DTE Code: 4151 www.tgpcet.com

TULSIRAMJI GAIKWAD-PATIL College of Engineering & Technology

AN AUTONOMOUS INSTITUTE

Two Days Workshop

on

"ARDUINO PROGRAMMING"

28th to 29th April 2024

Organized by

Department of Electrical Engineering

In Association with

NU INTELLIGENCE PRIVATE LIMITED

About the Institute:

Tulsiramji Gaikwad-Patil College of Engineering and Technology (TGPCET) was established in the year 2007 by Vidarbha Ruhu-oddeshiya Shikshan Sanstha (VRSS), a registered society. It is a self financed Private Engineering College, which is affiliated to Rashtrasant Tukadoji Maharaj Nagpur University (RTMNU) Nagpur and is approved by All India Council for Technical Education, New Delhi. Also college is approved by Directorate of Technical Education (DTE), Mumbai, Maharashtra State. The Institute is Accredited with A+ (3.32 CGPA) by NATIONAL ASSESSMENT AND ACCREDITATION COUNCIL (NAAC). An Autonomous Institute affiliated to RTM Nagpur University, Nagpur.

Vision

To emerge as a learning Center of Excellence in the National Ethos in domains of Science, Technology and Management.

Mission

- To strive for raising standard and stature of the students by practicing high standards of professional ethics, transparency and accountability.
- To provide facilities and services to meet the challenges of Industry and Society.
- To facilitate socially responsive research, innovation and entrepreneurship.
- To ascertain holistic development of the students and staff members by inculcating knowledge and profession as work practices.

About Electrical Engineering

Established with B.E. EE in the year 2011-12 with an intake of 60, it has been one of the key departments, active in teaching and research since its inception in 2011. B.Tech. Electrical Engineering programme got NBA Accreditation for 3 years. It has well qualified and experienced faculty with novel teaching methods. Department will also offer M.Tech. in Integrated Power System & Electric Vehicle Technology.

Department Vision

"To emerge as a learning hub and center of excellence in the domain of Electrical Engineering."

Department Mission

- To disseminate knowledge replete with quality education in the field of Electrical Engineering in meticulous and methodical manner.
- To provide platform to address societal issues as well as challenges faced by industries.
- To develop research culture and inculcate innovative and entrepreneurial skills.
- To ensure overall development of students and staff by instilling knowledge and professional ethics as a part of lifelong learning.

Aim

The aim of the workshop is to introduce students to the fundamentals of Arduino programming and empower them to develop their own electronic projects using Arduino microcontrollers.

Objective of Workshop:

- To provide comprehensive understanding of what Arduino is, its components, and its applications in electronics and robotics.
- To teach students the basics of programming using the Arduino IDE, including syntax, variables, data types, and control structures.
- To offer students practical, hands-on experience by guiding them through coding exercises and simple projects, such as blinking LEDs, reading sensor data, and controlling actuators.
- To Explore more advanced programming concepts, such as functions, libraries, and advanced control structures, to enable participants to write more complex and efficient code.
- To Encourage students to apply their newfound knowledge and skills to develop their own Arduino projects, either individually or in groups, under the guidance of instructors.

GAIKWAD-PATIL
GROUP OF INSTITUTIONS

Two Days Workshop on "ARDUINO PROGRAMMING"

28th to 29th April 2024

CHIEF PATRONS

Dr. Mohan Gaikwad-Patil, Chairman, GPG
Mr. Akash Gaikwad-Patil, Vice Chairman, GPG
Dr. Anjali Gaikwad-Patil, President, GPGI
Dr. Sandeep Gaikwad, Treasurer, GPGI

PATRONS

Dr. P. L. Naktode, Principal
Prof. Pragati Patil, Vice Principal
Dr. Geeta Padole-Gaikwad, Director, Admission Cell
Mrs. Surekha Raut, Director, Finance

CONVENER

Dr. Pratik Ghutke
Head, Department of Electrical Engineering

CO-CONVENER

Prof. Radharaman Shaha
Asst. Professor, Department of Electrical Engineering

COORDINATOR

Prof. Chetan Jambhulkar
Department of Electrical Engineering

ORGANIZING COMMITTEE

Prof. Kunal Sawalakhe
Prof. Pritesh Mhaiskar
Dr. Kumari Shipra
Prof. Vaishali Malekar
Prof. Ganesh Wakte
Prof. Praful Ghadge
Prof. Kishor Dhore
Prof. Ashwini Adamne
Prof. Pooja Yawale

Who Can Attend?

Student & Faculty Members and Research Scholars / PG Scholars from the AICTE / UGC or equivalent Universities / Organizations, Industry People.

