



**Guidelines for setting up of Atal Tinkering
Laboratories (ATLs) under Public Private Partnership
(PPP) with Atal Innovation Mission (AIM)**

Government of India
NITI Aayog
Atal Innovation Mission

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1. Introduction

1.1. Objective:

The purpose of this document is to provide information to the **interested partner** to provide the partner with a comprehensive understanding about the establishment of the Atal Tinkering Lab.

1.2. Who can be a partner?

“Partner” shall be hereby referred as any third party/corporate/trust/local government body/foundation/organization, etc. apart from AIM who is capable of funding and managing the ATL. The authority of selection and on-boarding of partner shall remain with Atal Innovation Mission.

2. About Atal Innovation Mission (AIM) and Atal Tinkering Lab (ATL)

2.1. Background of AIM:

Atal Innovation Mission (AIM) is Government of India’s flagship initiative to create and promote a culture of innovation and entrepreneurship across the length and breadth of our country.

2.2. Objective of AIM:

AIM’s objective is to develop new programmes and policies for fostering innovation in different sectors of the economy, provide platforms and collaboration opportunities for different stakeholders, and create an umbrella structure to oversee the innovation & entrepreneurship ecosystem of the country.

2.3. Background of ATL:

The Government of India has setup the Atal Innovation Mission (AIM) at NITI Aayog. Realizing the need to create scientific temper and cultivate the spirit of curiosity and innovation among young minds, AIM has established a network of Atal Tinkering Laboratories (ATL) in India. ATL is a workspace where young minds can give shape to their ideas through hands on do-it-yourself mode and learn / develop innovation skills.

The objective of this scheme is to foster curiosity, creativity and imagination in young minds and inculcate skills such as design mind-set, computational thinking, adaptive learning, physical computing, rapid calculations, measurements etc. Young children will get a chance to work with tools and equipment to understand what, how and why aspects of STEM (Science, Technology, Engineering and Math).

3. Partner-funded ATLS:

ATL initiative consists of a robust framework that can be leveraged through Public-Private/Public-Partnership (PPP). The PPP model shall tap into the interest of potential partners as mentioned in Section 1.2. to implement the ATL program within the Indian subcontinent and will increase access to innovation and entrepreneurship education in the school ecosystem.

The PPP ATLS shall be set up in collaboration with interested Partner where AIM shall provide knowledge, resources, and access to ATL ecosystem, and Partner shall be responsible for funding and operations of ATLS.

3.1. Type of schools eligible for PPP ATL

PPP ATLS can be established in schools (minimum Grade VI – X/XII) managed by State/ Central Government, Local body (Municipality/Nagar Nigam), Private trusts/society or Tribal/Social welfare department, etc.

3.2. Legal Terms

The selected schools shall be provided financial support to setup ATLS by the partner after signing of Statement of Intent (SoI)/any other legal agreement.

3.3. Fund utilization

Fund utilization by the selected schools shall be the prerogative of the partner. The suggested guidelines & best practices for the financial management of an ATL can be found on the AIM website <https://aim.gov.in/pdf/ATL-Tranche-Restructuring-Order-and-Guidelines-260822.pdf>

The Partner may consider below two models for establishment of PPP ATLS:

A. Standard Model of ATLS: Funding of Rs. 20 lakhs

Year	Amount	Purpose
1	Rs. 10,00,000/-	One-time establishment cost to be used to procure equipment for the ATL.
2 to 5	Rs. 10,00,000/-	Operational and Maintenance expenses for a period of 5 years in 3 or more tranches.

B. Agile Model of ATLS: Funding of Rs. 10 lakhs

Year	Amount	Purpose
1	Rs. 5,00,000/-	One-time establishment cost to be used to procure equipment for the Agile ATL/Centralized procurement of Agile ATL equipment.
2 to 5	Rs. 5,00,000/-	Operational and Maintenance expenses for a period of 5 years in 3 or more tranches.

3.4. Roles & Responsibilities of AIM & Partner

AIM and Partner shall review the progress of PPP ATLs on quarterly basis. The partner shall share a detailed yearly report for AIM's review.

The broad roles and responsibilities of AIM and Partner for setting up PPP ATLs are depicted below:

	AIM, NITI Aayog	Partners
Select	ATL Guidelines Standard Operating Procedures Knowledge Transfer Approve list of selected schools	Selection of ATL schools
Establish	Initial Capacity Building/ Training and Orientation Branding Guidelines	Disbursement of funds Procurement of Equipment Operations & Maintenance
Enable	Regional Mentor of Change and Teacher of Change networks. & internship opportunities	Adherence to ATL SOP Industry/Academia connect
Evaluate	Access to MyATL dashboard ATL Sarthi framework Review Meetings	Facilitate On-site visits to ATLs
Celebrate	Integrating all schools within the ATL ecosystem – e.g capacity building, events, contests, ATL modules, etc.	Incentivization & Gratification Community media & outreach events
Financial Commitment	Nil	10 lakhs for Agile Model 20 lakhs for Standard Model

4. ATL Program Design & Framework (Select – Establish – Enable – Evaluate – Celebrate)

Over the years, AIM has developed a robust framework for the establishment of ATLs which includes knowledge and resources to select, establish, enable, evaluate and celebrate ATLs. It is recommended that the Partner shall leverage the framework for implementation of PPP ATLS. The details of the framework are in the section below

