I-Robo (Amalgation of Interactive Learning)

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Abstract – World, Science, and People evolved too much in recent decades but education system is not able to match-up the pace. Education system of India (The rattamar Education) still follows old model of teaching and learning. By providing a smart environment we can provide better education to our students so that they can learn in a smart way.

The need here is to visualize our studies in a smart way suppose through a Smart Intelligent robot that can interact with students. In my words, we want to add one basic formula here that:

Smart Education with fun Education= Quality Education

I-Robo is an Educational robot for children of age 4 to 12 years. Our robot will be twin working. For instance, the child can play with this remote control car. The robot will consist of a screen which will help the children to learn something new which will give the easiest way of studying and will help in their leisure time too. Moreover, the robot will be AI-based. Also, there's one app connected to the robot however, the app will be only controlled by parents. The smart screen of a Robot contains many features like Age-wise updating of content, Virtual Activities (Exercise, Games, Stories, and much more), FunPad, Animated videos regarding studies, Test taking, Automated Report card generation, and Virtual travel to historical places through animations. Parents can schedule time table for different activities for a child.

***Index Terms*—Animation, Education, Robotics, Virtual reality.**

I. INTRODUCTION

Robots are a human thing that is capable of doing most of the work which human can perform and that too in much less time. Robots are also applications of artificial intelligence and sensors which combine together to form a human-machine called robots. There are numerous applications of robots in the world of science and computer application. Scientists and engineers are working on robots to make them almost applicable in every field. Robotics is one and only the greatest adopted and interesting branches in the arena of science and education which is loved by every youth and everyone wants to learn robotics for future use.

In the past, educational goals reflected the emphasis of society on the need for basic skills such as reading, writing, and arithmetic and an agreed-on body of information considered necessary for everyone. Many educators now accept that the world is changing too quickly to define education regarding specific knowledge or skills; they believe it should focus instead on more general capabilities such as learning to learn skills, which will help citizens cope with inevitable technological change. Everyone seems to agree that changes in our educational methods are needed to respond to new challenges. Though technology has been used in education and training for decades, it has mostly been used as an aid to supplement traditional classroom learning or to support distance learning programs. With the growing acceptance of Robotics Technology, it is possible to evolve innovative ways of teaching and learning that complement face-to-face teaching. Globally, Robotics with Information and Communication Technology (ICT) options are being explored to improve the quality of education and training initiatives and to enhance their reach.

As Robots are rapidly becoming an important part of modern life. They are being used in many different ways and in many different fields. As technology advances, robots are becoming more and more sophisticated. This has led to an increased focus on robotics in educational settings, particularly in the study of computer science. In this research paper, we discuss the use of robot (I-Robo) in enhancing learnings at home environment to support student learning and explore the potential benefits and challenges associated with their use. We look at the current state of robotics in the classroom, the potential for robotics to improve student learning outcomes, and the challenges associated with using robots in the classroom. We conclude by discussing the potential for robotics to improve student learning in the future.

II. FEATURES

- Can play & learn with the same product:
  The robot is smartly designed so that it can be used as a Toy as well as a Child can learn from the robot so it can act as a personal teacher to a child. The Robot includes many features that are necessary for the development of a kid such as AI-based, Logical, mathematical, as well as brain powered games.
- Parents guided & controlled app:
  Through Parent Specific Application they can track the progress of learning of their children and can set specific tasks and schedules for a child. A robot can also conduct Tests and the report card is generated with analysis and given to the parent's app.
- Smart & Effective education:
  The problem of Ratta Maar education can be solved with the visualization of studies. I-Robo provides a learning experience with animated videos, games, & Interactive Learning.
- Oral Test & analysis:
  I-Robo can also conduct Tests in Form of Oral as well as in Written. And immediate report card will be generated for the test that will be directly shown on the parent's App.

- Smart screen & writing Fun Pad:
  A smart Screen and writing pad is included on a Robot through which the child can write, design, and can fill in colors in a particular structure. AI recognition of drawings drawn by a child is developed so in case if a child draws some structure of a car but it's not proper that AI will automatically recognize that it’s a car.
- Virtual tour of Historical Places:
  Now through virtual travel children can travel to historical places in India. They can easily travel to places such as the Taj Mahal, Golden Temple, etc. Idea is to give a real-life experience and learnings about all Historical and cultural important places of India through a child-friendly UI/UX design.
- Scheduling Study:
  Now as a part of user-friendly software now parents can schedule the learning of children.

III. COMPONENTS OF I-ROBO

1. Software Part: It consists of Parents Guided Application, robot will have inbuilt software which is directly connected to an internet and server so that data can be updated automatically.

2. Body Part: The robot is made up of Polycarbonate Plastic & Rubber material. The body of an I-Robo consists of a Smart Screen, an On/Off Button & a speaker.

