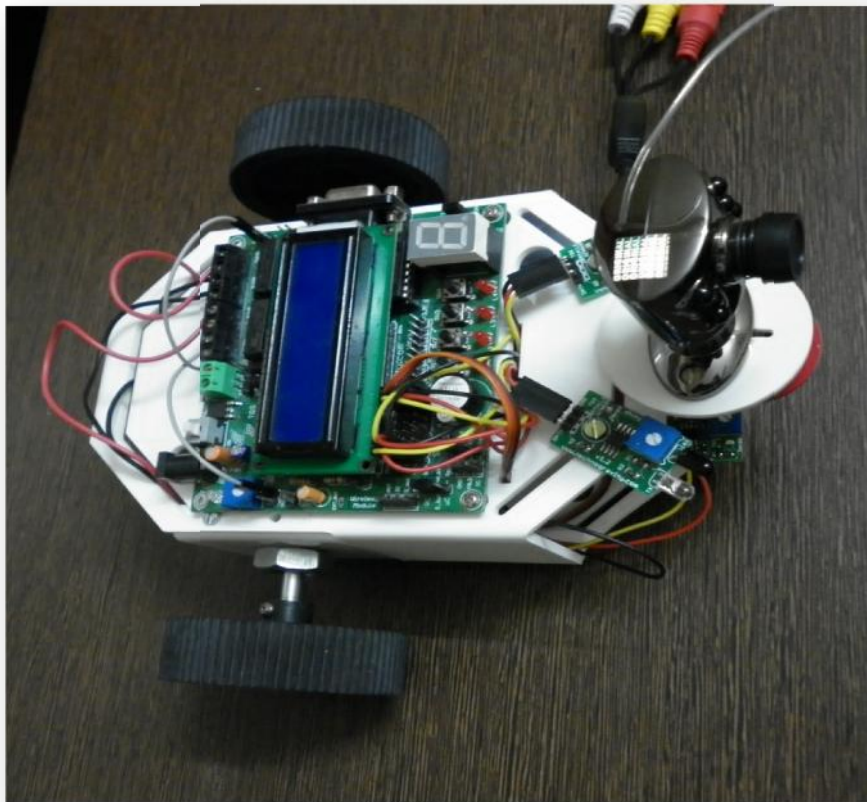


TECHNO  
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# AURO



## AURO – Autonomous Robotics

### Description



Autonomous robotics is the ulterior motive of learning Robotics. AURO is the best way of learning how to make an Autonomous Robot along with understanding the nuances of programming.

Autonomous Robot is actually what the world perceives as “Robotics”. It is a sub-topic of Automation and Technology. This course teaches a student how to make one’s own Autonomous Robot. The unique feature of this course is that at the end of the course every student has a distinctive design, one which is self-created.

We delve into world of Automation, then moving on to microcontrollers which form the brain of an Autonomous Robot. Then we move into the world of programming. With a brief orientation of assembly coding, we learn about Programming in depth through two unique and largely used methods - Visual coding and embedded C coding.

Thus we cover the programming aspects more exhaustively; visual coding helps to develop smart and strong algorithms, whereas Embedded C coding helps in development of core and complex programs.

Finally we learn 2D designing to help create exclusive designs. 2D designing is very useful in creating the body parts of a robot, as the designs will be required by industrial manufacturers to process them on any material (usually through laser cutting).

Thereby it also involves engineering drawing and its implementation.

Smart-e is our Autonomous robotics and project development board, thereby giving higher utility from one board. We use this smart board as the core circuit of our Autonomous Robot; which is based on 8051 micro-controller and embedded with various components.

8051 core helps in making programming simpler and along with Embedded C programming it will be more interesting. You do not require C language basics; we will do the needful for every student.

The sensors used are specially designed by TGS to suit your Robot. We have IR sensors for as the basic proximity sensor; although we can use it for our custom application interface.

Join the Course & be distinct!

Every participant to undergo Internship at TGS Center.

## Course contents summary



1. Embedded Systems
2. Peek into Micro-controllers
3. Programming: RS-232 Protocol
4. Embedded C Coding
5. Smart-e Board Project Mapping
6. Environment Sensing
7. UID – User Interface Display
8. Navigation
9. Alarm Systems
10. Developing Prototype Models
11. 2D Designing
12. Computer Aided Designing

## Duration



32 hrs. in total for the workshop.  
Includes 8 hrs. of internship @ TGS.