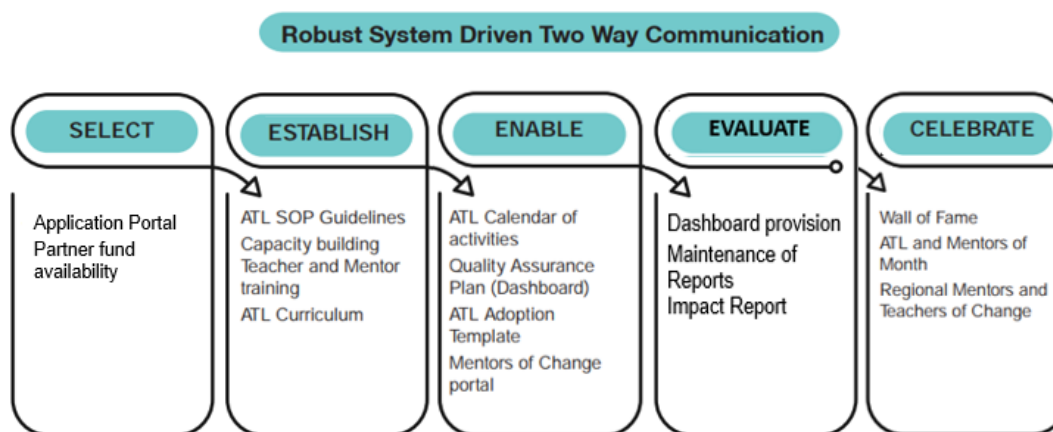


Fig 1.2 – Framework of ATL program

4.1. SELECT

The applicant schools shall be required to fill an online application process with the school details for assessing eligibility as per the eligibility criteria jointly decided between AIM and Partner. The indicative eligibility criteria for selection of ATLs placed at Annexure I.

The applicant school would have to provide at least 750 Sq. Ft. of built-up space in plains and 500 Sq. Ft. of built-up space for hilly / Himalayan and island states/UTs.

The existing facilities for meeting rooms and video conferencing among others can be used to supplement the laboratory space. AIM may visit regularly to check the functioning of ATLs

Note: Screening of the school shall be the responsibility of partner. AIM shall be reviewing the list of shortlisted schools submitted by the partner based on the eligibility criteria agreed between AIM and Partner.

4.2. ESTABLISHMENT

The ATL must be established in the selected schools by the partners, while AIM shall provide all necessary guidelines and operating procedures to establish ATLs in the selected schools.

4.2.1. Guidelines and SOP

AIM shall provide all relevant resources, guidelines and SOPs for establishment and operations of PPP ATLs.

4.2.2. Operations & Maintenance

The establishment and maintenance of the PPP ATLs shall be the responsibility of the partner, including the financial support as Operation and Maintenance Grant to the selected schools.

Equipment: The PPP ATL would contain educational and learning ‘do it yourself’ kits and equipment on – science, technology, electronics, robotics, open-source microcontroller boards, sensors, and 3D printers etc. The PPP ATLs must contain all equipment from the ATL Equipment list provided by AIM and placed on AIM website at

https://aim.gov.in/pdf/ATL_Equipment_List/ATL_Equipment_List_60_students.pdf

The Partner or school, if required may procure additional equipment.
 The equipment list as per the Agile ATLS is placed at Annexure II.

Operations: The school is fully responsible for successfully running and maintaining the ATL lab. In case of any mishap that happens in the ATL while using the ATL equipment or otherwise, the responsibility lies with the school only. Atal Innovation Mission or NITI Aayog cannot be held responsible in case of any mishap. The overall accountability of successful operations of PPP ATLS resides with the Partner.

The school shall operate the ATL as per operational manual provided by AIM and ensure that the lab is being run properly.

Link for operational manual: <https://aim.gov.in/ATAL-Operation-Manual.pdf>

4.2.3. Dedicated Resource Person

Partner/School shall assign a dedicated resource person hereby referred to as “ATL In charge” per school, who would be responsible for managing the day-to-day operations of the ATL.

- ATL In charge must be a teacher who understands the philosophy and purpose of ATL, with the right technical knowledge, experience and skill sets so that they can help smoothen the path towards innovation for their students.
- The ATL In charge would be responsible for regularly updating the ATL dashboard, ensuring regular participation of students in the competitions, and will directly be accountable to the ATL for monitoring purposes.
- It is the responsibility of an ATL in-charge to nurture the ATL innovation ecosystem, to facilitate generation of ideas and keep students motivated towards tinkering.
- Partner can also deploy additional “*Resource Person*” to support the ATL.

4.2.4. Branding

- **Branding:** The ATL schools under PPP Model may be called ‘Atal Tinkering Labs powered by <Partner Name>’
- **Use of AIM, NITI Aayog Logo:** Partner may be allowed to use the respective logos and names on the curriculum book, contents for the promotion of the ATL Workshops, Contests including but not limited to social sites etc., strictly for non-commercial and ATL related uses. AIM or NITI Aayog names or logos must be expressly authorized in writing by AIM for each activity or aspect where the logo or name is required to be used. Partner shall ensure that all necessary guidelines with respect to using the AIM or NITI Aayog logos shall be followed.
- The brand name ‘Atal Tinkering Labs powered by <Partner Name>’ can be withdrawn in case of non- performance of the ATL and/or non-compliance to ATL guidelines.

