



NepaTronix

"A one step solution"



CONTACT@NEPATRONIX.ORG



+977 9803661701

Proposal for Basic, Mid-Level, and Advanced Courses of Artificial Intelligence, Machine Learning and IoT V1.0

Raju Shrestha

CEO and Founder

Contact: +977 9803661701

Location: Manhoraphant-1, Jadibuti, Bhaktapur

Email: razushrestha9335@nepatronix.com

Email: contact@nepatronix.com

<http://www.nepatronix.org>

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List of Abbreviations

AI: Artificial Intelligence

ML: Machine Language

IoT: Internet of Things

PCB: Printed Circuit Board

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1. Introduction

NepaTronix is a growing Information Technology-focused organization specializing in Artificial Intelligence, Machine Learning and Robotics. Developed with the mission of technology for beneficial mankind, this organization is an outcome of IoT developers, network engineers, and web and AI developers, vigorously working to make the better use of computer and information technology for the better of mankind.

Every nation should have a better understanding of these developing fields of study given how AI and robotics are consuming the 21st century. By providing comprehensive knowledge of AI, ML, and robotics along with Internet of Things (IoT), printed circuit board (PCB) design, and drone training under a single platform, NepaTronix is working to create creative minds that produce innovative ideas for the advancement of society and the country as a whole.

Our expertise is in development of high-end devices using IoT, automation and instrumentation. We concentrate on creating and producing goods that benefit Nepalese society. Sanitary pad vending machine, electronic e-commerce website, smoke filtration machine, automatic water controller, smart curtain slide is some of our products that have been widely appreciated and used in Nepalese community. Our goal is to educate the next generation in IoT, robotics, AI, and machine learning so that our country can be innovatively self-sufficient to some extent. Similar to that, we also offer internal product sales, e-commerce components, lab setup for engineering colleges, and digital marketing services for businesses. We have currently completed more than 24 projects for over 26 satisfied clients.

2. Technical Proposition

2.1 Background of the project

Artificial Intelligence, Machine Learning and Robotics are ever-evolving subjects. The scope and syllabus of these subjects will always be expanding as long as the globe will be run by computer and technology and that will be for many decades along. With popularity of these courses but lack of proper platforms to obtain systematic knowledge, this project is defined to attend to this very need. Our project is focused on learners who are seeking to learn AI, ML, IoT and Robotics from basics to the advanced level. This course is suitable for both the beginners and those who are already acquainted with the basics of the AI, ML, IoT or Robotics and want to excel and explore more.

2.2 Course Delivery

2.2.1 Course Introduction

We provide beginners, intermediate and advanced courses of AI, ML ,IoT and Robotics to students of high school, Bachelors' level or technical students from technical school.

2.2.2 Artificial Intelligence

Computers can perform tasks that traditionally require human intelligence through the use of artificial intelligence (AI). To do this, algorithms must be developed to categorize, delve into, and make predictions from data. It also entails responding to data, gaining knowledge from fresh data, and advancing over time.

This course focuses on in-depth study of AI, uses and algorithms.

2.2.3 Machine Learning

Machine learning is an application of artificial intelligence (AI) that gives systems the capacity to automatically learn from experience without being explicitly programmed. The goal of machine learning is to create computer programs that can access data and use it to learn for themselves.

This course focus on teaching students how to create computer programs.

2.2.4 Robotics

The field of technology known as robotics focuses on the creation, use, and application of robots as well as the development of computer systems for their control, sensory feedback, and information processing. These technologies deal with automated devices that can replace people in hazardous settings or production procedures or that resemble people in terms of appearance, behavior, or cognition.

The goal of the robotics course is to teach students how to build, use, and apply robots for a better future.

2.2.5 Internet of Things

Internet of Things refers to a network of physical objects or things that have sensors, software, and other technologies built into them in order to connect to and exchange data with other systems and devices over the internet. These gadgets can be simple household items or highly developed industrial tools.

The goal of the course is to give students a thorough understanding of IoT and how to apply it to building systems.

2.2.6 PCB Design

A printed circuit board (PCB) is an electronic circuit used in devices to provide mechanical support and a pathway to its electronic components. It is created by layering different non-conductive sheets, like fiberglass or plastic, that are good at holding copper circuitry.

Electronic circuits come to life in physical form with printed circuit board design. Component routing and placement are combined with layout software during the PCB design process to specify electrical connectivity on a manufactured circuit board.

