

# Class Room Ambience Measurement using Ai Technique

M. Narayana Moorthi



**Abstract-** The word SMART is popular in everyday activities which is meant for city, road, vehicles and home through the integration of IOT (Internet of Things) and ICT (Information and Communication Technology). It is possible by using the above, our everyday activities can be monitored and recorded using advanced devices in our work environment. It is suggested to have such tools in the education institutes to have better classroom and lab infrastructure for teaching and learning environments. Now a day's many technologies exist and our aim is to integrate all the existing and new technologies to develop an embedded system application to make the classroom to be more smart and automated. In this context we will study how to design and develop the class room ambience measurement using AI technique. The machine is so smart by identifying the empty chairs and calling individual persons and occupy the place near to others so that the fan, light usage can me minimum which is possible through intelligent device and its prototype model is proposed here.

**Keywords:** Smart Class Room, Embedded Systems, Automation, Microcontrollers, Sensors

## I. INTRODUCTION

The detailed study about sensors and actuators makes us to think how the automation can be incorporated with the artificial intelligence. The science and technology is growing in faster way. Since the machine learning has wide applications, I have proposed the following design model to meet the requirements for the education industry by automation of class room activities. Why not we think of automation of class room using Nano and micro devices. This question leads to many directions of thinking which includes the challenges of energy required for class room teaching and learning. The power cut is big question mark in village and surrounding area' to manage the regular class room learning efficiently. Currently this is managed by UPS (uninterrupted power supply) but the use of battery pollutes the work environment as well as the cost and installation in urban places to monitor the power consumption is unanswered. This proposed study for class room automation is based on managing the power requirement using solar cells attached with new integrated prototype device [12][13][14][15][16] powered by AI technique. To address the above stated problems, the study work is extended as follows.

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\* Correspondence Author

Prof. M. Narayana Moorthi\*, Associate Professor, School of Computing Science and Engineering, Vellore Institute of Technology, Vellore (Tamil Nadu), India.

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Since the technology grows exponentially, it is a challenging process to bring all the newly identified tools and techniques which can be integrated in the classroom environment for better infrastructure and smart learning environment. Looking at the traditional learning system the classrooms are attached with whiteboard and marker, this leads to erase the board for every new topics to be discussed. Also teachers take attendance and need the presence and absentees of members in the classroom in a scheduled manner.

It is proposed to have E-Eraser (Electronic Eraser) and capturing the attendance using advanced IOT-ICT integrated devices like finger print reader, IR movement sensors or RFID Tags in the entry and exit of the classroom to make better classroom ambience environment. It is also adding more benefit to teacher and parent's community to monitor the absentees in the class room. Also the environmental conditions like temperature, light, date and time and present and absent count can be displayed using prototype board. Here in this paper we propose to design and develop a new all in one intelligent and integrated system for smart and automated classroom environment which can be useful for society.

## II. LITERATURE SURVEY

Microcontrollers are the main processors used in any embedded system. They are used in many places. The microcontrollers are available from many different manufactures like PIC / ARM / AVR / INTEL [1] [2]. Arduino development board is less cost and available from a number of vendors. Most I/O pins on a microcontroller can be set as digital inputs or outputs.

The selection of CPU for a specific design can be done by looking at many parameters like data size, address lines, RAM size, etc. The sensor [3] [4] is the one which reads the physical quantity such as temperature, light etc. These are normally represented by electrical signal known as Analog signals. These signals are converted into digital signal through ADC (Analog to Digital Converters). These digital data is stored and or processed with in the Microcontroller. The Microcontroller has its flash memory which is loaded with the necessary software program either in assembly language or high level language. The GPRS/GSM [5] [6] stands for General packet radio service and Global system for mobile communication. This GSM modem can be configured to send an SMS alert. AI is a broad computer science and engineering field using which smart machines can be built.



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The various AI algorithms are identified as follows: supervised learning, unsupervised learning, semi supervised learning and reinforcement learning by means of which the classification, clustering and regression of input data is done. AI [17] is a leading technology which is applied in leading industries and factories to bring new intelligent prototype machine model which can be applied for automation. Here automation refer to monitoring, analysing, controlling and reporting of environmental data without human intervention. Now a days many industries are working towards class room automation for better education [7][8][9][10][11].

