DEMHA TECHNOLOGY INSTITUTE

Invest in the Future

Instruction Plan

Syllabus – Primary Labs

SYLLABUS I – BASIC MODULE

Level I

1. Basic Electronics – I
   1.1.Paper Circuits
   1.2.Introduction to Breadboard
   1.3.Series and Parallel Circuits
   1.4.Traffic Light Circuit with Switch
2. Mechanics – I
   2.1.DIY Grabber
   2.2.Robotics Arm
3. 3D Design and Printing – I
   3.1.Design and print a 3D Keychain
   3.2.Design and 3D Print a Cup
4. Data Visualization
   4.1.How do I spend my day?
5. Design and Entrepreneurial Thinking – I
   5.1.Design Thinking and Prototyping (Redesign Auto Rickshaw)
   5.2.Final Project: Design Thinking to make classroom environment improvements

Level II

1. Basic Electronics – II
   1.1.Automatic Street Light using LDR
   1.2.Solar Powered Electric Fan
   1.3.Basic of Arduino – I
   1.4.Basic of Arduino – II
2. Mechanics – II
   2.1.Hydraulic Lift
   2.2.Bug Bot
3. 3D Design and Printing – II
   3.1.Design and 3D Print a Rocket
   3.2.Design and 3D Print a Simple Mobile Holder
4. Design and Entrepreneurial Thinking – II
   4.1.Design a Room for Elderly
   4.2.Final Project: Ensure Water Conservation

Level III

1. Basic Electronics – III
   1.1.Ohm's Law and How to use a Multimeter
   1.2.Seven – 7 Segment Display
   1.3.PCB Etching
   1.4.Sensors and Actuators using Arduino
2. Internet of Things
   2.1.ESP32 Basics
   2.2.Interfacing LDR with ESP32
   2.3.Control an LED using Mobile App
   2.4.IoT Plant Monitoring using ESP32
3. 3D Design and Printing – III
   3.1.Design and 3D Print a Spanner
   3.2.Design and 3D Print a Walking Robot

4. Woodworking
   4.1.Introduction to Woodworking
   4.2.Make your own Birdhouse
5. Design and Entrepreneurial Thinking – III
   5.1.Sustainable Home Model
   5.2.Final Project: Sustainable Village Model

SYLLABUS II – ADVANCE MODULE

AIoT Integration

1. AIoT Integration – About the Program
   1.1.Introduction of Artificial Intelligence Curriculum
   1.2.AIoT Integration – Joint Initiative
      1.2.1. Rational for AIoT Integrating in Curriculum program
      1.2.2. Objectives of the program
2. Introduction of Tinkering and Artificial Intelligence
   2.1.Introduction to Tinkering and stages of Tinkering
   2.2.Introduction to Artificial Intelligence
3. Developing AI and Tinkering Integration Ecosystem
4. Integrating AI and Tinkering across Curriculum
   4.1.Integrating AI and Tinkering in Formal Subject Pedagogies
   4.2.AI and Tinkering Integration alignment with Skill Development
5. Implementation process and Guidelines
   5.1.Suggestive Implementation Strategies
   5.2.Some more guidelines
6. AIoT Integration in Curriculum Lesson Plans

Blockchain

1. Blockchain
   1.1.Introduction to Blockchain
   1.2.What is Blockchain?
   1.3.Key elements of Blockchain
   1.4.How blockchain technology works
2. Benefits and Challenges of Blockchain
   2.1.Benefits of Blockchain
   2.2.Challenges of Blockchain Adoption
3. Understanding blockchain's decentralized model
   3.1.Advantages of the Decentralization
4. Uses of Blockchain in different industries
   4.1.Automotive
   4.2.Banking and Financial Services
   4.3.Government
   4.4.Healthcare and Life Sciences
   4.5.Media and Entertainment Industries
   4.6.Supply Chain
   4.7.Manufacturing
5. Blocks, Chains and, Block header
6. Understanding Blockchain Consensus Algorithms
   6.1.What is Blockchain Consensus Mechanism?
   6.2.Different Consensus Algorithms