Learners can learn about PCB, its applications in electrical devices, as well as its various types and designs, through PCB design courses.

2.2.7 Drone training

From the fundamentals of flight to more specialized topics like how to operate drone safely and how to prevent accidents, drone training covers a wide range of topics.

The course emphasizes teaching different drone types, their applications, usage, and how to actually construct and operate drones.

3. Course Design

Each course's syllabus for courses related to AI, ML, robotics, IoT, PCB design, and drone training is created to give students detailed understanding of the subject. According to their needs and preferences, students can learn the subject at hand by choosing from one of the following levels: 1. Basic Level

1. Intermediate Level

2. Mid-Level

3. Advanced level

For a detailed course syllabus, please see the attached document.

3.1 Course Instructors

Our teaching faculty consists of professionals in their fields who have in-depth knowledge of AI, ML, IoT, PCB design and drone training.

Raju Shrestha- [Robotic and IoT]

Nabin Dahal- [AI and ML]

Saroj Chaudhary – [Robotic, IoT and PCB]

Himal Dahal- [AI and ML]

Bibek Kumar Ganesh - [Hardware and PCB]

Manu Shrestha (Python with Django)

3.2 Course Duration

Course duration varies as per the course level.

Basic Level: 3 days' workshop

Mid-Level: 1 week workshop

Advanced Level: 2.5-month workshop

3.2.1 Teaching Methods

Our teaching approach is entirely practical because we think that learning happens best when it is done. Through group discussions, brainstorming, and self-activity, we encourage learning.

3.2.2 Evaluation

Students are evaluated on basis of capstone project. The project offers a one-of-a-kind chance to conduct independent group research and come up with a creative answer to a pressing problem. The capstone project plays a crucial role in preparing students for the working world due to its practical applications and ability to help students hone their professional knowledge and skills.

3.2.3 Aftermath of the course

With in-depth knowledge of the AI, ML, or Robotics, students will be more confident and enthusiastic to learn and innovate. With the group discussions and capstone projects, students will get opportunities to explore their imagination with guidance from the instructors. Since the instructors are always ready to help, students can have proper guidance at the proper time.

Completion of the advanced level courses in the AI, ML, IoT, PCB design and drone training benefits in following ways:

- Prepares students for the working world
- Enhances resume and makes oneself more competitive as a candidate

- Experience of valuable practical experience
- Skill enhancement

Also, students will receive a certificate of completion once the course is finished. Students that are inventive and interested can also be given the chance to work for NepaTronix.

4. Financial Proposal

Table 1 NepaTronix proposes the following for the courses.

Courses	Basic Level (Rs.)	Mid-level (Rs.)	Advanced level (Rs.)
Machine Learning	35,000	65,000	1,80,000
Artificial Intelligence			
Internet of Things	35,000	65,000	1,80,000
PCB Design	40,000	50,000	1,50,000
Drone Training	35,000	65,000	1,80,000

5. Course Syllabus

Table 2 IOT/Robotic class course content

S.N	Topic	Hardware Required	Software Required	Time
1.	Fundamental Of Electricity ✓ Electric Charge ✓ Electric Current ✓ voltage ✓ Energy ✓ Power	none	none	1hr
2.	Type of Energy source ✓ Generator ✓ Hydropower ✓ Dynamo ✓ Battery	none	none	1hr
3.	Basic Electronic Component ✓ Transistor ✓ Resistors ✓ Battery ✓ Electric Motor ✓ Buzzer ✓ sensor ✓ Switches ✓ Diode ✓ color code ✓ capacitor	Transistor Resistors, Battery Electric Motor, Buzzer, sensor Switches, Diode color code, capacitor	none	2hr
4.	Introduction to the Arduino	Arduino and its cable	Windows 8 or higher	1hr
5.	Microcontrollers and how they work ✓ How microcontroller differ from PCs ✓ How microcontrollers are programmed ✓ How microcontrollers interface with sensors (e.g., Button) and actuators (e.g. motors) Windows	none	Arduino IDE	1hr

6.	The structure of Arduino sketches ✓ How the Arduino sketch is transformed into working code ✓ How a compile Arduino sketch is loaded and run ✓ Arduino sketch as problem solving	none	Arduino IDE	1hr
7.	Practical digital electronics by example ✓ Microcontroller digital	Arduino UNO, switch, push button, connector wires, Bread board	Arduino IDE, windows 8 or higher	2hr