Important Date for Registration

Date: 27/03/2024
Registration Fees:- Rs. 400/-

Timing

10:00 AM to 05:00 PM

Information About Workshop

All registered participants will be eligible for certificate if their attendance is above 80% including all the sessions & after submission of assignment and feedback form.

For Details Contact: 95033 09891 / 89995 66364

Resource Persons

Mrs. Neema Amish Ukani
Director, NU Intelligence Pvt. Ltd. Nagpur

Ms. Swapnali Tagde
Arduino Mentor

Student Coordinator

Mr. Aditya Kundalkar
Ms. Gayatri Nande
Mr. Rohit Bhoyar
Ms. Chahul Tembhare
Mr. Prajit Meshram

DTE Code: 4151 www.tgpcet.com

TULSIRAMJI GAIKWAD-PATIL College of Engineering & Technology

AN AUTONOMOUS INSTITUTE

Introduction

The Arduino is a cheap, flexible, open-source microcontroller platform designed to make it easy for hobbyists to use electronics in homemade projects. With an almost unlimited range of input and output add-ons, sensors, indicators, displays, motors, and more, the Arduino offers you countless ways to create devices that interact with the world around you. In Arduino Workshop, students will learn how these add-ons work and how to integrate them into your own projects.

B.Arch | B.Tech | M.Tech | MBA | MCA | Polytechnic | D.Arch | B. Pharm | D. Pharm | BAMS | B.Sc Nursing* | Physiotherapy

DTE Code: 4151 www.tgpcet.com

TULSIRAMJI GAIKWAD-PATIL
College of Engineering & Technology

AN AUTONOMOUS INSTITUTE

Two Days Workshop

on

"ARDUINO PROGRAMMING"

28th to 29th April 2024

Organized by

Department of Electrical Engineering

In Association with

NU INTELLIGENCE PRIVATE LIMITED

GAIKWAD-PATIL GROUP OF INSTITUTIONS

B.Tech | B.Arch | M.Tech | MBA | MCA | Polytechnic | BAMS | D. Pharm | B. Pharm | B.Sc Nursing | Physiotherapy

Department Vision & Mission

Vision: To emerge as a Learning Hub and Centre of Excellence in the domain of Electrical Engineering.

Mission:

1. To disseminate knowledge replete with quality education in the field of Electrical Engineering in meticulous and methodical manner.
2. To provide platform to address societal issues as well as challenges faced by industries.
3. To develop research culture and inculcate innovative and entrepreneurial skills.
4. To ensure overall development of students and staff by instilling knowledge and professional ethics as a part of lifelong learning.

Program Educational Objectives(PEOs)

1. Demonstrate and analyze the fundamental knowledge with respect to the various domains of Electrical Engineering.
2. Investigate and apply modern tools to develop innovativeness in different applications of Electrical Engineering domain.
3. Integrate new emerging trends and concepts in Electrical Engineering profession for sustainable development.
4. Develop professionals having managerial and administrative Qualities for Electrical Engineering related industries.
5. Promote lifelong learning, to prepare for the next challenges in the field of Electrical Engineering.

Program Outcomes (POs)

1. **Engineering Knowledge**
2. **Problem Analysis**
3. **Design/development of solutions**
4. **Conduct investigations of complex problems**
5. **Modern tool usage**
6. **The engineer and society**
7. **Environment and sustainability**
8. **Ethics**
9. **Individual and team work**
10. **Communication**
11. **Project management and finance**
12. **Lifelong learning**

Two Days Workshop on "Arduino Programming"

Mode of Workshop : **Offline**

Duration : **Two Days**

ProgramTime : **10:00 am to 5:00pm**

Total Students participated: 50 (IV & VII semester Students of EE Department)

Expert of the Workshop:

1) Mrs. Neema Ukhani, Director, NU Intelligence Pvt. Ltd., Nagpur.

2) Ms. Swapnali Tagde, Arduino Mentor

Coordinators of Workshop: Mr. Chetan Jambhulkar, Asst. Professor, Dept. of EE

Schedule of Workshop:

1. Inauguration
2. Day -1, Session -1 on Fundamental of Arduino by Mrs. Neema Ukhani.
3. Day -1, Session-2 on Hands on practice of Software simulation of Arduino by Ms. Swapnali Tagde, Arduino Mentor.
4. Day -2, Session-1 on Practical Application of LDR sensor introduction, pin out Smart Street Light project using LDR sensor interfacing with Arduino, LED, Buzzer.
5. Day - 2, Session-2 on Implementation and troubleshooting of the project MQ- 2 sensor introduction, pin out and applications.
6. Students Question-answer session.
7. Vote of thanks given by Prof. Chetan Jambhulkar.