4.3. ENABLE

4.3.1. Knowledge Resources

AIM shall provide a rich repository of content and resources on its website, for ATL in-charges to learn from to ensure a successful implementation of the initiative. The content includes videos, documents, and other hand holding material for the ATL-In charge to conduct the ATL activities and sessions, in accordance with the AIM, NITI Aayog guidelines.

4.3.2. Curriculum, workshops and learning modules

All applicants, irrespective of their funding partner shall be part of the ATL community and shall have access to all of AIM's resources, workshops and learning modules.

4.3.3. Teacher Training and Capacity Building

AIM along with its partners shall conduct offline and online training sessions for ATL in-charges and resource persons. AIM has also created self-paced teacher training portal that can be leveraged for PPP ATLS.

4.3.4. Calendar for activities

AIM publishes a yearly calendar and the same is available on AIM website.

To foster inventiveness among students, AIM conducts several competitions and events centrally, and in addition, the school is encouraged to conduct the following activities for the PPP ATLS:

- a) Programs to teach and explain students about different concepts – ranging from ideation, design, proto-typing, networking to physical computing.
- b) Periodic regional and national level competitions.
- c) Periodic exhibitions / fairs / carnivals.
- d) Workshops on problem solving, designing and fabrication of products.
- e) Other events.

Partner must maximize the participation of PPP ATLS in all ATL related activities and events.

4.3.5. Mentor of Change (MoC) Initiative

The Mentor India program is a voluntary national movement being led by AIM, wherein skilled professionals provide pro-bono mentoring to young ATL innovators, with a strong sentiment towards nation building.

This network may be leveraged for the PPP ATLS.

4.3.6. Industry/Academia Connect

Partner can leverage their network with industries, academia, research, civil society, Mentor of change (MOC) network as established by AIM, for knowledge sharing and mentoring support.

4.3.7. Internship Opportunities for Students:

Each year, AIM identifies top ATL students through flagship competitions for an immersive handholding and mentorship to hone their innovation skills and prototypes. The below are few flagship internship programs by AIM which may be extended for PPP ATLS.

1. *Student Innovator Program (SIP)*

The AIM Student Innovator Program (SIP) is an initiative to build confidence in young innovators to pursue the dream of becoming a student-entrepreneur. The SIP exposes a student to world-class Incubators, experienced and excited mentors, technical resources, research, IPR and business skills.

2. *Student Entrepreneurship Program (SEP)*

AIM has designed the Student Entrepreneurship Program (SEP), an effort to institutionalize a mechanism where top teams of the SIP (one from each focus area) can work with the corporate and industrial partners and receive further mentorship, funding for IPR, product design, and product deployment in market in collaboration with AIM's Corporate Partners.

4.4. EVALUATION

For the successful implementation of any new initiative, good governance and regular monitoring are of paramount importance and form essential components of the program. Therefore, all ATLS shall be evaluated on yearly basis, using on-site evaluations as well as online portals such as *MyATL Dashboard*, developed by AIM.

4.4.1. ATL Dashboards

AIM has developed online Dashboard for ATL School to self-report their activities on a monthly basis, which may be leveraged by PPP ATLS for on-going and sustainable monitoring of the labs.

The ATL Dashboard will help AIM and partner monitor and recognize each school's present engagement in ATL, participation in regional, national, or international events & competitions and achievements.

4.4.2. On-site Visits

Partner shall conduct regular on-site visits to evaluate the performance of PPP ATLS and adherence to the guidelines. Partner shall facilitate visits by AIM officials to PPP ATLS as and when requested.

4.4.3. ATL Sarthi

AIM has developed a sustainable monitoring and evaluation framework 'ATL Sarthi' which may be leveraged by PPP ATLS. ATL Sarthi provides necessary tools and support to schools to adopt a self-monitoring approach for better and continuous performance. It also provides necessary guidelines for local authorities like districts, states, innovation councils, private organizations etc. to help assess ATLS

in their particular region and provide much-needed guidance and support to steer this ATL ecosystem to new heights.

4.5. CELEBRATE

AIM has developed several platforms and initiatives to recognize top performers in ATLs including students, teachers, and schools, as mentioned below. All these platforms shall be open for PPP ATLs.

4.5.1. Exemplary Teachers of Change

To share and celebrate the exceptional work done by the ATL in-charges and to give them recognition for their efforts a 'Exemplary Teachers of Change' book is published twice a year. This book has inspiring quotes and messages from top performing ATL in-charges to serve as an inspiration for others across India.

4.5.2. ATLs of the month

To recognize their effort and engagement with ATL via the MyATL Dashboard, AIM announces the list of ATLs of the Month from each state of India. The list of schools is announced on the 7th of every month on AIM's website and social media.

4.5.3. Social media stories

AIM, NITI Aayog encourages all students, teachers and mentors to post their innovation stories on social media platforms, which are then shared by AIM, NITI Aayog. These stories not only help in sharing the contribution of ATL towards changing the innovation mindset of the country, but also serve as incentives for our stakeholders for their commitment towards this national mission.

4.5.4. Wall of Fame

AIM, NITI Aayog initiated the ATL Wall of fame (aim.gov.in), a recognition platform for the students, teachers, and mentors by celebrating and recognizing them along with providing exiting rewards & opportunities.

