and obtain a legal copy so we can produce more quality training. If you become aware of an organisation using this textbook illegally and you notify us, you will be awarded 50% of any damages that we receive from the ensuing lawsuit to prevent illegal copying.

If there are topics you would like us to include in future volumes in this training series, or if you are aware of an organisation using this textbook illegally, please contact us on info@robotscience.co.za.

ROBOTICS 101 HANDBOOK 1

TABLE OF CONTENTS

WORKSHOP 1: Getting Started

WORKSHOP 2: Prototyping Breadboards

WORKSHOP 3: Soldering 1

WORKSHOP 4: Soldering 2

WORKSHOP 5: Sensor Basics 1

WORKSHOP 6: Sensor Basics 2

WORKSHOP 7 and 8: Electronics Build

WORKSHOP 9: Robot Assembly

WORKSHOP 10: Dead Reckoning

WORKSHOP 11: Maze Competition

WORKSHOP 12: Fault Finding

WORKSHOP 1

Introduction to Robotics

WORKSHOP 1.1: Getting Started

WORKSHOP 1.2: Hello Text Software

WORKSHOP 1.3: Flash LED on D13

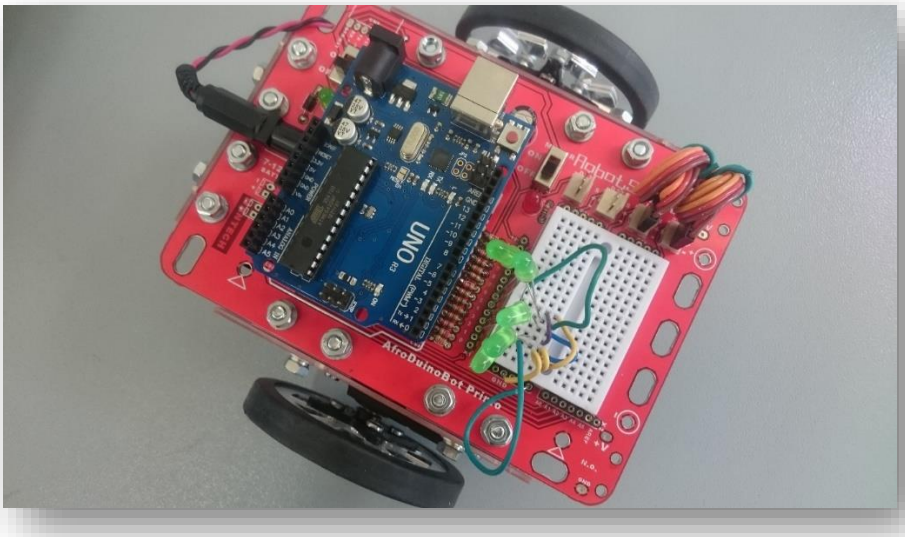
WORKSHOP 1.4: Counting

WORKSHOP 1.5: Robot Motors FWD

WORKSHOP 1.6: Motors LEFT and RIGHT

WORKSHOP 1.7: Calibrate Motors

WORKSHOP 1.8: Motor Calibration in Software



WORKSHOP 2

BREADBOARD CIRCUITS

WORKSHOP 2.1: Mini Breadboard

WORKSHOP 2.2: Bigger Breadboards

WORKSHOP 2.3: Hand Tools

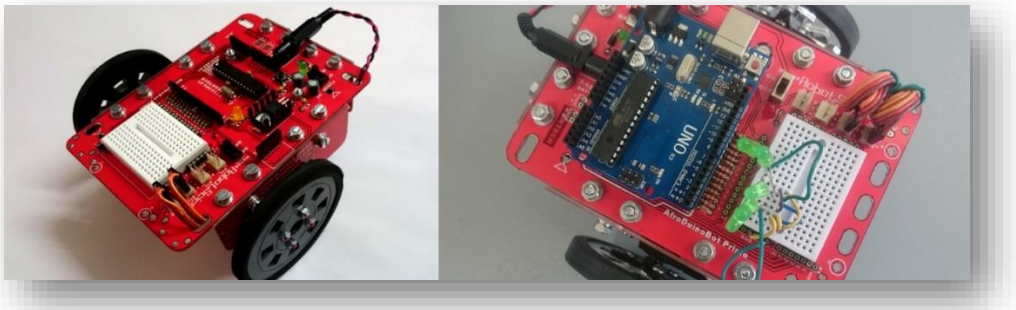
WORKSHOP 2.4: Circuit on Breadboard: Flasher