Aim of workshop:

The aim of the workshop is to introduce students to the fundamentals of Arduino programming and empower them to develop their own electronic projects using Arduino microcontrollers.

Objectives of workshop:

1. **Introduction to Arduino**: Provide students with a comprehensive understanding of what Arduino is, its components, and its applications in electronics and robotics.
2. **Programming Basics:** Teach students the basics of programming using the Arduino IDE, including syntax, variables, data types, and control structures.

3. **Hands-On Experience:** Offer students practical, hands-on experience by guiding them through coding exercises and simple projects, such as blinking LEDs, reading sensor data, and controlling actuators.
4. **Advanced Topics:** Explore more advanced programming concepts, such as functions, libraries, and advanced control structures, to enable participants to write more complex and efficient code.
5. **Project Development:** Encourage students to apply their newfound knowledge and skills to develop their own Arduino projects, either individually or in groups, under the guidance of instructors.
6. **Problem-Solving and Troubleshooting:** Equip students with problem-solving strategies and troubleshooting techniques to overcome common challenges encountered during Arduino programming and project development.
7. **Creativity and Innovation:** Foster creativity and innovation by encouraging participants to explore different sensors, actuators, and communication protocols to create unique and innovative projects.
8. **Collaboration and Networking:** Facilitate collaboration and networking among participants, allowing them to exchange ideas, share experiences, and learn from each other's projects and challenges.
9. **Empowerment and Confidence:** Empower students to continue their journey in electronics and programming by providing them with the knowledge, skills, and confidence to independently explore and experiment with Arduino and other microcontroller platforms.
10. **Lifelong Learning:** Instill a culture of lifelong learning by inspiring students to continue exploring new technologies, honing their skills, and staying updated with the latest developments in the field of embedded systems and IoT (Internet of Things).

Introduction of Program:

Department of Electrical Engineering of Tulsiramji Gaikwad Patil College of Engineering and Technology, Nagpur (TGPCET) have organized a two days' workshop on "**Arduino Programming**" which is scheduled on 28.04.2024 and 29.04.2024 at APJ Abdul Kalam Hall in association with NU Intelligence Pvt. Ltd, Nagpur. This workshop is organized for IV semester & VI semester students. Total 50 Students have attended this workshop.

About the Workshop:

The two days workshop on "**Arduino Programming**" was organized by electrical department for fourth & sixth semester students. The workshop was coordinated by Mr. Chetan Jambhulkar, Asst. Professor, Dept. of EE. The session experts of the workshop were Mrs. Neema Ukhani, Director, NU Intelligence Pvt. Ltd., Nagpur. & Ms. Swapnali Tagde, Arduino Mentor

During the workshop, the students have gained knowledge about Arduino and Arduino Programming. The workshop was ended up with certificate distribution. Hence, students got also practical exposure in regard of Arduino Programming.

The main goal of this workshop was to convey advancement in automation system that will enhance their domain knowledge. With this we ended up the two days workshop very finely and cultivating students of electrical engineering department with their enthusiastic participation.

Mapping with PO:

This workshop helps student to learn about

1) Engineering Knowledge
2) The Engineer and Society
3) Environment & Sustainability
4) Modern tool usage
5) Individual and team work
6) Communication
7) Lifelong Learning
8) Project Management & Finance

Outcomes:

1. **Understanding of Arduino Basics:** Participants will gain a solid understanding of what Arduino is, its components, and how to use the Arduino IDE for programming.
2. **Programming Skills:** Participants will acquire fundamental programming skills in C/C++ language, tailored for Arduino microcontrollers.
3. **Hands-On Experience:** Through practical exercises and project development, participants will gain hands-on experience in connecting components, writing code, and building simple electronic circuits.
4. **Completed Projects:** Participants will have developed and completed Arduino-based projects, demonstrating their ability to apply learned concepts to real-world applications.
5. **Documentation:** Participants will document their projects, including circuit diagrams, code, and project descriptions, enhancing their ability to communicate their ideas and solutions effectively.
6. **Problem-Solving Skills:** Participants will develop problem-solving skills by troubleshooting errors and challenges encountered during project development.
7. **Collaboration and Networking:** Group projects will foster collaboration among participants, allowing them to exchange ideas, share knowledge, and build professional networks.
8. **Confidence Building:** Participants will gain confidence in their ability to work with electronics and programming, empowering them to tackle more advanced projects in the future.
9. **Creativity and Innovation:** The workshop will inspire participants to think creatively and innovatively, encouraging them to explore new ideas and solutions using Arduino technology.
10. **Lifelong Learning Mindset:** Participants will develop a passion for lifelong learning, driven by their curiosity to explore new technologies and enhance their skills in Arduino programming and electronics.
11. **Community Engagement**: The workshop will foster a sense of community among participants, creating opportunities for ongoing collaboration, knowledge sharing, and support within the Arduino programming community.
12. **Career Opportunities:** Participants may discover new career opportunities or avenues for personal growth in fields related to electronics, embedded systems, IoT (Internet of Things), and programming.

