The Talking Periodic Table

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ABSTRACT

In this paper, we present a project Talking periodic table which is built on DFPlayer MINI SKU: DFR0299 MP3 module. The project help the student in easy learning of chemistry in school and college level. Embedded system technology is increasing its application in every field.. The project exploits the embedded technologies in order to make elements of a periodic table to "talk" during users' request and capable of automatically telling their property using multimedia facilities. In particular, we have deployed module in the chemistry lab to help students for getting properties of various elements during practical session. Once a device has been triggered, the related element address is retrieved and a audio message is delivered to the related user. Eventually, proper multimedia recommendation techniques drive users towards other objects of possible interest to facilitate and make more stimulating the user.

Keywords:Learning, MP3module, DFPlayer, Periodic table

I. INTRODUCTION

Taking the benefit of the embedded system technology in learning process for students is the main motive of our projects. We have gone through various problems of students they come across during their studies. We consider school students from V standard to XII . These students' gives a large set of problems they are going through. Among major of students issues is related with the chemistry and its learning procedure. Most of the study of chemistry is depends on the Periodic-Table , elements configurations and their properties we take this study as challenge and design module for learning of periodic table. To better understand their problems we analyze the kind of relation that Exists between the students and the learning procedure. Usually, the purpose of the learning is to read and learn more and not to explicitly use the technology. Concisely, the type of student's behavior can be described through three methods. Some student just read and learns; other students read and write some other students read and making it musical format. We designed different prototype for every category of students using different embedded technology like android mobile application app, multimedia devices, power presentation slides and other methods. Here we find that acoustic and learning is having a great relation. we worked more and more on this category and get good response among students. From various products of embedded technology we found MP3 module from DFPlayer MINI SKU:DFR0299. This mini MP3 PLAYER is a small and low price MP3 module with an simplified output directly to the speaker. The module can be used as a standalone module with attached battery, speaker and push buttons or used in combination with a microcontroller or any other with RX/TX capabilities. These feature gives us base for designing our project.

Our work is based on a system that can understand the user requirements accurately so that the student learn easily and remember for long time.

II. SYSTEM OVERVIEW

The system includes data flow between MP3player flash drives without using a computer. We are creating modules that will help us to create a data transfer   when user required. There will be 9 MP3 modules, each accepting DATA from user placed on the board. The module will be connected to the speaker. As module gets signal from user data is retrieved from its memory location and the data in form of voice is given to the user. Data is feed in module with the help of standard SD card.
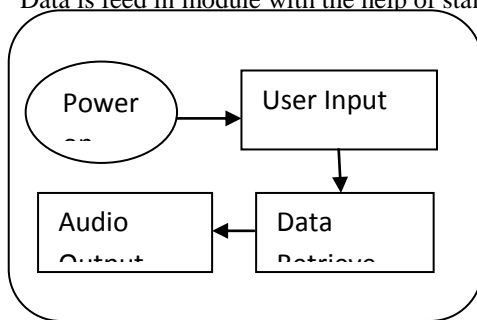

Fig. 1 .Block diagram of module.

Hardware Specifications

   A.   Acrylic Board Fabrication

   B.   Power supply includes 5 volt,1Amp Smps.

   C.   Speaker 8 ohms.

   D.   Switches.

   E.   Resistor (1/4 watt)

   F.   Connecting wires.

   G.   SD card 4 GB.

   H.   DFPlayer Mini MP3 Player is a small and low price MP3 module with output directly to the speaker. The module can be used as a standalone module with attached battery, speaker and push buttons or used in combination with or any other with RX/TX capabilities. Each module can handle 14 different mp3 voice data. So we require

   118 /14=09

(No of elements / one module capacity= no of modules required)

Table I mp3 module features

FEATURE	VALUE
Support sampling rates	Sampling rates (kHz): 8/11.025/12/16/22.05/24/32/44.1/48
Output	24 -bit DAC output, support for dynamic range 90dB , SNR support 85dB
Memory support	Fully supports FAT16 , FAT32 file system, maximum support 32G of the TF card, support 32G of U disk, 64M bytes NORFLASH
Control modes	I/O control mode, serial mode, AD button control mode
Data support	Supports up to 100 folders, every folder can hold up to 255 songs
Volume	30 level adjustable volume, 6 -level EQ adjustable

Table II MP3 module pin description

PIN	DESCRIPTION	NOTE
VCC	Input voltage	DC3.2~5.0V;Type:DC4.2V
RX	UART serial input	
TX	UART serial output	
DAC_R	Audio output right channel	Drive earphone and amplifier
DAC_L	Audio output left channel	Drive earphone and amplifier
SPK2	Speaker-	Drive speaker less than 3W
GND	Ground	Power GND
SPK1	Speaker+	Drive speaker less than 3W
IO1	Trigger port 1	Short press to play previous(long press to decrease volume)
GND	Ground	Power GND
IO2	Trigger port 2	Short press to play next(long press to increase volume)
ADKEY1	AD Port 1	Trigger play first segment
ADKEY2	AD Port 2	Trigger play fifth segment
USB+	USB+ DP	USB Port
USB-	USB- DM	USB Port
BUSY	Playing Status	Low means playing \ High means no

Fig 2   Mp3 module.