6.3.Proof of Work
6.4.Proof of Stake
6.5.Conclusion

7. Understanding the Basics of Cryptocurrency and Blockchain Wallets
    7.1.What are cryptocurrencies?
    7.2.History of Cryptocurrency
    7.3.Cryptocurrency Wallets
    7.4.Summary
8. Coins, Tokens, and Smart Contracts
    8.1.Coin and Token
    8.2.Smart Contracts
    8.3.Platform Selection for designing Blockchain Solutions
    8.4.Actual Platform's Speed and Scalability Rate
    8.5.Availability Functionality
    8.6.Network Adaption Rate
    8.7.Platform Security
    8.8.Public or Private
    8.9.Several Nodes
    8.10. Conclusion
9. Case Study: Introducing civil identity on the blockchain
    9.1.The Challenge
    9.2.Streamlining Direct Democracy
    9.3.The Enterprise Ethereum Solution
    9.4.How did it work?
    9.5.User experience
    9.6.Goals achieved
    9.7.Ethical challenges of Blockchain
    9.8.Closing thoughts

Ethical Leadership

1. Introduction
2. What is Leadership?
    2.1. Activity I – What makes a leader?
    2.2. Activity Summary and Discussion
3. What is Ethics?
    3.1. Activity II – The Ethical Challenge ("Value Nani")
    3.2. Activity Summary and Discussion
4. What is Altruism?
    4.1. Discussing Altruism
    4.2. Activity Summary and Discussion
5. What is Decisive Action?
    5.1. Being Ready to Take Risks
    5.2. Activity Summary and Discussion

Intellectual Property Rights

1. What is Intellectual Property?
2. Who can create Intellectual Property?
3. Why is IP Important to us?
4. Types of Intellectual Property Rights and How to file them.
5. What is a Patent? Copyright? Trademark? Geographical Indicator? Design?

Space Module

1. Introduction
2. Walkie – Talkie | Telescope
3. Convex & Concave Lenses
4. Pinhole Camera
5. Glove Specimen Box | Rover
6. WeatherVane & Anemometer / Wind Speedometer
7. Mini – Satellites
8. Suggested Sensors for your Satellite
9. Mission Control

Drones Aviation

1. Key features of Drone Regulations
    - 1.1. Notification of Final Regulations for Civil Use of RPAS
        - 1.1.1. Operational / Procedural Requirements
        - 1.1.2. No Drone Zones
        - 1.1.3. Operations through Digital Platform
        - 1.1.4. Enforcement Actions
    - 1.2. RPAS regulation document
2. Introduction to drones and their applications
    - 2.1. Definition of drones
    - 2.2. History of drones
    - 2.3. India and drones
    - 2.4. Tinkering and drones
    - 2.5. Do's and Don'ts
        - 2.5.1. Do's
        - 2.5.2. Don'ts
    - 2.6. Classification of drones based on structure
        - 2.6.1. Fixed wing structure
        - 2.6.2. Lighter than air systems
        - 2.6.3. Rotary-wing aircraft
    - 2.7. Application of drones
3. Dynamics of an aerial system
    - 3.1. Forces of flight
    - 3.2. Principal axes and rotation of aerial systems
        - 3.2.1. Longitudinal axis
        - 3.2.2. Lateral(transverse) axis
        - 3.2.3. Perpendicular axis
4. Stability and Control
    - 4.1. Equilibrium
    - 4.2. Stability
        - 4.2.1. Stable system
        - 4.2.2. Unstable system
        - 4.2.3. Neutrally stable system
    - 4.3. Control
        - 4.3.1. Roll
        - 4.3.2. Pitch
        - 4.3.3. Yaw
        - 4.3.4. Throttle
5. Drone Sensors
    - 5.1. What is a sensor and what is It supposed to do?