Conclusion:

The workshop is a way to share advanced knowledge to the students which is beyond the books so that they can think in an innovative way. This aspect of the program should be expanded for future programs. The overall workshop ended up with good experience.

Acknowledgement:

On the behalf of Electrical Engineering Department, we sincerely thank to expert Mrs. Neema Ukhani, Director, NU Intelligence Pvt. Ltd., Nagpur. & Ms. Swapnali Tagde, Arduino Mentor for accepting our invitation and delivering an informative session during two days' workshop.

Glimpses: -

Guest Speaker giving the detail insight about future automation system

Students participant of Two Days Workshop on Arduino Programming

Guest & faculties during the Inauguration of workshop

Mrs. Neema Ukhani delivering the session during the workshop

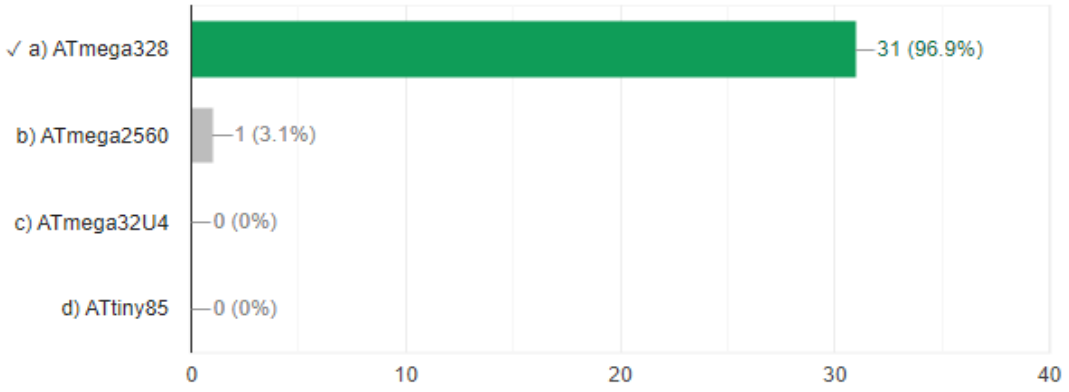
Ms. Swapanali Tagde delivering the session during the workshop

Distribution of Certificate to the student participants

Google form questions and responses after conduction of workshop:

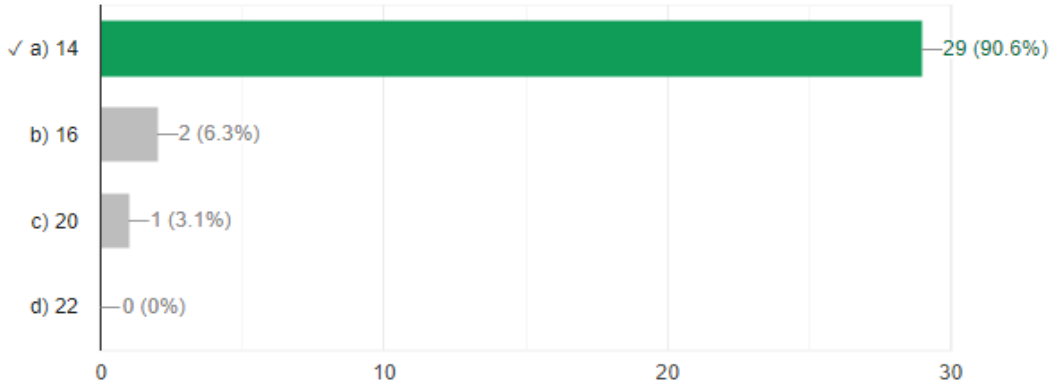
1 .What is the microcontroller used in Arduino Uno?