ANNEXURE I

ELIGIBILITY CRITERIA

- Applications will be solicited from partners to establish ATL.
- The eligibility criteria for applicants are:

Criteria	Parameters
Infrastructure	<ul style="list-style-type: none"> All weather area (750 sq. ft.) All weather area (500 sq. ft.) in hilly / Himalayan and island states, UTs Computer Lab with internet facility Steady Electricity connection Science Lab Library and Playground
Faculty	<ul style="list-style-type: none"> Dedicated & qualified staff: Maths & Sciences
Reach	<ul style="list-style-type: none"> Enrolment – Min. 400 students in Grade VI – X Enrolment – Min. 250 students in Grade VI – X in hilly states Regular attendance of 75% & above of the staff & enrolled students over the past 3 years

- The parameters to be used for evaluation of applicants are:

Criteria	Parameters
Performance of Students	<ul style="list-style-type: none"> % of students scoring 60 – 69.99% in Grade X & XII board exams in previous 3 years % of students scoring 70 – 79.99% in Grade X & XII board exams in previous 3 years % of students scoring 80 – 89.99% in Grade X & XII board exams previous 3 years % of students scoring 90% and above in Grade X & XII board exams in previous 3 years
Participation in Extra-curricular Science activity	<ul style="list-style-type: none"> Participation level in Science Innovation fair/ events
Partnerships	<ul style="list-style-type: none"> Mentor engagement Alumni engagement



ANNEXURE II

SUGGESTIVE LIST OF EQUIPMENT AND KITS IN ATAL TINKERING LABORATORIES (ATL)

(*Suggested Quantity is for a class of 20-30 students, could be scaled up as needed)

Package 1: Electronics Development, Robotics, Internet of Things and Sensors				
Category	Name	Specification	Suggested Quantity	Type
Electronics Development	Arduino Uno or equivalent	ATmega328P - 8 bit AVR family microcontroller, equivalent or better.	20	Consumable
		Operating Voltage: 5V		
		Digital I/O Pins: 14 (of which 6 provide PWM output)		
		PWM Digital I/O Pins : 6		
		Accessories : Case shell enclosure, compatible USB cable (length - 6 inch or more)		
Electronics Development	Arduino Nano or equivalent	ATmega328P - 8 bit AVR family microcontroller, equivalent or better.	10	Consumable
		Operating Voltage: 5V		
		Digital I/O Pins : 14 (of which 6 provide PWM output)		
		Analog Input Pins : 8		
		Accessories : Compatible USB cable (length -6 inch or more)		

Category	Name	Specification	Suggested Quantity	Type
Electronics Development	Arduino Mega or equivalent	ATmega 2560P - 8 bit AVR family microcontroller, equivalent or better.	5	Consumable
		Operating Voltage: 5V		
		Digital I/O Pins : 54 (of which 6 provide PWM output)		
		Analog Input Pins: 16		
		Accessories: Case shell enclosure, Compatible USB cable (length -6 inch or more)		
Electronics Development	Raspberry Pi 3 Model B+	RASPBERRY PI 3 MODEL B+, equivalent or better	3	Consumable
		Accessories - MicroSD card - 32 GB, USB 3.0 cable (1 meter), HDMI to VGA - 1 meter, HDMI to VGA adapter, Case shell enclosure		
Electronics Development	Breadboards & Mini Breadboard	Solderless 400 pin breadboard	10	Consumable
		Solderless 800 pin breadboard	20	
		Self-Adhesive Proto Shield	10	
Electronics Development	General Purpose solderable Board	FR2 A Grade Material (140 x 90 mm)	30	Consumable
		FR2 A Grade Material (80 x 55 mm)	30	Consumable
	Berg Strips	Female Berg Strip, 2.54mm pitch, 40 pin single row, breakable pin	30	Consumable
		Male Berg Strip, 2.54mm pitch, 40 pin single row, breakable pin	30	Consumable
Electronics Development	16x2 LCD display	Dot matrix LCD display. 16 characters X 2 lines. I2C	15	Consumable
Electronics Development	USB Cables	USB Cable Set (A to B, 12 inch or more)	10	Consumable
Electronics Development	USB Cables	USB Cable Set (Mini, 12 inches or more)	10	Consumable
Electronics Development	Battery	9-12V 2000 to 2500 mAh rechargeable battery with 2 chargers. Equivalent or better	30	Consumable

Category	Name	Specification	Suggested Quantity	Type
Electronics Development	Resistor Kit	One kit contains - 30 carbon film resistors of 20 different resistance values each assorted, packaged together and labelled.	20	Consumable
		Wattage: 0.125W to 1W		
		Values: 0Ω, 1.5Ω, 4.7Ω, 10Ω, 47Ω, 100Ω, 220Ω, 330Ω, 470Ω, 680Ω, 1kΩ, 2.2kΩ, 3.3kΩ, 4.7kΩ, 10kΩ, 22kΩ, 47kΩ, 100kΩ, 330kΩ, 1MΩ		
Electronics Development	Capacitor Kit	One kit contains - 20 electrolytic capacitors of 10 different capacitance values each.	20	Consumable
		Assorted kit packaged together and labelled.		
		Values: 10pF, 22pF, 100pF, 1nF, 10nF, 100nF, 1μF, 10μF, 100μF, 1000μF		
Electronics Development	Linear Voltage Regulator	7805, 7812, 7809	20	Consumable
Electronics Development	Water Pump module	DC12V 3W Submersible Water Pump	5	Consumable
Electronics Development	Piezoelectric Plate	Normal Copper based 4 cm Diameter approx.	20	Consumable
Electronics Development	8*8 LED Matrix Module	Max7219 Dot LED Matrix Module. MCU Control LED Display Module	10	Consumable
Electronics Development	Bluetooth module	HC 05 Bluetooth module	10	Consumable
		Voltage Rating: 5 V		
Electronics Development	7 Segment Led Display	LED 4-Digit Display Module	10	Consumable
		Voltage Rating: 2.4V to 5.5V		
		4-Pin interface:		
		Vcc, Gnd, Data, Clock		
Electronics Development	GSM	Sim900 GPRS Transfer Board Micro Sim Gsm Core TTL Port Module for Arduino	5	Consumable
Electronics Development	GPS	GY-NEO6MV2 new GPS module	5	Consumable
Electronics Development	Laser Diode Emitter	650 nm 5mW Mini Laser Dot Diode Module	5	Consumable