- 5.1.1. Accelerometer
- 5.1.2. Barometer
- 5.1.3. Gyro Sensor
- 5.1.4. Magnetometer
- 5.1.5. Other sensors
- 5.1.6. Distance sensors
  - 5.1.6.1. Light-Pulse Distance Sensor
  - 5.1.6.2. Radio Detection and Ranging
  - 5.1.6.3. Sonar-Pulse Distance Sensing
- 5.1.7. Time of Flight (ToF) Sensors
- 5.1.8. Thermal sensors
- 5.1.9. Chemical Sensors

6. Propulsion and vertical motion
   - 6.1. Propulsion
   - 6.2. Propeller
     - 6.2.1. Parameters of a standard propeller
     - 6.2.2. Propeller Materials
   - 6.3. Motors
7. Battery of a drone
   - 7.1. Battery
   - 7.2. Types of batteries
     - 7.2.1. Wet cell batteries
     - 7.2.2. Dry cell batteries
   - 7.3. Which batteries should we use for drones?
     - 7.3.1. High Energy Density
     - 7.3.2. C-Rating
     - 7.3.3. Voltage
     - 7.3.4. Discharge Profile
8. Introduction to drone programming
   - 8.1. What is programming/coding
   - 8.2. Logic in programming
     - 8.2.1. Sequential statement
     - 8.2.2. Conditional statement
     - 8.2.3. Repetitive statement
   - 8.3. What is C++
   - 8.4. Integrated Development Environment (IDE)
   - 8.5. Application Programming Interface (API)
   - 8.6. Programming a drone
9. How to build your multi-rotor drone
   - 9.1. Drone categories in India
   - 9.2. Components required to build a nano drone
     - 9.2.1. Frame
     - 9.2.2. Propulsion system
     - 9.2.3. Propeller guards
     - 9.2.4. Drone controller
     - 9.2.5. Flight controller
     - 9.2.6. Battery
   - 9.3. Examples of open-source Nano drones
   - 9.4. Steps to build your drone
   - 9.5. Build your own drone

SYLLABUS III – STEM MODULE

1. 3D – Modeling
2. 3D – Shapes
3. Acid Base Indicators
4. Adaptations
5. AI Activity Card
6. Animated Word Problems
7. STEM Card Area and Perimeter
8. Balancing Chemical Equations
9. Buoyancy Surface
10. Capillary Action
11. Carbon Footprints
12. City Planning
13. Coding and Design
14. Colours of Lights
15. Computational Thinking
16. Conductors and Insulators
17. Constellations
18. Cylinder
19. Decoding Mental Health
20. Degrees and Radians
21. Dispersion of Light
22. Dyes in Daily Life
23. Floatation and Sinking
24. Food Facts
25. HCF and LCM
26. Health and Fitness
27. How Do Birds Fly
28. Kitchen Chemistry
29. Learning to Code
30. Marine Remediation
31. Mathematical Patterns
32. Mean and Mode
33. Microbes and Germs
34. Motion and Mechanism
35. Nutrition Analysis
36. Ratio and Proportion
37. Reduce – Reuse – Recycle
38. Refraction and Optical Illusion
39. Refractive Photography
40. Renewable Energy
41. Simple Machines
42. Solar System | Space – Junkies
43. Square – Up
44. Symmetry – Hunt
45. Things – That – Fly
46. Username – Generator
47. Waste Management
48. Weather – Or – Not
49. What's – In – It

SYLLABUS IV – FINANCE MODULE

1. Essential Financial Concepts
2. Savings
3. Banking
4. Loans
5. Financial Planning
6. Digital Payments
7. Insurance
8. Currency
9. Safety, Complaints and Redressal
10. Building Career Awareness New

TEACHER'S TRAINING COURSE

1. Basics of Electronics
2. Basics Circuit Ohms Law
3. Circuits on Tinkercad
4. Introduction to Sensor
5. Introduction to Accutators
6. Computational Thinking
7. Breadboard & PCB Part 1
8. Breadboard & PCB Part 2
9. Arduino Part 1
10. Arduino Session-2 (Arduino With Tinkercad)
11. Mechanical Tools 1
12. Mechanical Tools 2
13. Introduction to 3D Printing
14. Design Thinking
15. Introduction to Raspberry Pi
16. Raspberry Part II
17. Business Pitch
18. Python Module
19. Safety Equipments
20. AIoT Integration
21. Introduction tobBlockchain
22. Ethical Leadership
23. Introduction to Drones Aviation
24. Introduction to Space Module
25. Intellectual Property Rights