31 / 32 correct responses



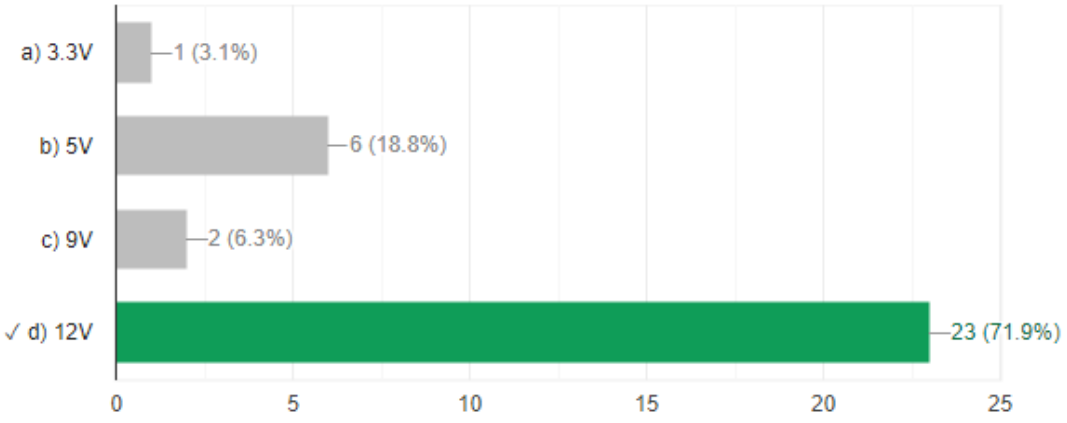
2. How many digital input/output pins does Arduino Uno have?

29 / 32 correct responses



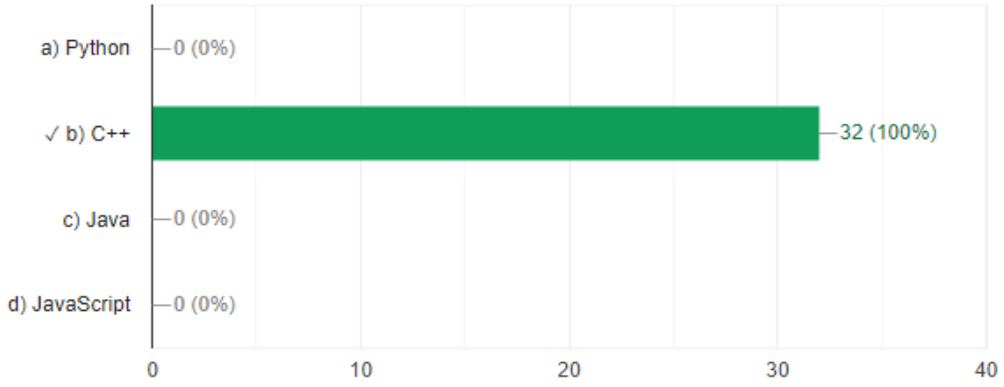
3. What is the maximum voltage input that Arduino Uno can tolerate?

23 / 32 correct responses



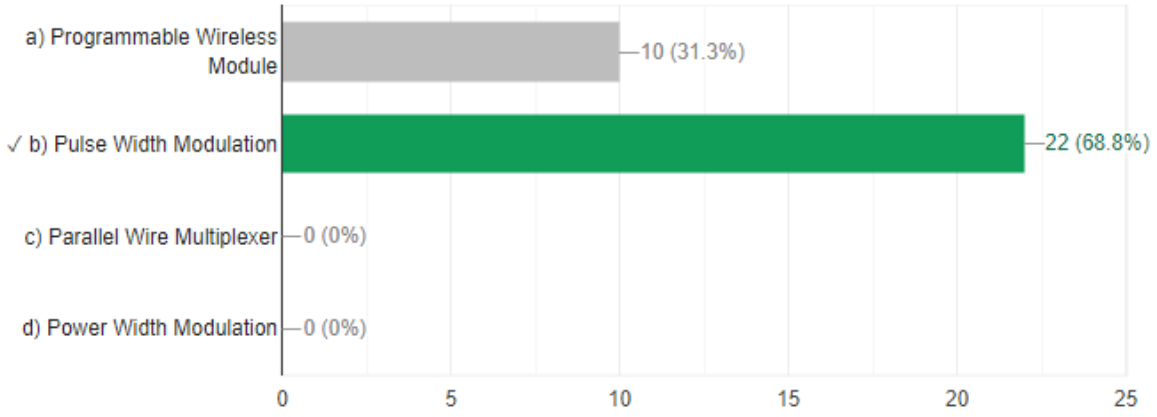
4. Which programming language is primarily used to program Arduino Uno?