Category	Name	Specification	Suggested Quantity	Type
Electronics Development	LDR Module	5mm/12mm, Photosensitive LDR Light Sensor Module	20	Consumable
Electronics Development	Keypad	Universal 16 Key Switch Keypad	15	Consumable
Electronics Development	JoyStick	2-axis joystick with push button function	15	Consumable
Electronics Development	Active Buzzer	Small 5 volt	20	Consumable
		Big 5 volt	20	Consumable
Electronics Development	Motor driver Module	L293D	10	Consumable
Electronics Development	Sound Playback Module	ISD1820 voice recording module or equivalent	10	Consumable
Electronics Development	DC Plastic Gear motor with wheel	12V, 150RPM, Side Shaft BO (Battery operation) Motor	30	Consumable
Electronics Development	Node MCU	ESP 8266	7	Consumable
		I2C, 1 wire, plug and play		
		Operating Voltage: 5V		
Electronics Development	Vibrating Motor	Weight: 10 Grams	20	Consumable
		Operating Voltage: 1.5 to 3V		
Electronics Development	Alligator Connectors	Multi-Colour Alligator Connectors - 12 inch	200	Consumable
Electronics Development	Battery clips with DC Jack	9-volt battery clips with DC Jack	40	Consumable
Electronics Development	Hook-up Wires	Red & Black set 100 Meters each	4	Consumable
Electronics Development	Jumper Cable	Male-Male	1000	Consumable
		Male-Female	800	
		Female-Female	400	
Electronics Development	RGB LEDs	Regular 5mm 3-5 volt Range	400	Consumable
Electronics Development	LEDs (Red)	Regular 5mm 3-5 volt Range	1000	Consumable
Electronics Development	LEDs (Green)	Regular 5mm 3-5 volt Range	1000	Consumable
Electronics Development	LEDs (Blue)	Regular 5mm 3-5 volt Range	1000	Consumable
Electronics Development	LEDs (Yellow)	Regular 5mm 3-5 volt Range	1000	Consumable
Electronics Development	LEDs (White)	Regular 5mm 3-5 volt Range	1000	Consumable

Category	Name	Specification	Suggested Quantity	Type
Electronics Development	Timer IC - LM 555	LM 555 Timer IC.	15	Consumable
		Voltage range - 4.5V to 16V		
Electronics Development	Atmega16u2	8 bit microcontroller Individual IC (DIP).	5	Consumable
		Voltage range: 2.7V to 5.5V.		
		Operational Range: -40°C to +80°C		
Electronics Development	Diodes and Transistors Kit	One Kit Contains - 25 Assorted Basic Diodes of 4 different types each.	5	Consumable
		Types: NPN Transistor - 2N3904, BC547 PNP Transistor - 2N3906, BC557 Silicon Diode - 1N4148, Power Diode - 1N4004/4001.		
		Equivalent or better.		
		Wattage: 1W, Current rating: 1A		
		Assorted kit packaged together and labelled.		
Electronics Development	Button Switch Set	One Kit Contains - 100 buttons of different types.	5	Consumable
		Types: Push, toggle, rotary, selector and slide switch.		
		Assorted kit packaged together and labelled.		
Electronics Development	Capacitive touch Module	MPR 121 with I2C.	10	Consumable
		Voltage Range: 2.5V to 3.6V DC.		
Electronics Development	Capacitive Touch Switch Module	Digital Capacitive touch switch module -TTP223B	10	Consumable
		Voltage Range: 2V to 5V DC.		
Internet of Things & Sensors	IR Sensors, Obstacle avoider sensor module	LM393	10	Consumable
		Detection distance: 2 - 30 cm		
		Detection angle: 30 - 40°		
Internet of Things & Sensors	Triple Axis Magnetometer	3-Axis Magneto resistive Sensors	10	Consumable
		I2C Digital Interface		
		Integrated 12-bit ADC		
		Range of -8 to +8 Gauss		
		160 Hz Maximum o/p rate		