Theory : Practical = 30 : 70

8 days X 4 hrs. per day i.e. 8 sessions in all.

## Benefits from the workshop



1. Autonomous Robotics is the first of many steps into the field of Advanced Robotics, which in true analogy is considered as the basics of Robotics.
2. It involves understanding and implementation of various basic modules of Robot, analyzing its behavior dependant on user program and developing programs to derive mobility for a robot.
3. Embedded C programming on 8051 core micro-controller helps in understanding the basic steps involved in micro-controller based project and applications design.
4. It helps to explore and compare robot programming and software programming; how hardware control takes place due to the same.
5. Understanding how to control a circuit using computer, how to burn codes into micro-controllers helps in further development in real time robot design and implementation.

## Kit contents – Summary



Sr. no.	Kit contents	Per kit
	<b>Components</b>	
1	Smart-e Board	1
2	uC - P89V51RD2	1
3	DB - 9 Cable	1
4	DC Geared Motors – 150 rpm	2
5	Wheels – 2" (lines)	2
6	Chassis (Complete)	1
7	LED Headlights - PCB	1
8	Caster wheel	1
9	Nut Bolts & spacers	N
	<b>Sensors</b>	
10	IR Line Sensors	2
11	IR Proximity Sensors	2
	<b>Accessories</b>	
12	Screw driver (minus)	1
13	Rechargeable Battery - 9.6 V 1A	1
14	SMPS 12 V 1A + charger pin	1
	<b>Packaging</b>	
15	Carry case	1
16	Folding Bag	1
	<b>Reference</b>	
17	Manual + CD	1

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## Course Contents (detailed)

### 1. Embedded Systems

1. Embedded overview
2. Elements
3. Types & controls
4. Real world systems
5. Micro-controller systems
6. Automation introduction
7. Industrial Automation

### 2. Peek into Microcontrollers

1. Comparison to u-processors.
2. Overview of available uCs
3. 8051 core
4. Special Function Registers
5. Pin/Port Description
6. Various Features

### 3. Programming : RS-232 protocol

1. Protocol Overview
2. Components & chips for interface
3. Serial Communication
4. ISP : In-system programming
5. UART
6. Hyper Terminal

### 4. Embedded C coding / programming

1. C,C++ overview
2. Comparison to assembly & visual programming
3. Header files
4. SDCC
5. Macros & Functions
6. Loops & conditions
7. Structuring
8. Compilers
9. Algorithm & flowchart Design
10. Delay function coding

## 5. Smart-e Board Project Mapping

1. Mother board features
2. Port Mapping
3. Power Supply Paths
4. Board expansion
5. Project Design considerations
6. Multiplexing

## 6. Environment sensing

1. Study of different types of sensors
2. Proximity sensors
3. Infra-red
4. Range selection
5. Sensor selection criteria
6. Interfacing Proximity Sensors

## 7. User Interface Display - UID

1. Types of Displays
2. LCD Overview
3. Bit-level Commands
4. LCD Interfacing + programming
5. Rotating & Menu display
6. LED Displays
7. Segment & pattern display
8. 7 segment Display - SSD
9. SSD Interface + programming
10. Counters & Timing display

## 8. Navigation

1. Components for Navigation
2. Auto navigation
3. Collision Avoidance
4. Object & path following
5. Exploration
6. Mapping
7. Fixed distance navigation
8. Designing basic systems

## 9. Alarm Systems

1. Basic algorithm & flowchart
2. Sense & react mechanism
3. Buzzer system
4. Fire alarm
5. Proximity alarm
6. Count alarm
7. Theft alarm

## 10. Developing prototype models – overview

1. CAD Designing
2. General Purpose PCB Design
3. Main circuit board PCB Design
4. Documentation

## 11. 2D Designing

1. Units and dimensions
2. Basic Geometry
3. Polygons
4. Cartesian Co-ordinate Systems
5. Basic Plotting of 2D shapes
6. Orthographic Designing

## Few Applications overview

1. Visual basic control
2. Industrial Arm
3. Conveyor systems
4. Wireless control
5. Voting machines
6. Password Protection systems
7. Automatic wash control
8. Unmanned Aerial Vehicles – UAV