32 / 32 correct responses



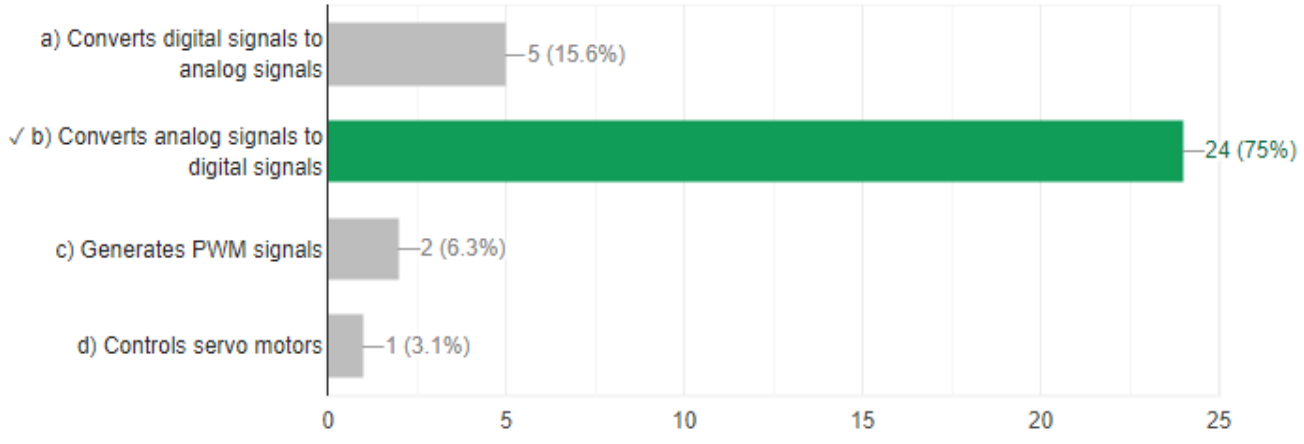
5. What does PWM stand for in Arduino Uno?

22 / 32 correct responses



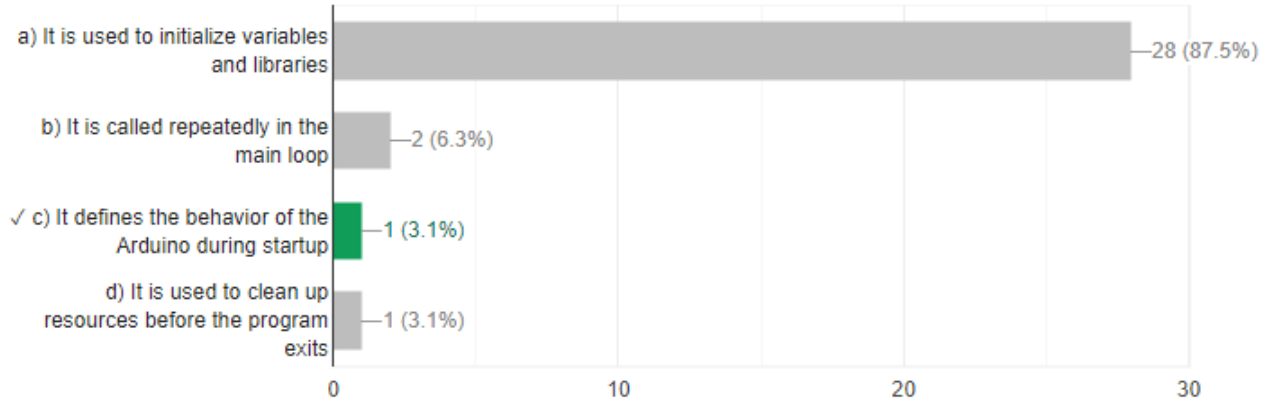
6. What is the function of the Analog-to-Digital Converter (ADC) in Arduino Uno?

24 / 32 correct responses



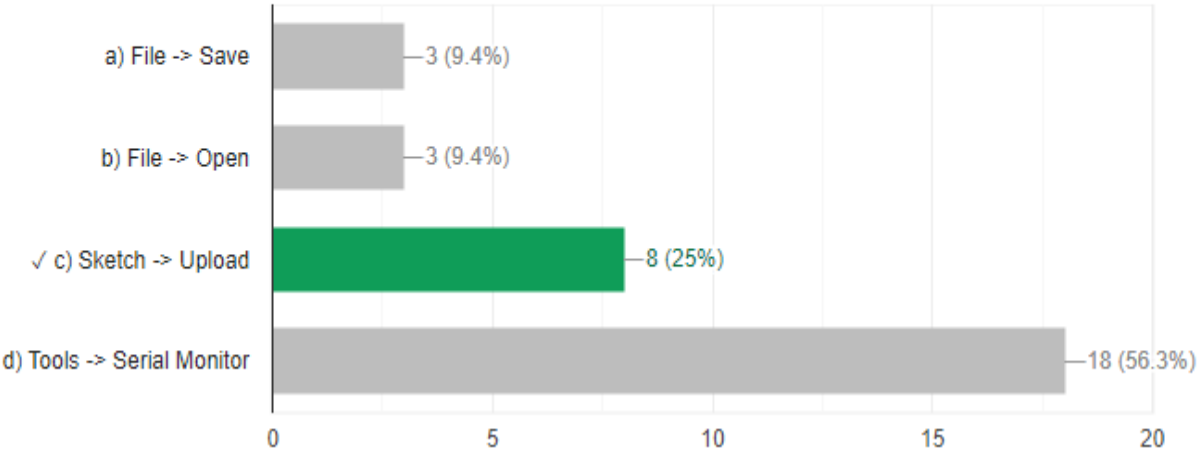
7 . What is the purpose of the "setup()" function in Arduino programming?