WORKSHOP 2.5: Breadboard Switch Circuit

WORKSHOP 2.6: Breadboard LED Circuit

WORKSHOP 2.7: Sensor on Breadboard

WORKSHOP 2.8: Two Sensors on Breadboard



WORKSHOP 3

SOLDERING FOR ELECTRONICS: 1

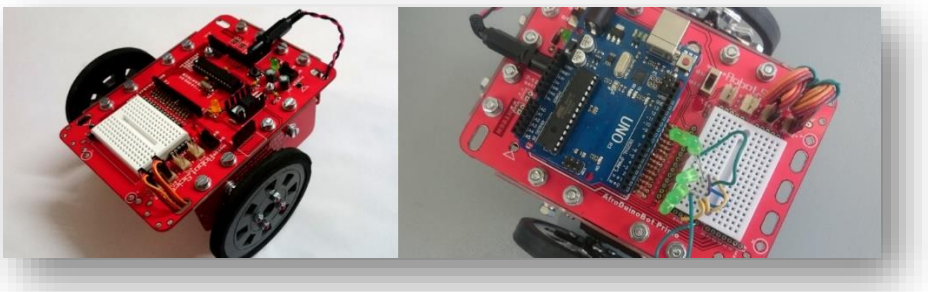
WORKSHOP 3.1: Introduction to Soldering

WORKSHOP 3.2: Good Soldering Iron

WORKSHOP 3.3: A Bad Solder Iron: Do not Buy!

WORKSHOP 3.4: Solder Practice: Shapes

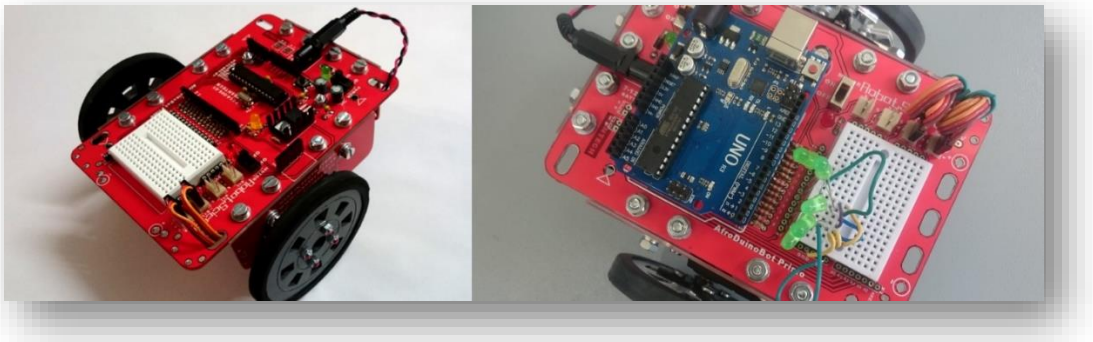
WORKSHOP 3.5: Soldering: Two LED Flasher