3. Base Part: The base Part is also known as a Remote Car part, it can be easily controlled through a mobile phone. It can be used by a child as a remote car.

IV. APPLICATION OF I-ROBO

- Robotics in classrooms

Using robots as an educational tool to teach children was initiated in the early 1980's where learning is achieved most effectively by constructing robotic artifacts. Children can study through the process of designing, building and programming their robots. In the foundational work at MIT media lab, Resnick and Ocko (1991) started the progress of LEGO/Logo. They integrated LEGO Technic products with the Logo programming language that enabled children to build and program robots. This learning by doing method has attained much attention in recent years. A new robotic infrastructure is shaped resulting in global socio-cultural transformation. In the realm of education, robots are currently being used to teachmath (Janssen et al.,2011), history (Park, Kim and Pobil, 2011), new languages (Saerbeck et al., 2010), and even new tasks (Looije et al., 2008). Some studies vary the type of feedback (positive,

negative, neutral) (Park, Kim and Pobil, 2011) and behavioral techniques (Szafir and Utlu, 2012) given from the robot, while others vary the type of learning adaptation (Janssen et al., 2011) provided from the system.

Generally speaking, students are more attracted to the robot when it exhibits positive feedback (Saerbeck et al., 2010 ; Park, Kim and Pobil, 2011), are more motivated to learn from the robot when there is personalized learning (Janssen et al., 2011), and have increased recall abilities when the robot uses appropriate behavioral techniques to re-engage (Szafir and Utlu, 2012).

Different perspective observed in the literature is that most of the applications of robotic technology in education have mainly emphasized on supporting the teaching of subjects that are closely related to the robotics field, such as robot programming, robot construction, or mechatronics. Moreover, most of the applications have been utilized the robot as an end or a passive device in the learning activity, where the robot has been built or programmed (Mitnik, Nussubaum, and Soto, 2008). Rusk etal. (2008) agree that the way robotics is currently presented in educational settings is undesirably narrow. Exploring a broader range of possible applications has the potential to engage young people with the wider area of interests. Young people who are not interested in conventional approaches to robotics become motivated when robotics activities are presented as a way to tell a story, or in connection with other disciplines and interest areas, such as music and art (Resnick, 1991; Rusk et al.,

2008). Different students are attracted to different types of robotics (Resnick, 1991). Students interested in cars are expected to be driven to create motorized vehicles,

while students with interests in art or music are supposed to be excited to build interactive sculptures. Rusk et al., (2008) examined the strategies for introducing students to robotics technologies and concepts and argue for the significance of implementing multiple pathways into robotics, to assure that there are entry points to engage young people with different interests and learning styles. It seems that an educational robot is a relevant tool for improving learning. However, this assertion needs to be further supported by the application of experiences and above all, through empirical evidence.

- Robotics in learning at home Environment

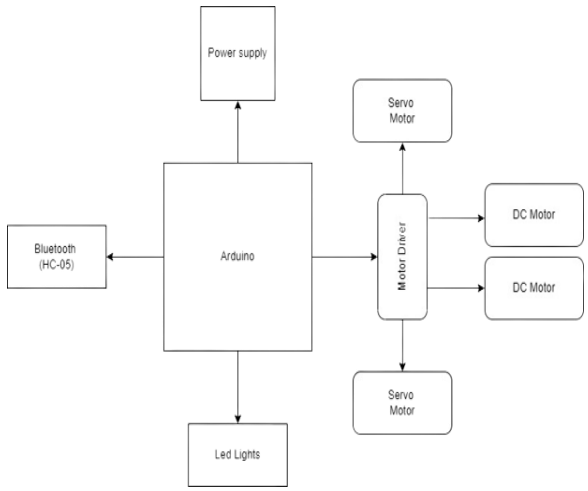
Robotics creates learning experiences for children about sensors, motors, and the digital domain. Playing with motors, gears, sensors, levers and programming loops will lead children to become engineers and as well as storytellers by designing their projects that move in response to their surroundings. Robotics can help children to learn about related mathematical concepts, the scientific method of inquiry and problem solving.

V. ADVANTAGES OF USING I-ROBO FOR LEARNING

1. Personalized Learning: I-Robo can be programmed to customize the learning experience for students, helping them learn more effectively and efficiently. This can help students focus on the topics they need to learn and move forward in their studies.
2. Improved Engagement: I-Robo can help to keep students engaged and motivated when learning at home. They can be programmed to provide interactive activities which keep students engaged and help them to focus on the task at hand.
3. Increased Interactivity: I-Robo can provide a more interactive learning experience than traditional learning materials. They can be programmed to ask questions, provide feedback, and create an interactive learning environment.
4. Increased Accessibility: I-Robo can make learning more accessible for students who have physical, cognitive, or other disabilities, allowing them to learn more effectively.
5. Reduced Costs: I-Robo can help to reduce costs associated with learning materials and supplies, as well as instructional costs.
6. Reduces Screen Time Usage: Excessive screen time is harmful to your kids. The negative effects of too much screen time include sleep and behavioral problems. It can also lead to attention, social, and emotional problems. I-Robo can help reduce the time that your kids are on the screen.7. Provides Real-Time Assessment: I-Robo provides you with your kid's assessments almost immediately. You can know your kids' academic response in less than minutes and decide to take the necessary action.