1 / 32 correct responses



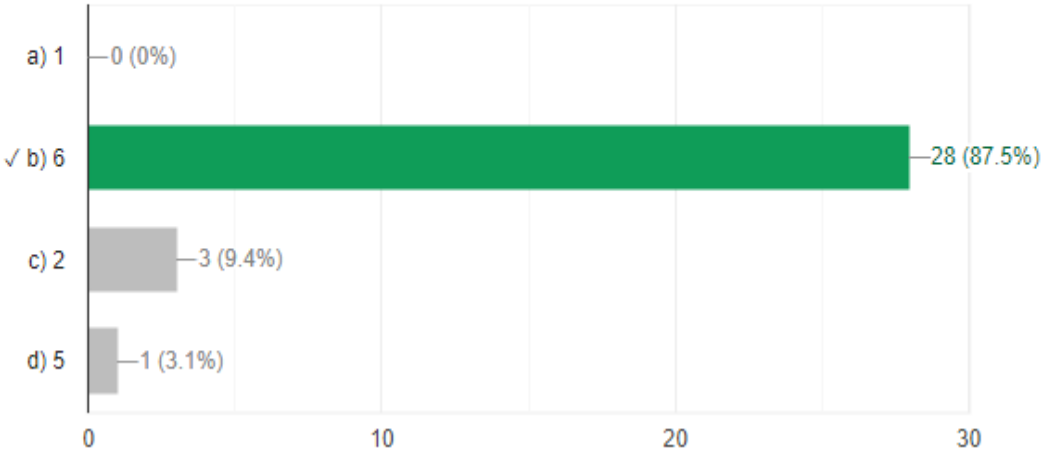
8. Which Arduino IDE menu option is used to upload code to Arduino Uno?

8 / 32 correct responses



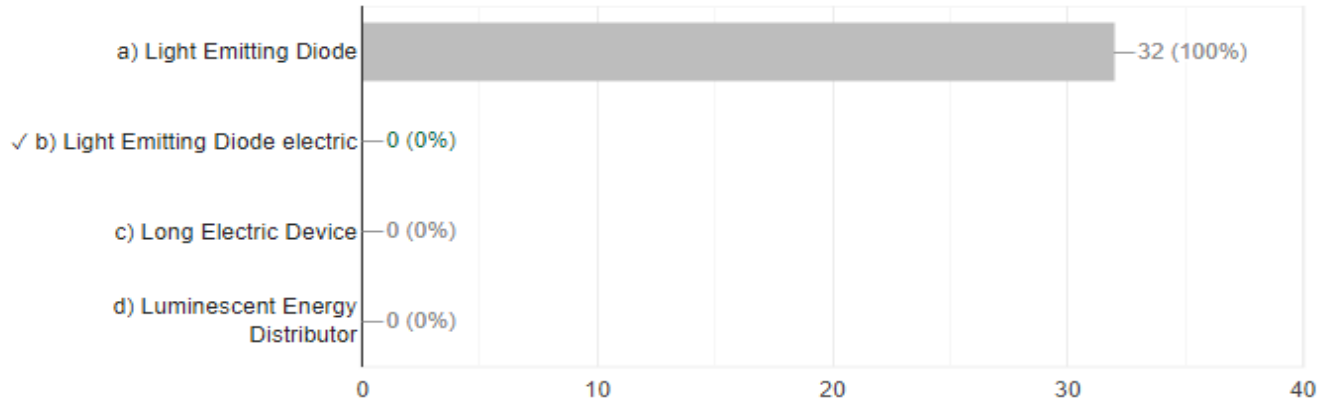
9. How many analog pins does Arduino Uno have?