WORKSHOP 4

SOLDERING FOR ELECTRONICS: 2

A Two Transistor Flasher on Veroboard



WORKSHOP 5

SENSORS 1: THE BASICS

WORKSHOP 5.1: Binary Electronics

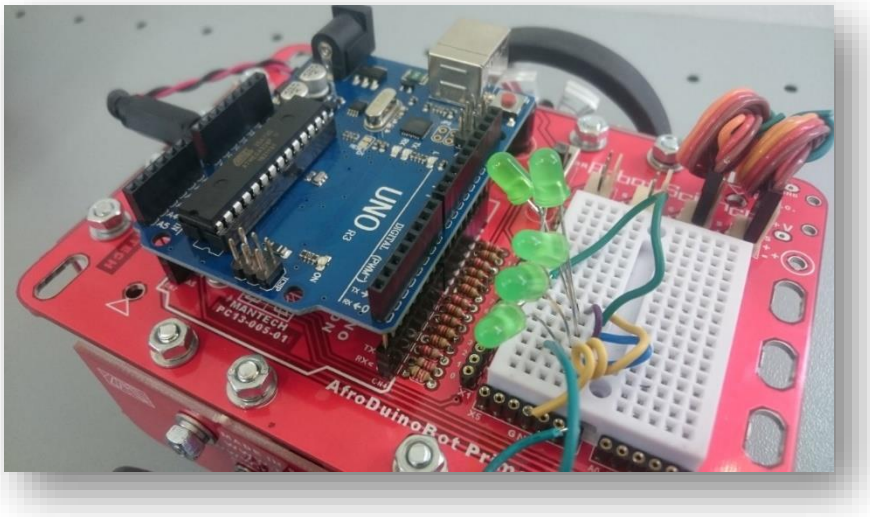
WORKSHOP 5.2: Series and Parallel Circuits