Category	Name	Specification	Suggested Quantity	Type
Internet of Things & Sensors	Humidity Sensor	Operating range:	10	Consumable
		20 – 95 % RH		
		Temperature: 0 - 60 Celsius		
		Power supply:		
		1.5V AC (Max sine)		
		Operating frequency:		
500Hz - 2kHz				
Internet of Things & Sensors	MQ Series	MQ - 2 Smoke Detection	4	Consumable
		MQ-3 Alcohol - Ethanol Sensor	4	
		MQ-4 Methane Natural Gas Sensor	4	
		MQ-5 Methane Liquified Gas Sensor	4	
		MQ-6 Liquified Petroleum Gas Sensor	4	
		MQ-7 High Sensitivity CO Carbon Monoxide Sensor Detector	4	
		MQ-8 Hydrogen Gas Sensor	4	
		MQ-135 Air Quality Sensor	4	
Internet of Things & Sensors	IR transmitter/ receiver	TSOP 1738	10	Consumable
		Switching rate: 38 KHz		
		Voltage Rating: 5V		
Internet of Things & Sensors	Ultrasonic Sensor Module HC-SR-04 or compatible	Working Voltage - DC 5V	20	Consumable
		Working current - 15 mA		
		Working Frequency - 40 Hz		
		Range - 1 cm to 4 m		
		Effectual Angle - <15°		
		Measuring Angle - 30°		
		Resolution - 0.3 cm		
Internet of Things & Sensors	Triple Axis accelerometer-	3-axis sensing	10	Consumable
		Small, low profile package		
		4 mm × 4 mm × 1.45 mm LFCSP		
		Low Power: 350 μA (typical)		
		Single-supply operation: 1.8 V to 3.6 V		
		Temperature stability		

Category	Name	Specification	Suggested Quantity	Type
Internet of Things & Sensors	PIR Motion Detector Module	High digital pulse when motion detected	20	Consumable
		Low digital pulse when idle /no motion detected		
		Sensitivity range (up to 6 m)		
		Power supply: 5V – 12V		
Internet of Things & Sensors	Pulse Rate Heart Sensor	Pulse Rate Sensor Finger Based (finger or earlobe) Working voltage 3-5V	5	Consumable
Internet of Things & Sensors	Relay Module	5V 10A - 2 Channel Relay Module. Compatible with Arduino.	15	Consumable
Internet of Things & Sensors	Relay Module	5V 10A - 1 Channel Relay Module. Compatible with Arduino.	15	Consumable
Internet of Things & Sensors	Big Sound microphone module	Large Electret capsule sound module	15	Consumable
Internet of Things & Sensors	Big Sound microphone module	Large Electret capsule sound module	15	Consumable
Internet of Things & Sensors	Soil Moisture Sensor module	FC-28 with LM293 comparator	5	Consumable
		Operating Voltage: 3.3V to 5V.		
Internet of Things & Sensors	Touch Sensor	Capacitive Touch Sensor Module. TTP22X series. Voltage Range: 2.4V to 5.5V	5	Consumable
Internet of Things & Sensors	Metal Touch Sensor Module	KY-036 or equivalent metal touch sensor module	5	Consumable
Internet of Things & Sensors	Rain Drop Sensor	Rain Sensitive, Rain Drop Detection Sensor Module. Voltage Range: 3.3V to 5.5V.	5	Consumable
		Size: 5mm X 40mm or equivalent.		
Internet of Things & Sensors	Flex Sensor	Flex Sensor. Size - 2.2 Inches	5	Consumable
Internet of Things & Sensors	Temperature Sensor	LM35 Full range temperature sensor. Voltage Range: 4V to 30V. Error: $\pm 0.5^{\circ}\text{C}$	5	Consumable
Internet of Things & Sensors	Temperature and humidity sensor module	DHT 11	15	Consumable
		Voltage Range: 3V to 5V		

Category	Name	Specification	Suggested Quantity	Type
Internet of Things & Sensors	Force Pressure Sensor	Force sensitive resistor with a square, 1.75x1.5" sensing area	5	Consumable
Internet of Things & Sensors	Colour Recognition Sensor	TCS3200 Colour Recognition Sensor	5	Consumable
Internet of Things & Sensors	Water Flow Sensor	Arduino Compatible Water flow sensor. 5V DC Input.	5	Consumable
Internet of Things & Sensors	Sound Sensor	Sound Sensor Module, Microphones module	10	Consumable
Internet of Things & Sensors	IR Sensors Array module for Line Following	8 IR Sensors Array module for Line Following	10	Consumable
		Operating Voltage: 5V		
Internet of Things & Sensors	Power Bank	10000 mAh 5-volt Power Bank	5	Consumable
Internet of Things & Sensors	RFID Reader – Tags	Current :13-26mA / DC 3.3V	10	Consumable
		Idle Current :10-13mA		
		Sleep Current<80uA		
		Peak Current<30mA		
		Operating Frequency: 13.56MHz<30mA		
		Read range between 20 cm to 1 m		
Internet of Things & Sensors	RF Modules Tx & Rx 315 MHz ASK	Frequency Range: 433.92/315 MHz	10	Consumable
		Supply Voltage: 3 – 6 V		
		Output: 4 – 16 Dbm		
		Low power consumption		
		Easy application		
Robotics	Stepper motor with Driver board	28BYJ-48 ULN2003 5V Stepper Motor + ULN2003 Driver Board	10	Consumable
Robotics	DC motor	12V DC Gear 150 RPM	30	Consumable

Category	Name	Specification	Suggested Quantity	Type
Robotics	Servo motors	Position Servo Angle based Metal Gear	10	Consumable
		Small Servo Metal Gear	10	
		Continuous Metal Gear Servo 360	10	
		Small Servo Plastic Gear	30	
Robotics	150 RPM BO Motor	150 RPM BO Motor	15	Consumable
Robotics	L298P Motor Driver	L298P Motor Driver Shield or relative Driver Shield	15	Consumable
Robotics	Servo Motor Tester	CCPM 3 channel Servo Tester	2	Consumable
DIY Kit	Robotics DIY Kit	Robotics DIY kit with programmable intelligent brain/brick.	4	Equipment
DIY Kit	Mechanical (Modular) Construction kit	Metal/plastic mechanical construction kit compatible with electronic equipment.	4	Equipment
STEM Learning/Application Kit	Drone Kit	Educational Purpose	2	Equipment
	Aerospace Kit		1	
	Automobile Kit		1	
	Bio-Medical Kit		1	
	Agri-Tech Kit		1	
	Water/Sanitation Kit		1	
	Bio Tech Kit		1	
	Other Potential STEM Application Kit		1	

