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Instrumental Learning Course using Raspberry PI

Prof. Amol Bhoi, Shailesh Wattamwar, Shivani Gaikwad, Madhuri Kale
Department of E&TC
G H Raisoni Institute of Engineering and Technology, Wagholi, Pune, India

Abstract: *By utilising technology to foster a sense of presence and dynamic dialogue, distance learning has transformed education. With the help of long-lasting memories and engagement, this cutting-edge teaching method seeks to make a significant impression on students. Additionally, it offers timely tracking of students' academic progress records, enabling tailored changes in lesson plans depending on student feedback. However, due to specific equipment requirements, notably with regard to sound quality, some traditional courses, such as learning an instrument, have difficulty converting to distance learning models The provision of content-based and individualised instruction is hampered by the special needs of instrument learning being unmet by the existing distant learning platforms. This research suggests a concept for online instrument learning courses that uses embedded systems and Internet of Things (IoT) technology in order to overcome this problem. This strategy improves remote learning experiences while simultaneously satisfying hardware needs, which motivates students more.*

Keywords: Plant disease detection, feature extraction, image processing

I. INTRODUCTION

Numerous fields, including education, have seen substantial change as a result of the network technology's quick development. These modifications have affected educational models, philosophies, and practises in addition to the dissemination of educational information [1]. Students have access to a wealth of educational resources and a variety of learning opportunities thanks to the incorporation of network technology in the classroom. Due to the diversification of learning activities and the destruction of traditional teaching's time and space constraints, the speed of changes in educational systems and content has accelerated [2]. As long as students have access to a network, distance learning in particular allows for independent learning regardless of the time or location.

The greater proportion of nonreal-time interactions between teachers and students than real-time interactions is a significant feature of distant learning. The ultimate learning outcome of the course is based on how well these interactions work. Several elements work together in the context of remote voice singing lessons to provide a strong sensation of presence through genuine and vivid connection. Students' attention is riveted by this unique experience, which makes an impact that lasts a lifetime. Streaming video can also be used to support collaborative and experimental learning activities. Furthermore, online communities with a focus on particular themes or problems attract distance learners.

II. LITERATURE SURVEY

1. The state of instrument learning today exposes some issues that must be resolved in order to improve student performance. First and foremost, it's important to improve pupils' fundamental instrumental performance abilities. Due to a concentration on sophisticated technical techniques, students of popular instrumental music in colleges and universities frequently lack proficiency in fundamental abilities. This disregard for fundamental abilities negatively impacts students' overall instrumental performance, which is a crucial aspect of teaching instrumental music.

2. Second, there is a dearth of proficiency in playing well-known instrumental music. New genres have entered the music business as a result of the rapid development of numerous instrumental music forms. Teenagers who utilise instrumental music to convey their thoughts and emotions are drawn to many of these genres, especially the energetic and upbeat ones. But a sizable portion of today's instrumental students perform without using their authentic musical voice, which leads to poor fluency in instrumental performance. This lack of performance ability detracts from the aesthetic appeal of the entire musical piece and falls short of accurately capturing the qualities of popular instrumental music.

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3. Thirdly, teachers need to help kids become more adept at using high and low tones. Many students struggle to execute high and low tones appropriately during their instrumental performances. In addition, the medium and low parts of instrumental music are essential elements that need to be given enough consideration. In order to address the middle and low portions, students frequently sing in the upper register, yet depending exclusively on natural tone and pitch does not produce the required musical impression. This method robs the singer of vocal expression and degrades the performance as a whole. Students must integrate their skills in both high and low ranges to provide a holistic interpretation of instrumental works, effectively articulating the musical feelings, and attaining the intended musical expression.

III. PROPOSED SYSTEM

Remote users can access the WEB page through the public website and realize the interactive control of the server to achieve the intelligent management of the furniture and electrical appliances.