	✓ input/output(I/O) ✓ Ports and I/O pins Wiring up switches and push buttons ✓ Events and action-deciding what to do when a button is pressed or switch is turned on ✓ Doing more fancy things with multiple buttons and multiple LEDs			
8.	Functions and variables explained o Function as a means of reusing code ✓ Variable as a means of remembering values and passing information into function ✓ Function as a means of providing" functionality"- a survey of the various functions o Functions that return values ✓ Devising your own function ✓ Comparing values and comparison operator ✓ Logical expressions and logical operator	Arduino Uno, potentiometer (10K-ohm), LRDs, connecting wires, Bread board	Arduino IDE, windows 8 or higher	2hr

	✓ Making decision using if else statements and switch statements			
9.	Timer and their uses ✓ Using timer to flash an LED(s) ✓ Using for loops and while loops to repeat pieces of code ✓ Experimenting with “interesting” lighting effects	LEDS, connecting wires, Bread board	Arduino IDE, windows 8 or higher	2hr
10.	Reading analog value- analog to digital conversion ✓ How analog to digital conversion works ✓ Configuring pins for analog input ✓ Capturing analog values ✓ Reading a variable potentiometer by measuring the voltage across it ✓ Representing an integer value in binary	LEDs, sonar sensor, bread board, connecting wires, IR sensor, LDRs	Arduino IDE, windows 8 or higher	1hr

11.	Controlling Power output using pulse width modulation (PWM) ✓ The Arduino analog output using PWM output o Using PWM to vary the intensity to an LED ✓ Using a variable potentiometer- to dim and brighten LEDs by converting its resistance to suitable PW analog output value	none	Arduino IDE, windows 8 or higher	2hr
12.	Introduction to driving device requiring higher voltage or currents than can be directly handle by the microcontroller ✓ Low voltage DC motor ✓ Servo ✓ Relay	none	Arduino IDE, windows 8 or higher	3hr
13	Introduction of Raspberry PI Raspberry Pi programming ✓ Python programming basic circuit connection with raspberry-pi ✓ 2-3 raspberry pi project	Raspberry-pi, HDMI cable, Desktop, mouse, keyboard	Rasbian	5hrs
14	IOT projects 10-15	None	none	5hrs
15	Project presentation by student	None	None	2hrs

Table 3 PCB Course Syllable

S.N.	Topic	Hardware Required	Software Required	Time
1	Introduction of PCB? ✓ Why PCB? ✓ Types of PCB. ✓ Advantage of PCB. ✓ Material for PCB	None	None	2hrs
2	Parts of PCB ✓ Pads ✓ Traces ✓ Via Types of layers. ✓ Top metal Layer ✓ Bottom Layer ✓ Solder Mask ✓ Silk screen	None	None	2hrs
3	Element to be considered. - Components ✓ to select components ✓ values needed ✓ Package Needed Methods ✓ Schematic Design ✓ PCB layout Design ✓ Prototype board	None	None	1hrs
4	Software: ✓ Altium designer ✓ Autodesk Eagle ✓ Proteus ✓ Easy EDA ✓ DesignSpark ✓ Sprint Layout ✓ Kicad	None	Kicad	30 min
5	Introduction to PCB Design Procedure.	None	None	30min
6	Tips of PCB design	None	None	30min

7	Through Hole vs Surface Mount	None	None	2hrs
8	Introduction to Surface Mount Technology. ✓ what is SMT? ✓ why SMT? ✓ Advantage of Smt. ✓ Types of SMT. ✓ Components of SMT. ✓ Layers of PCB.	None	None	2hrs
9	Practical work: ✓ Installation of Kicad CAD software. ✓ Pre-work ✓ Simulations ✓ Hardware required.	Multi-meter, Iron , Hacksaw Drill+ Drill Bits (0.5mm, 1mm, 2mm) Flint Paper, Wire Cutter , CD Marker, Solder Iron , Solder Paste (Flux) , Solder Wire, Solder Pump, Copper Clads Ferric Chloride	Kicad	6hrs

10	Steps to be followed ✓ Film Generation ✓ Shear Raw Material (Copper Clad) ✓ Drill Holes ✓ Electroless copper Apply copper in hole barrels ✓ Apply Image ✓ Apply Photosensitive material to develop selected areas from panel ✓ Strip and Etch ✓ Solder Mask ✓ Solder Coat	None	None	2hrs
11	✓ Projects: basic plan: 2-3 ✓ project Intermediate plan: 5-7 project professional plan: 10-15 project			15 Hours