III. SYSTEM CONNECTIONS

The system include very complex wiring which can be categorize into three categories

A. Power wiring we connect the 5volt SMPS with pins of the Mp3 module which will be used for performing the operations. Also we will connect a power supply to help the keyboard in transfer of user request to Mp3 module. We can also use battery in absence of power supply .The battery must be of a voltage that will meet the minimum power requirement of the device. If it fails to provide the necessary power, the device will fail to implement all the operations.

B. Speaker wiring includes the data transfer from 9 different mp3 modules to 9 different speakers. To avoid harmonics and other Electromagnetic interference we have to use separate speakers for individual mp3 modules.

C. Keypad wGiring includes the data transfer request from user to the mp3 module. Our system includes 118 Elements so we have to assemble 118 switches to the 9 Mp3 module .MP3 module works in different control mode I/OG control mode, serial mode, AD button control mode. We tested the project with all three modes and find that usinGg the module in AD button mode is best solution for the project. As this method include complex wiring it is hard to assemble and required lots of time .The other option is to use microcontroller in serial mode which include simple wiring and less no. of module .But understanding programming of microcontroller for a school student is not easier. So to make is simple we use AD button mode in our project.
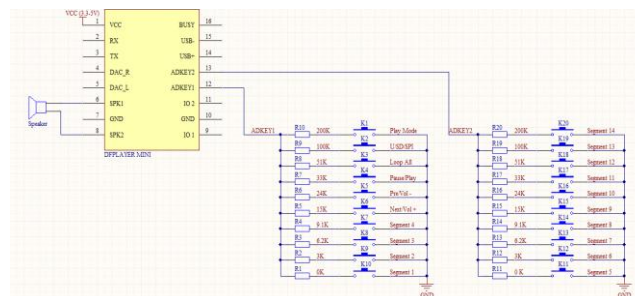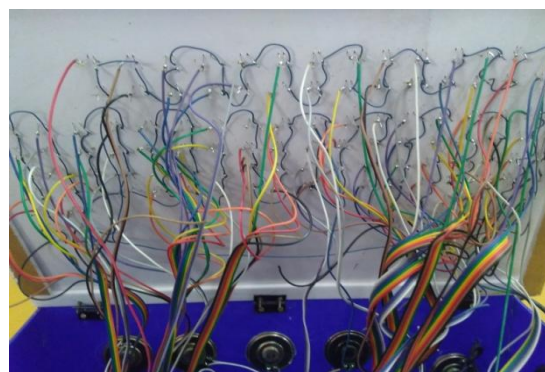

Fig 3.   Mp3 module.
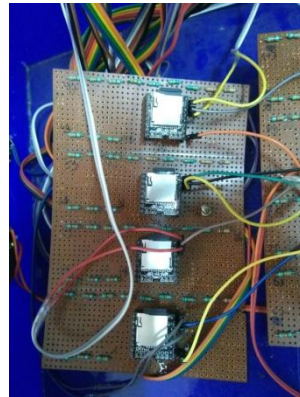

Fig 4. Wiring of keyboard

Fig 5. Wiring of mp3 module

IV. APPLICATIONS

Talking periodic table designed is a useful tool in learning and memorizing elements of periodic table in easier and simpler way. Same project can be modified for learning in Physics laws, Mathematical formula, Biological parts very easily
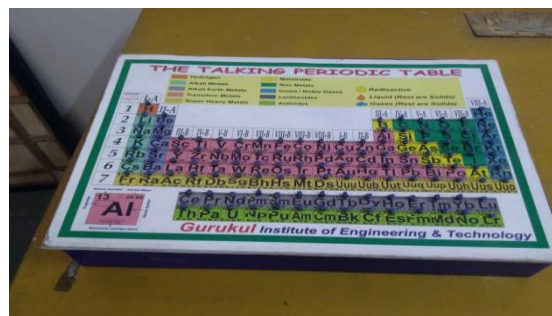

Fig.6. Finished Product Prototype

V. RESULT

We hereby propose a design model for learning periodic table which can easily interact with user. Students can easily learn atomic no. , atomic mass, density, state and other properties of elements in a single touch . Our proposed system gives facility of audio as well as visual information on a single platform so as to create more effective learning solution.

VI. CONCLUSION

Embedded technology is a becoming a great tool in educating students in effective manner. Mobile apps for education are not gaining pace as these are creating problem rather than providing solution. The design model is an effective way to learn and memories periodic table.

REFERENCES

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3. Product mannual MINI SKU: DFR0299 MP3