28 / 32 correct responses



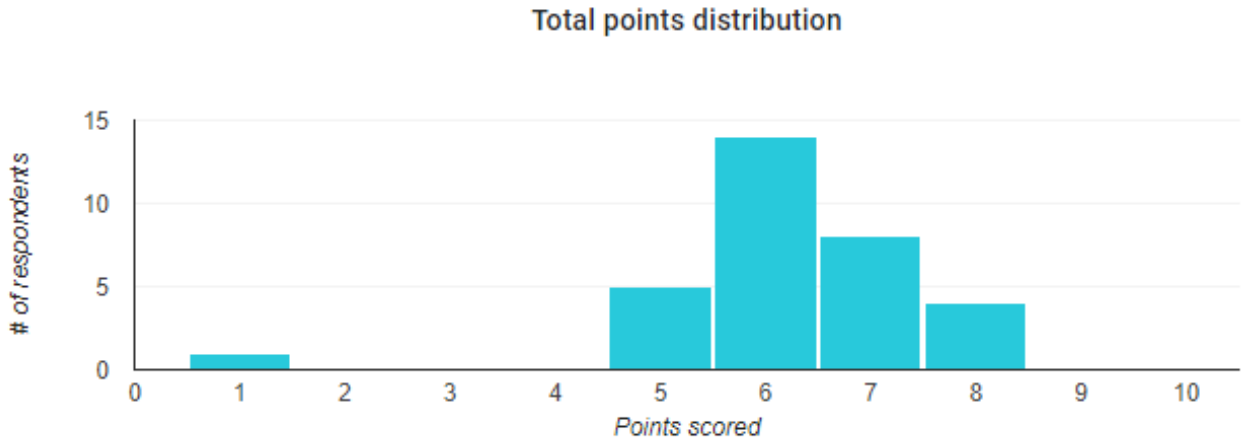
10. What does LED stand for?

0 / 32 correct responses



Column chart for answer of question for 32 responses:

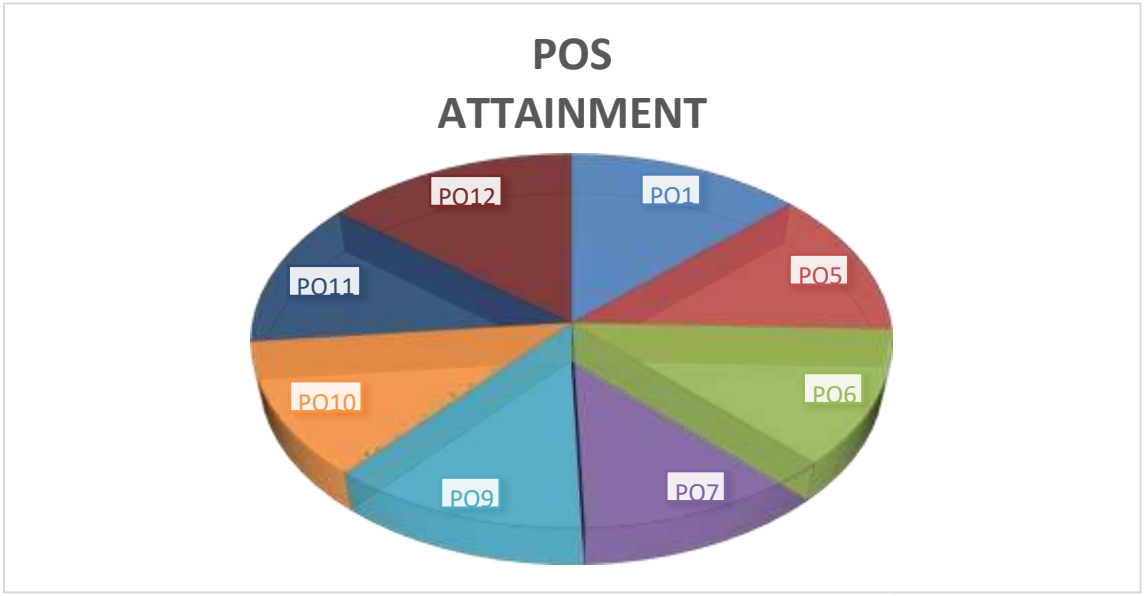
Average	Median	Range
6.19 / 10 points	6 / 10 points	1 - 8 points



Correct answer in % range 80-100 (3),60-80 (2) and below 60(1)

Question number	Correct answer in%	Pos Mapped							
		PO1	PO5	PO6	PO7	PO9	PO10	PO11	PO12
1	96.9	3	3	3	3	-	3	3	3
2	90.6	3	2	2	3	3	2	2	3
3	71.9	2	3	1	2	2	3	2	3
4	100.0	3	3	3	3	3	3	3	3
5	68.8	3	3	3	2	3	2	3	3
6	75.0	2	2	1	1	2	2	3	2
7	03.1	2	2	2	2	2	2	2	2
8	25.0	2	2	2	2	1	3	2	2
9	87.5	3	3	3	1	3	2	2	3
10	0.00	2	1	2	3	1	2	1	2
Average	**61.88**	**2.4**	**2.3**	**2.2**	**2.2**	**2.22**	**2.2**	**2.3**	**2.6**

Pie chart analysis for POs attainment



Mr. Chetan Jambhulkar
Asst. Professor
Coordinator of Workshop

Dr. Pratik Ghutke
Head of Department, EE
Convener