WORKSHOP 5.3: Voltage Divider Circuits

WORKSHOP 5.4: Digital Input: Pull Down Resistor

WORKSHOP 5.5: Input Serial Monitor

WORKSHOP 5.6: Transistor Switch



WORKSHOP 6

SENSORS 2: A LINE FOLLOWING MODULE

WORKSHOP 6.1: Analogue Inputs

WORKSHOP 6.2: The Photo Transistor

WORKSHOP 6.3: Light Sensitive Robot

WORKSHOP 6.4: Line Module

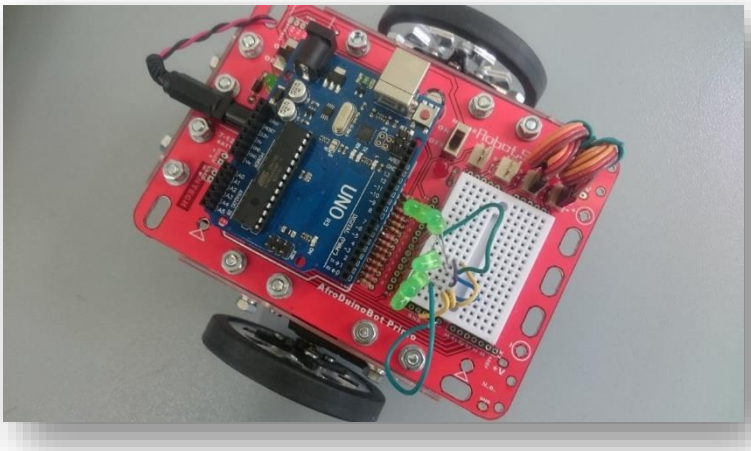
WORKSHOP 6.5: Module Serial Test

WORKSHOP 6.6: Line Follower Explained

WORKSHOP 6.7: Serial Monitor View

WORKSHOP 6.8: Three Sensor Code

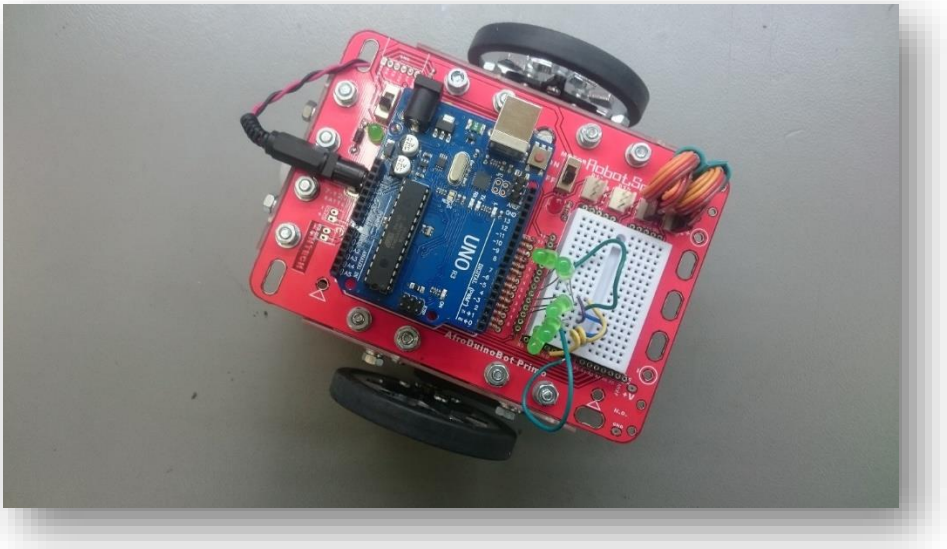
WORKSHOP 6.9: Sensor Indicator LEDs



WORKSHOP 7 + 8

THE CONTROLLER ELECTRONICS

Build the PCB Controller Chassis [Two Sessions]