For Package P1, it is important to note that the various kinds of electronics/ robotics platforms are likely to be on different platforms, and their sub-components are normally not inter-changeable. Therefore, schools are advised to evaluate all platforms for robotics, IoT, and electronics development, and pick any one/ more of the available P1 educational platforms, and buy all components on the same platform, so that the various components are compatible to each other.

Package 2: Rapid Prototyping Tools				
Category	Name	Description	Suggested Quantity	Type
Rapid Prototyping Tools	3D Printer Kit and tools	Printer Type: FDM (Fused Deposition Modelling), Minimum Dimensions: 160mm *160mm *160mm Build Size or 4 litre Build Volume., Nozzle: 0.3mm to 0.4mm nozzle diameter, slicing software should be free or Open source, LCD Screen UI that display print metrics, Good Heated Print bed. Material Compatibility - PLA, ABS, and derivatives of PLA, Ninjaflex Quality Anti-bacterial/fungal Cover. Repair Kit - with spare springs, screws, keys, tweezers, etc.	1	Equipment
Rapid Prototyping Tools	Dedicated UPS/Power back up	Dedicated UPS/Power Back up with 2-hour battery backup.	1	Equipment
Rapid Prototyping Tools	Filament for 3D printer	Compatible 1000 Grams Filament in 5 different colours	5	Consumable
Rapid Prototyping Tools	Filament Storage Box	Compatible Filament storage box	5	Consumable
Rapid Prototyping Tools	Set of Arts & Crafts Accessories – e.g.- stationary items and basic prototyping material	Cardboard	5	Consumable
		Foam core boards	5	
		20m spool of thick strings various colour	5	
		Rubber band	100	
		Popsicle sticks	100	
		Wood glue – 500 ml	2	

Package 3: Mechanical, Electrical and Measurement tools				
Category	Name	Description	Suggested Quantity	Type
Mechanical Tools	Hacksaw Frame	Size: 12 inches	1	Equipment
Mechanical Tools	Hacksaw blades	Size: 12 inches	10	Consumable
Mechanical Tools	Mini Hacksaw Frame	Size: 6 inches	1	Equipment
Mechanical Tools	Mini Hacksaw blades	Size: 6 inches	10	Consumable
Mechanical Tools	Pliers: 4.5-inch size	External Straight	1	Equipment
		Nose Circlip Plier	1	
		Long Nose Plier	1	
		Combination Mini Plier	1	
		Wire stripping pliers	1	
		Bent nose plier	1	
		Needle nose pliers	1	
Mechanical Tools	Tweezer Set	6 Pc Non-Magnetic Tweezer Set Size - 6 inches	2	Equipment
Mechanical Tools	Ball Pein Hammer	Ball Pein Hammer Weight - 0.75kg	1	Equipment
Mechanical Tools	Steel Shaft Claw Hammer	Claw Hammer Steel Shaft Weight - 0.75kg	1	Equipment
Mechanical Tools	C-Clamp	Metal Clamp: 3-inch size	4	Equipment
Mechanical Tools	Allen Key Set	10 Piece Ring Imperial Allen Hex key	1	Equipment
Mechanical Tools	Drill Machine Set	Drill Machine with accessories Hammer/Screw and clockwise/anticlockwise modes. Power: 500W Chuck capacity - 1 to 10 mm Drill Bits - Masonry, Metal, Wood	1	Equipment
Mechanical Tools	Drilling Workstation	Drill Press, Drill Holder and Rotary Tool, Compatible with Drilling machine provided	1	Equipment
Mechanical Tools	Spanner Set	12-piece combination Spanner Set Range - 4 mm to 30 mm	1	Equipment

Category	Name	Description	Suggested Quantity	Type
Mechanical Tools	Vice Normal	Table top vice	1	Equipment
Mechanical Tools	Precision Screw Driver Set	6 Piece Precision Screw Driver Set Types: PH0, PH1, Flat head - 1.4mm, 2mm, 2.4mm, 3mm	2	Equipment
Mechanical Tools	Wrench	Adjustable Universal Wrench	2	Equipment
Mechanical Tools	Wire Strippers	Wire Stripper Cutter Plier With Spring -26x6x20 cm (LxWxH)	5	Equipment
Mechanical Tools	Screwdriver	40 pc Multi-purpose screwdriver set	3	Equipment
Mechanical Tools	Cordless Rotary Multitool Set	Cordless Rotary multitool with all cutting, grinding, polishing, engraving and drill bits. Speed: Adjustable up to 30000 RPM Battery Type: Li-ion Voltage/current range : 8-10V, 0-2 A	1	Equipment
Mechanical Tools	Air Blower	500 W or more. Variable speed blower	1	Equipment
Mechanical Tools	Drill Bit Set	High Quality 13 Pcs HSS Drill Bits Set for Wood, Iron, Aluminium, Plastic etc.	1	Equipment
Mechanical Tools	File set	6 pc file set Working length - 6 inch	1	Equipment
	Mini File set	6 pc mini file set Working length - 3 inch	1	Equipment
Mechanical Tools	Flexible Cutting Mat	A3 Size with Marked Pattern and Grids (18" X 12")	1	Equipment
Mechanical Tools	Plastic Storage Drawer/Organiser	Number of Drawers: 60 or equivalent Drawer size (l*w*d) (inch) : 2*2*5	2	Equipment
Mechanical Tools	Pegboard	Peg board System to mount tools on wall with attachments. Size: 3ft*2ft	2	Equipment