Table 4 Artificial intelligence (AI) & Machine learning (ML)

S.N	Topics	Software Required	Time
1.Theory	<ul style="list-style-type: none"> ○ Introduction to AI, ML, Deep learning and Convolutional Neural network, Natural language processing 	Google colabratory, Jupyter notebook	1.5hrs
	<ul style="list-style-type: none"> ○ Different machine learning categories <ul style="list-style-type: none"> • Supervised • Unsupervised • Reinforcement 		45min
	<ul style="list-style-type: none"> ○ Different Deep learning categories <ul style="list-style-type: none"> • ANN • DNN • RNN 		45 min
	<ul style="list-style-type: none"> ○ Introduction about the different libraries needs to be imported during development of the project e.g. <ul style="list-style-type: none"> • Numpy • Pandas • Matplotlib • Tqdm • os • Other different libraries required while developing the project. 		45min
	<ul style="list-style-type: none"> ○ Introduction about the overfitting, under fitting and Normal model. Its advantages and disadvantages. 		30 min
	<ul style="list-style-type: none"> ○ Introduction about different models will be used while developing the model. 		30min

	<ul style="list-style-type: none"> ○ cnn structure, input layer, different hidden layers (fully connected layers) and output layers. ○ 		30 min
	<ul style="list-style-type: none"> ○ Introduction about the different layers used in the model <ul style="list-style-type: none"> • Conv2D • Maxpooling • Flatten • Dense and other layers		45 min
	<ul style="list-style-type: none"> ○ Calculations of the different layers while doing feature extraction. <ul style="list-style-type: none"> • Kernel, stride, padding, Pooling. 		30 min
	<ul style="list-style-type: none"> ○ Introduction about tensor flow, keras, sklearn and other platforms. 		30 min
2. Practical	Object detection using YOLO algorithm <ul style="list-style-type: none"> ○ Introduction to object detection ○ Introduction to YOLO algorithm. 		30 min
	<ul style="list-style-type: none"> ○ Different steps needs to be performed to do object detection <ul style="list-style-type: none"> • Requirement • Prepare the dataset or collection of datasets • Use the dataset to train the model 		30 min
	<ul style="list-style-type: none"> • Testing the model • Deploy the project 		

	<ul style="list-style-type: none"> ○ Dataset creation <ul style="list-style-type: none"> • Collection of the custom data for detection of specific part of object. • Annotation of the collected data • Splitting the data into different training, testing and validation section. 		2 hrs
	<ul style="list-style-type: none"> ○ Install the required dependencies, fetch the required repos, Training the model, and test the result of the model. 	Google colabratory	2 hrs
	<ul style="list-style-type: none"> ○ Deploying the model in real time and real life. 	Python, IDE like vs code, pycharm, jupyter notebook	1.5 hrs
3.	Speech to character conversion <ul style="list-style-type: none"> ○ Introduction about the speech to character conversion 	Jupyter notebook	30min
	<ul style="list-style-type: none"> ○ Introduction about different libraries will be used in the project 		30min
	<ul style="list-style-type: none"> ○ Practical implementation of the Speech to text conversion. 	Jupyter notebook	1.5hrs
4	Creating own voice assistance <ul style="list-style-type: none"> ○ Introduction about the voice assistance its advantages, disadvantages, uses 		30min
	<ul style="list-style-type: none"> ○ Introduction about all the libraries 		30min
	<ul style="list-style-type: none"> ○ Practically build the personal voice assistance 	Jupyter notebook	2hrs
5	Dog Breed prediction		30min

	<ul style="list-style-type: none"> ○ Introduction about different multiclass problems, introduction about the project going to be developed with all the requirements 		
	<ul style="list-style-type: none"> ○ Building the dog breed prediction model using self-developed model with the datasets that are already available on internet 		2hrs
	<ul style="list-style-type: none"> ○ Deploying the trained model in web using Heroku. 		2 hrs
6	Color Detection in objects using computer vision <ul style="list-style-type: none"> ○ Introduction about the computer vision, its advantages, disadvantages and applications. 		30 min
	<ul style="list-style-type: none"> ○ Introduction about different libraries required 		2hrs
	<ul style="list-style-type: none"> ○ Practical work 		4 hrs

6. Contact Person

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