WORKSHOP 9

ASSEMBLING THE ROBOT

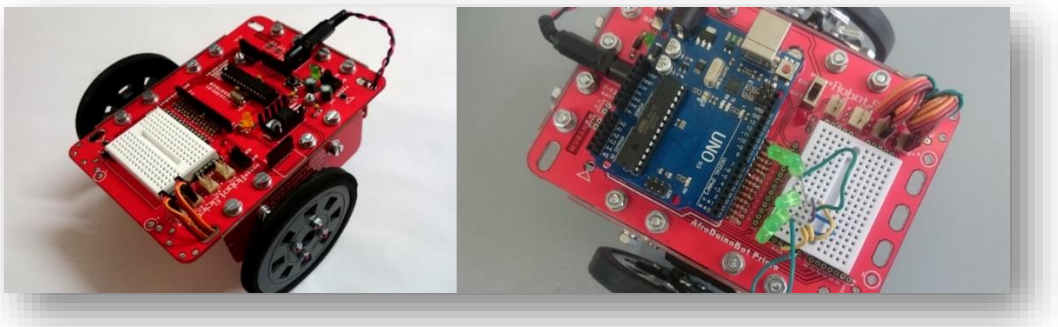
WORKSHOP 9.1: Assemble the Chassis

WORKSHOP 9.2: Assemble the Wheels

WORKSHOP 9.3: Connect the Motors

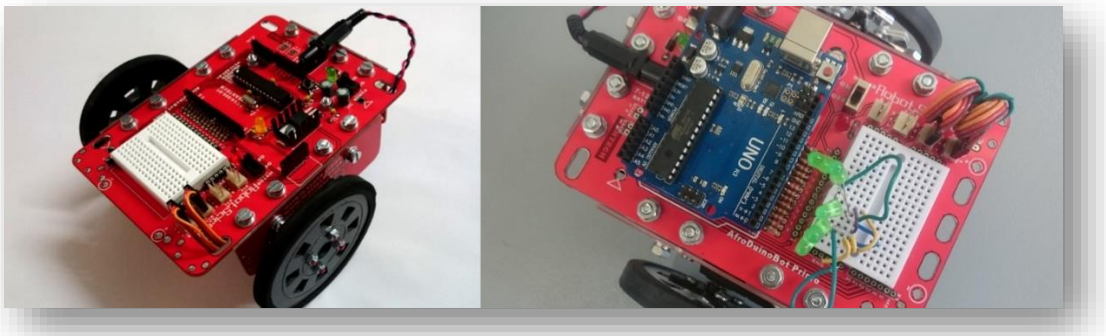
WORKSHOP 9.4: Calibrate the Motors

WORKSHOP 9.5: Test the Motors



WORKSHOP 10

NAVIGATION: DEAD RECKONING



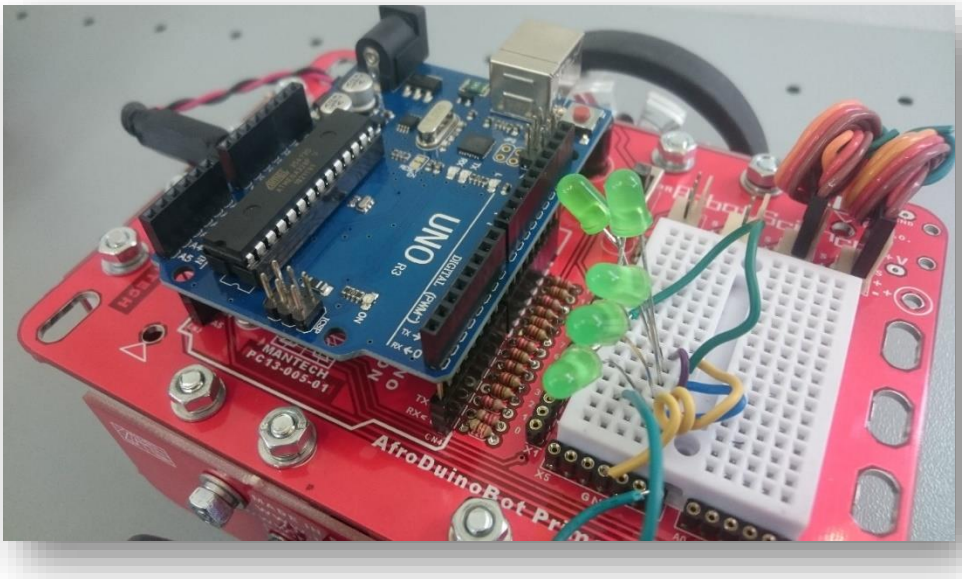
WORKSHOP 11

A DIY ROBOTICS COMPETITION

WORKSHOP 11.1: A Maze with 45 Deg Turns

WORKSHOP 11.2: Robotics Competitions

WORKSHOP 11.3: Competition Rules



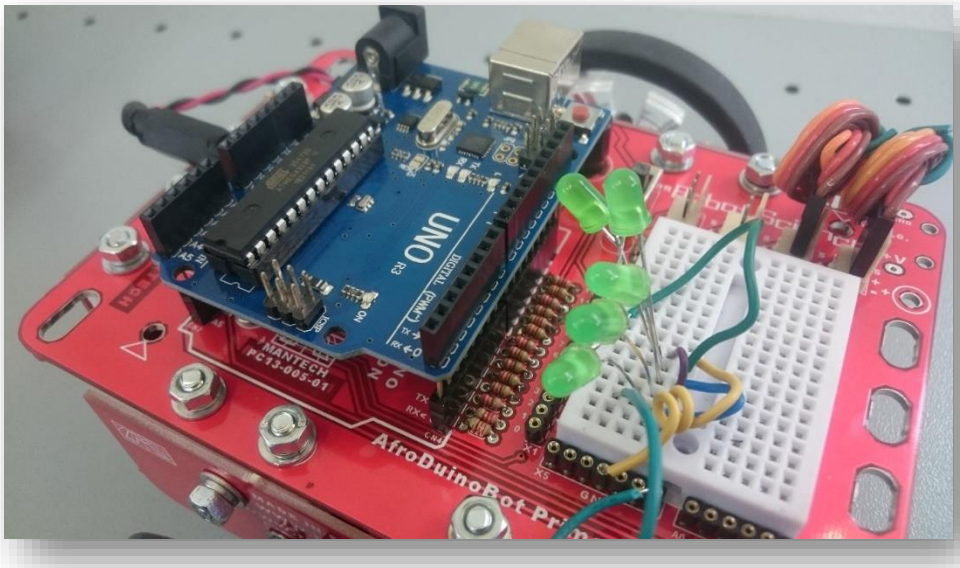
WORKSHOP 12

FAULT FINDING and PARTS LISTs

WORKSHOP 12.1: Fault Finding

WORKSHOP 12.2: Primo Robot Parts List

WORKSHOP 12.3: Tools List



Thank you for purchasing this robotics textbook. By making this purchase you are supporting the production of more exciting textbooks in this series.

In ROBOTICS 101 HANDBOOK 1 you will learn the essential basics that you require to embark on an exciting career in electronics, robotics and mechatronics. We have taken great care that there's not too much theory, and lots of practical learning activities including how to build circuits, how to build and program your first robot. In this series we are planning to teach you about basic machine learning, how to design and 3D print add-on equipment and prepare you for an exciting career.