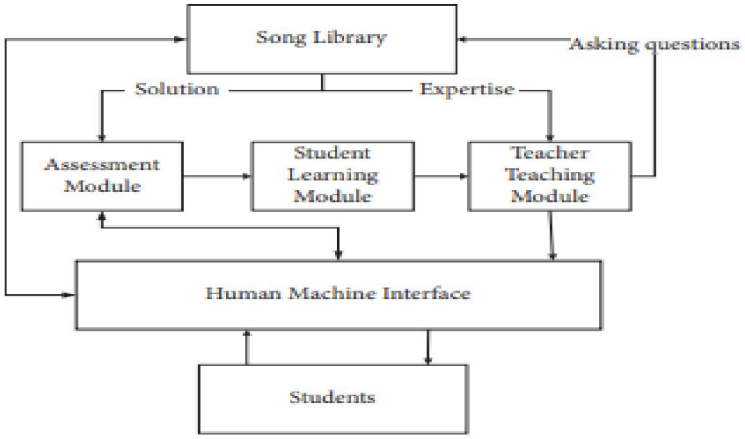

FIGURE 1: Hardware structural design of the proposed system.

Fig.1 Structure of Proposed System

Remote users can also use handheld devices (iPad, cell phone, and laptop) of any platform to complete the corresponding control

In addition to the handheld terminal platform, local users can also use voice control to manage their convenience. ,e voice module program of this system is set to control the command. ,e voice system needs to be activated in the form of a password before control.

In addition to course teaching management, this system also has audio and video entertainment functions. ,rough network technology, they can use online on-demand songs, videos, server downloads, and other common Internet functions. is system is integrated to complete a course teaching information platform with embedded WEB server construction, IoT RFID, and other technologies. ,is platform can realize the function of remote cross-platform control of singing equipment through WEB page, voice, and handheld devices (iPad, cell phone, and PC) through the master control center. ,ey can also be controlled with intelligent audio and video and other functions at the same time.

IV. METHODOLOGY

This section goes through the research technique that was employed in this project, including the methodical division of the study's several research phases, the meticulous design and implementation of the raspberry pi system, and the IoT-based remote learning design. The components' selection and integration to achieve the design goals is also described in detail.

Research and Familiarization: Conduct thorough research on Raspberry Pi Zero W, its specifications, capabilities, and limitations.

Set up Raspberry Pi Zero W: Gather the necessary hardware components, including the Raspberry Pi Zero W board, microSD card, power supply, and peripherals

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Gather the necessary hardware components, including the Raspberry Pi Zero W board, microSD card, power supply, and peripherals.

Configure the Operating System: Follow the on-screen prompts to set up the initial configuration of the operating system. Connect the Raspberry Pi Zero W to a Wi-Fi network to enable wireless connectivity.

Documentation and Maintenance Document the setup, configuration, and usage instructions for future reference. Regularly update and maintain the Raspberry Pi Zero W system, including applying security patches and software updates.

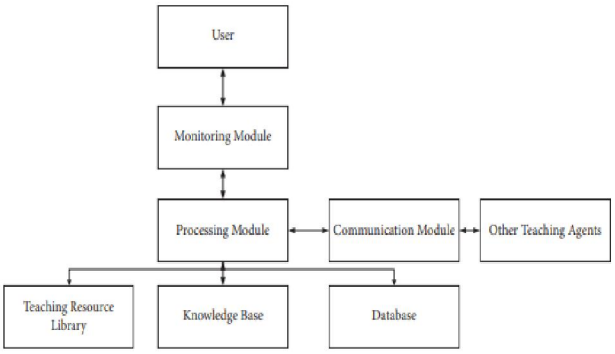

FIGURE 2: Student learning module.

Fig.2 Architecture Diagram

Hardware Interfacing: Identify the hardware peripherals or sensors you wish to interface with the Raspberry Pi Zero W. Connect the peripherals to the appropriate GPIO pins or USB ports on the Raspberry Pi Zero W. Install any necessary software libraries or drivers for the hardware components.

Develop or modify code to interface with the hardware peripherals, utilizing programming languages like Python. Image evolution: Model evaluation aims to estimate the generalization accuracy of a model on future data.

Web application: The web application would be developed using python the images fetch from android application and start the processing on data.