VI. MODELING

A. Block Diagram for Prototype-1



Info: A block diagram is an essential tool for visualizing a project. It is a graphical representation of the components and their interactions in a system. It is used to identify the components that make up a project, the relationships between them, and the flow of information and resources between them. A block diagram can be used to analyze the structure of a project and the connections between components. It can also help to identify potential issues and solutions to them.

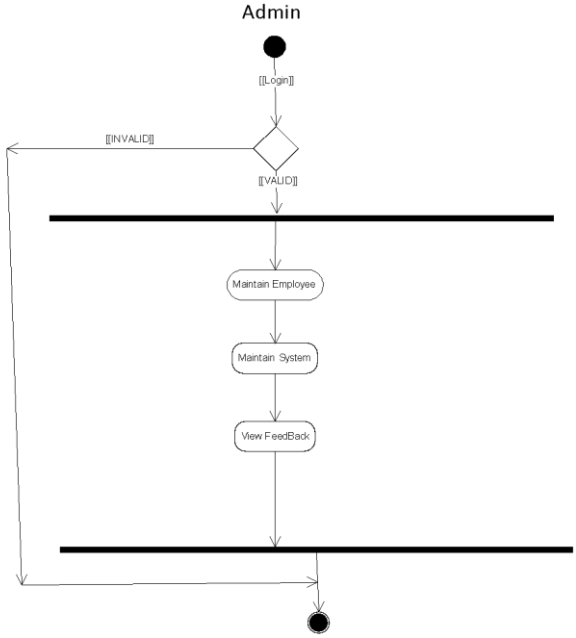
Here, in this block diagram, we have shown a basic connection between the Robot interacting with the mobile app. For an interaction to begin we have used the HC-05 Bluetooth module, The Arduino motor driver shield is used for the connection of two Servo motors and two DC motors. The use of motor driver Arduino shield has been extended to connect 8 RGB LED Lights for the attractive face.

Symbols Used while making I-Robo Block Diagram:

A block diagram majorly comprises rectangle shapes known as blocks and the straight lines with arrows at the end. While the blocks represent the key elements of the entire process, the arrowed lines show the relationship between the two objects and the direction the data, information, processing, signals, or the electric current flows in. An important point to note, and always keep in mind, here is that all the blocks and the connecting lines must be well-labeled. When a block is to be labeled, its name (the element that it represents) must be written inside the rectangle. On the other hand, in the case of the connecting lines, the name could be written above or below them within appropriate proximity.

NOTE: As we move further on making the prototype-2 of I-Robo the Diagrams Shown in this research paper will be even more complex.

B. Admin Activity Diagram for Prototype-1



As with flowcharts and other diagrams, activity diagrams are a way to visually represent dynamic behavior within a system. Activity diagrams depict the flow of programs on a high level, allowing users to more clearly understand the conditions and constraints associated with specific operations, and to see message flow between activities. Creating an activity diagram in UML makes it possible for users to model and diagram both conditional and parallel behavior. The flow of an activity can be managed using various control elements in the UML flow diagram. In terms of usage, activity diagrams are uniquely suited for:

- Modeling use cases and the steps they consist of.
- Detailing software protocol as a permissible sequence of interactions between components.
- Modeling software algorithms.
- Charting business workflows among multiple users in a system.
- Modeling the execution flow between system entities.
- Present detailed information about functions or algorithms in the system.
- Create a high-level understanding of system functionalities.

As with any kind of business-process diagram, the main benefit of using an activity diagram is improved process visibility and clarity. Users can take in and briefly understand the relationship between objects, including how they flow together. They can also see where

different responsibilities and dependencies lie, and where important decisions lie must be made. Likewise, diagramming is beneficial to collaboration and documentation, communicating processes in a way that is easily shareable across teams and departments.

VII. LIMITATION

As a robot will be a friend of any child, it is important to make AI friendly robot. For this implementation proper team is required.

Many different more unique functionalities can be added later on to the idea which may increase the cost of the prototype.

VIII. FUTURE ENHANCEMENT

1. 3-D Modeling of an I-Robo
2. AI-based working Robot
3. Development of AR Videos for better video Interaction
4. Voice control App

IX. CONCLUSION

We conclude that our I-Robo will have a great impact on the overall development of a child through advanced technology. Because of that, it will create a huge impact on society. We strongly believe in smart education+ Fun= Quality Education.

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