Category	Name	Description	Suggested Quantity	Type
Electric Tools	Hot glue gun	Works with standard 0.5-inch glue sticks. Temperature - 230 to 280 degree Celsius.	5	Equipment
Electric Tools	Digital Oscilloscope	Minimum Bandwidth: 50 Mhz. Minimum number of channels: 2 channels. Sample Rate: 1Gsa/s With inbuilt waveform function generator.	1	Equipment
Electric Tools	Soldering Kit	Variable Wattage of Soldering Iron: 15-30 watts/230 volts Soldering Iron Temperature Range: 280°C to 450°C De-Soldering Pump, Soldering Flux (Paste) 100 grams, DE-soldering Copper Braid (Solder Wick) - 1.5m*2mm Compatible Soldering Tip - Bevel, Chisel, Conical - 5 each per kit. Soldering Wire: 20/22 AWG soldering Wire with rosin core flux (100 Grams)	5	Equipment
Electric Tools	Adapters	DC power Adapter with 5V, 2A	10	Consumable
Electric Tools	Adapters	DC power Adapter with 12V, 2A	10	Consumable
Electric Tools	Electric Screw Driver Set	Multipurpose Electric screwdriver set. Accessories - Compatible bits Mode - Wireless Battery - Li-ion 3.6V or equivalent with charging dock	1	Equipment
Electric Tools	Dual Temperature Heat Gun	1800 W Dual Temperature Heat Gun	1	Equipment

Category	Name	Description	Suggested Quantity	Type
Electric Tools	Soldering Helping hand	Specifications: Adjustable crocodile holding clamps/clip. Soldering iron holder. LED light. Magnifying lens.	4	Equipment
Measurement Tools	Return measuring tape	Return measuring tape 5Mx19mm	2	Equipment
Measurement Tools	Stainless Steel Rule	Stainless Steel 12" / 150 mm Rule	5	Equipment
Measurement Tools	Digital Vernier Calliper	150 mm / 6" Digital Vernier Calliper	2	Equipment
Measurement Tools	Spirit Level	12" Spirit Level	1	Equipment
Measurement Tools	Digital Pen electric Tester	Voltage tester	1	Equipment
Measurement Tools	Digital Multi Meter	Digital Multi Meter Voltage Current Resistance-7 functions + 19 ranges to cover DC voltage 200mV to 1kV, AC voltage 200 V - 750 V, DC current 200 μ A - 10 A Resistance 200 -2 M Ohm and Transistor & diode test.	5	Equipment
Biology Kit	DIY Paper Microscope	DIY Paper microscope. Magnification range - 100x to 2000x	5	Consumable
Astronomy Equipment	Telescope	All glass optical components Altazimuth mount suitable for terrestrial and astronomical use minimum 700 mm focal length	1	Equipment
Textile Equipment	Sewing Kit	Semi-Automatic Sewing machine Straight stitch Consumables - 2 set of assorted needles and 10- colour spool set.	1	Equipment

Package 4: Power Supply & Accessories and Safety Equipment				
Category	Name	Description	Suggested Quantity	Type
Power Supply & accessories	Glue Sticks	11 mm x 200mm Hot Melt Glue Stick	150	Consumable
Power Supply & accessories	Nuts and Bolts and screw	Specs - M4X12MM M4X20MM M5X16MM M5X25MM M6X20MM	40	Consumable
Power Supply & accessories	Cable Tie	Small Cable Tie Pack - Pack of 100	15	Consumable
		Medium Cable Tie Pack - Pack of 100	15	Consumable
		Big Cable Tie Pack - Pack of 100	15	Consumable
Power Supply & accessories	Sand Paper	Grit Values - 80, 100, 120, 200, 300. 5 Nos of each	10	Consumable
Power Supply & accessories	Power Strip Adaptors	Standard Quality Extension with 5Amp safety fuse. 5 or more sockets in each extension. 5-meter length of each extension.	5	Consumable
Power Supply & accessories	Bulb Holders	Regular Hanging Bulb holder	10	Consumable
Power Supply & accessories	Electric Wires	Twisted Red black pair	20 meters	Consumable
Power Supply & accessories	USB TO DC jack cable	USB to DC jack cable for Battery bank	10	Consumable
Safety equipment	First-Aid Kit	Standard Medical First Aid kit in portable container.	2	Consumable
Safety equipment	Fire extinguisher (handy units)	Powder Type Fire Extinguisher 2KG	2	Consumable
Safety equipment	Safety goggles (with/ without LED torch)	Polycarbonate Safety goggles Clear lens with no tint	30	Consumable
Safety equipment	Safety Gloves Pairs	Latex Coating Gloves (Medium Size)	20	Consumable
Safety equipment	Safety Mask	Filtering efficiency ranging 80 percent when tested against 0.3-micron sodium chloride particle	20	Consumable