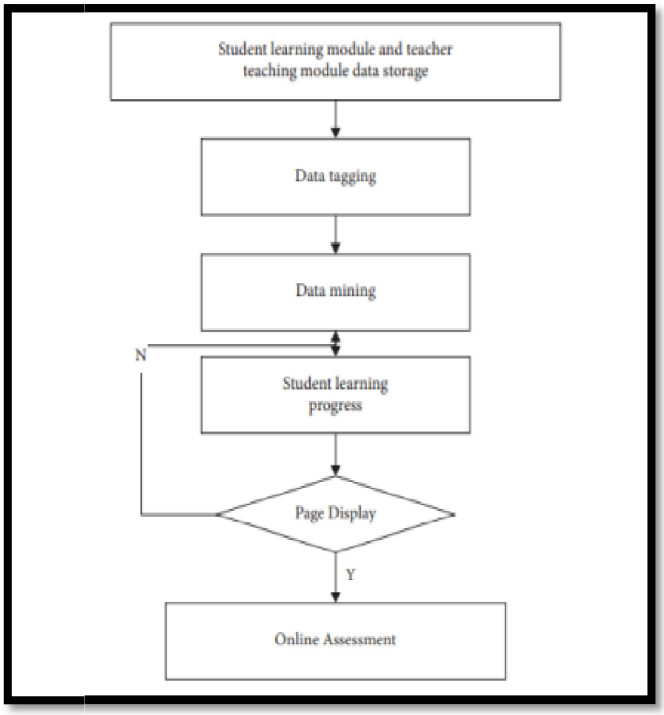

Fig: Flowchart of evaluation procedure

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4.1 Module

Student Learning Module: The student learning module may correctly represent the learning ability and skill level of students and gives a customized teaching base to the system. ,is module is composed of teaching coordination agents and several other agents. Different teaching agents have the required knowledge for independent problem solving and as independent AI individuals. They are mainly responsible for specific teaching material presentation, problem-solving, and providing instructive advice to students Knowledge sharing is achieved through a collaborative mechanism. During this entire teaching process , the coordinating agent is able to adjust the entire learning syllabus based on the monitoring data and the teaching strategies sent by the instructional management.

Teacher Teaching Module: Is module combines knowledge about the structure of the course. It provides answers to students' selection questions and supervises students' learning behavior. The model is a concrete measure to achieve learning in an individual-oriented interactive way. This module provides students with acceptable teaching strategies mainly based on learning requirements. throughout the teaching and learning process, the teacher can collect student feedback through the Internet as a way to improve the teaching strategy database. At the same time, the students can use their own reasoning mechanism to provide intelligent guidance on problems encountered during the teaching process. For any system information, the instructor's teaching process is documented in the teacher teaching model database. This is necessary in order to document the teaching style and offer the assessment module.

Assessment Module: The assessment rules are used to analyze student responses, determine the ideas that students have grasped, and pass them to the learning unit of students. It employs artificial intelligence reasoning to create a thorough assessment of students' learning behavior, attitude, effectiveness, and ability. The reasoning is based on data supplied by the student learning module and the instructor teaching module, as well as its rule base.

Outcome:

Students can anticipate acquiring a fundamental level of competency on their instrument of choice. They will pick up fundamental skills like good posture, hand alignment, and the ability to read music notation.

Repertoire: Depending on their proficiency level, students will learn to play a variety of songs and pieces. They will be able to develop a confident musical repertoire as a result.

Technique development: Students will work to hone their technical abilities on the instrument through regular practise and instruction from the instructor. To improve finger dexterity, control, and general playing ability, this may entail exercises and drills.

Students will study how to analyse and articulate musical compositions using dynamics, phrasing, and articulation. They will learn the fundamentals of music and how to emote through their playing.

Performance abilities: The course may give pupils the chance to demonstrate their development through recitals or performances. They may grow in self-assurance, get over their stage fear, and learn valuable performance skills as a result of this experience.

Self-learning abilities: Students will learn how to practise efficiently on their own while also receiving instruction from the instructor. They will be able to deconstruct challenging works, pinpoint their areas of weakness, and establish a structured practise schedule.

V. APPLICATIONS

- Intelligent learning tools.
- Easy Learning for beginner.
- Automated Feedback and Assessment.
- Provides new opportunities for instrument in teaching teachers

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VI. RESULT:

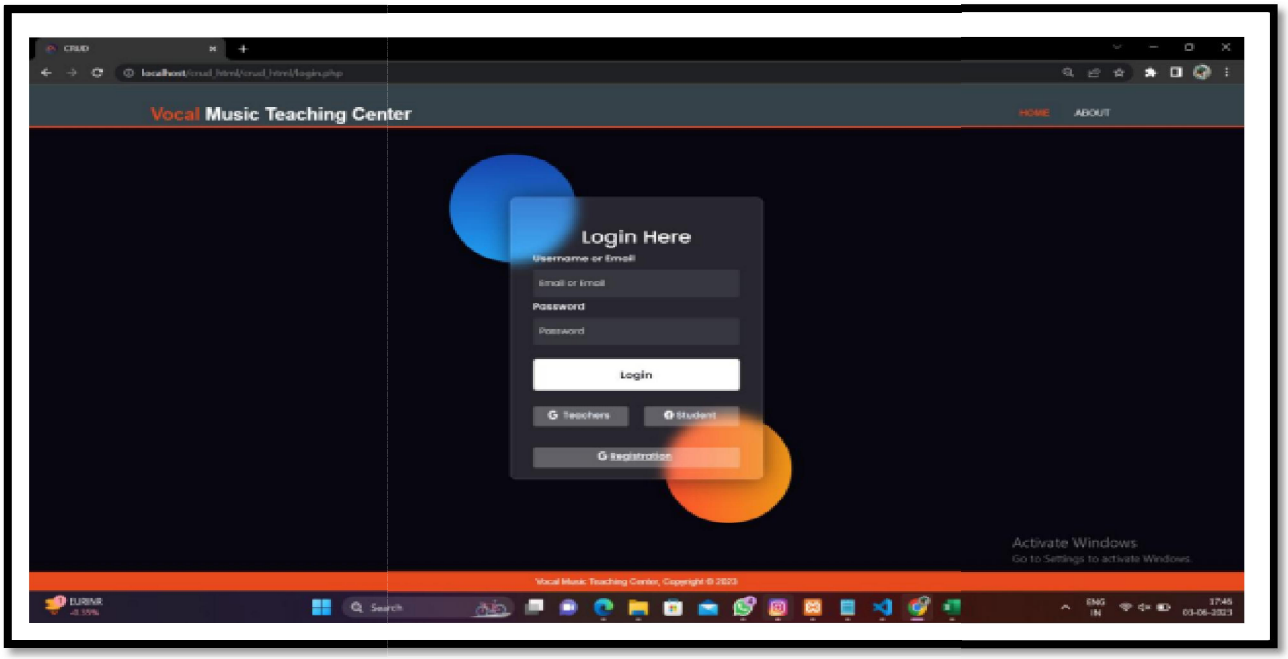

Fig 1: Login Page

Fig 2: Home Page

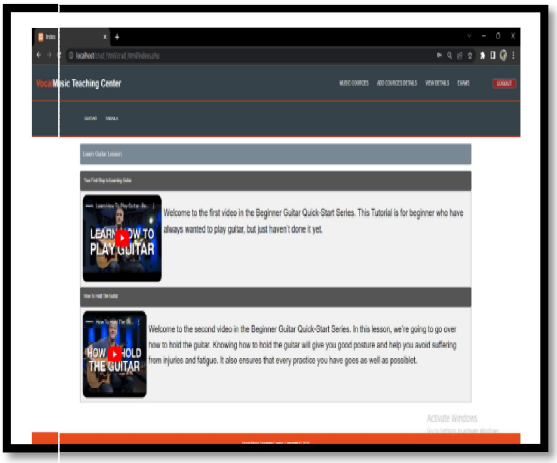

Fig 3: Course Details

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Fig 4: Quiz Question Module

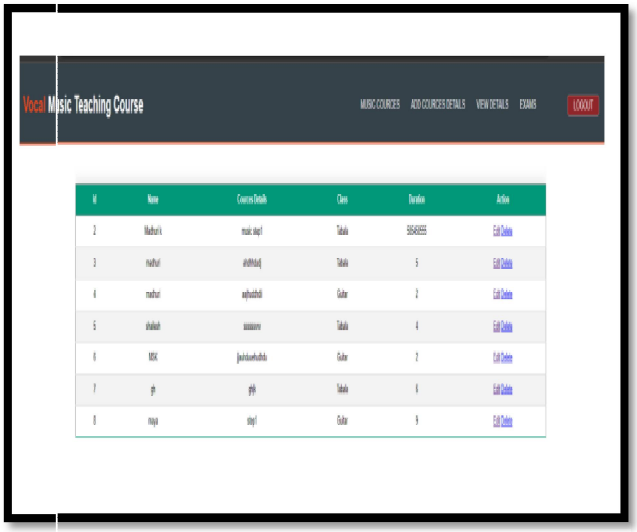

Fig 5: View Student Course details

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