## III. OVERVIEW OF THE PROPOSED SYSTEM

The following describe the steps involved to implement the above method,

- (1) Identify the class room to mount the proposed device, collect the name list of teachers and students from database, collect the table / chair / light / fan / door / window using sensor interface
- (2) Read the climate / time and display in the notice board using proposed microcontroller board, read the present and absentees using sensor / camera / finger print reader and display the details, send an SMS alert if there is any absentees
- (3) The machine is more intelligent by calling the names of persons and guiding them to change the seating according to optimum environment parameters observed

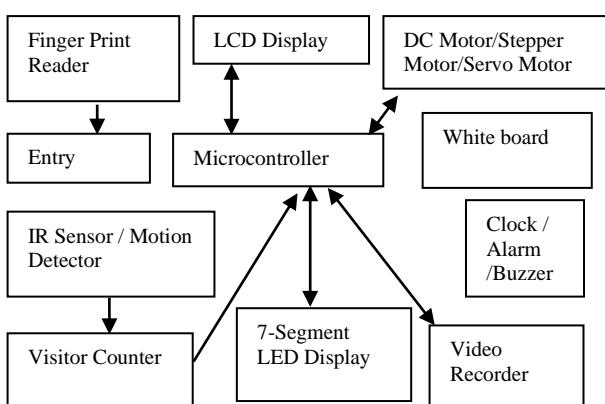


Figure -01: Classroom System Architecture

The proposed system is illustrated in Figure-01 which is the layout of smart class room AI machine prototype system. This system is designed to collect the room environment data using hardware prototype model. The acquired digital data is displayed on the 7-Segment LED or LCD. This can be done by interfacing microcontrollers to buzzer or speaker, LED/LCD, GPRS/GSM Modem and mobile phones. The room door is open or closed based on person's authentication. As soon as the students enter they use finger print reader, which identifies the person's present, number of presents by activating a counter also opens the door for entry. The number of present and absent can be displayed on the 7-Segment LED or LCD. At the same time with in a time frame if students are not present it sends an alert signal or notification like SMS to their parents / guardians /

wardens for further actions. Also the start and stop of the class session can be illustrated by activating buzzer or speaker. While class session started the white board can be smart by implementing the Electronic Eraser using Motors. Also the video recorder using camera interface will be more useful for those who are absent for that particular session and it can be kept as backup in library for further reference. The overall design and development of smart classroom is as follows.

## IV. IMPLEMENTATION FRAMEWORK

The electronic and sensor based devices are changing the size from macro to micro and Nano devices. This paper discusses the framework to implement the above IoT prototype model to measure the room ambience measurement using micro and Nano devices. Miniaturization of technological devices are more essential and it is proposed here for machine intelligence to read the room ambience measurement. The proposed device is so small in such a way it collects the room ambience and communicates the data to dashboard for remote monitoring applications. The Figure 01 shows the proposed prototype board which consist of microcontroller with other peripherals made available in SOC-system on chip for easy interfacing using micro device architecture. The collected data from each sensor is stored as a database and the edge device computes the various parameters and communicates to cloud for remote monitoring and logging purpose. The machine learning technique using CNN convolution neural network is used to detect the object in class room and take decisions based on need. The following figure 02 illustrates how to display the date and time using Nano development board.

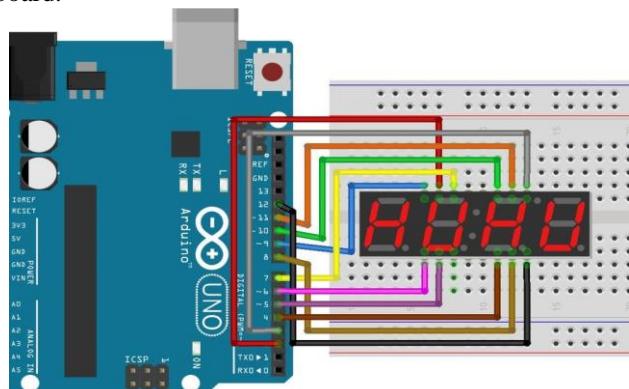


Figure -02: Proposed Machine Model

The various notations used for the implementation is as follows:

Let, Ci – Class room and Li- Laboratory class

Si – Student enrollment details; i = 1 to n where each student data base is as follows,

Si = {Reg No, Name, Photo, Fingerprint, Cell No}

The sensors and actuators deployed in every class room and laboratories includes

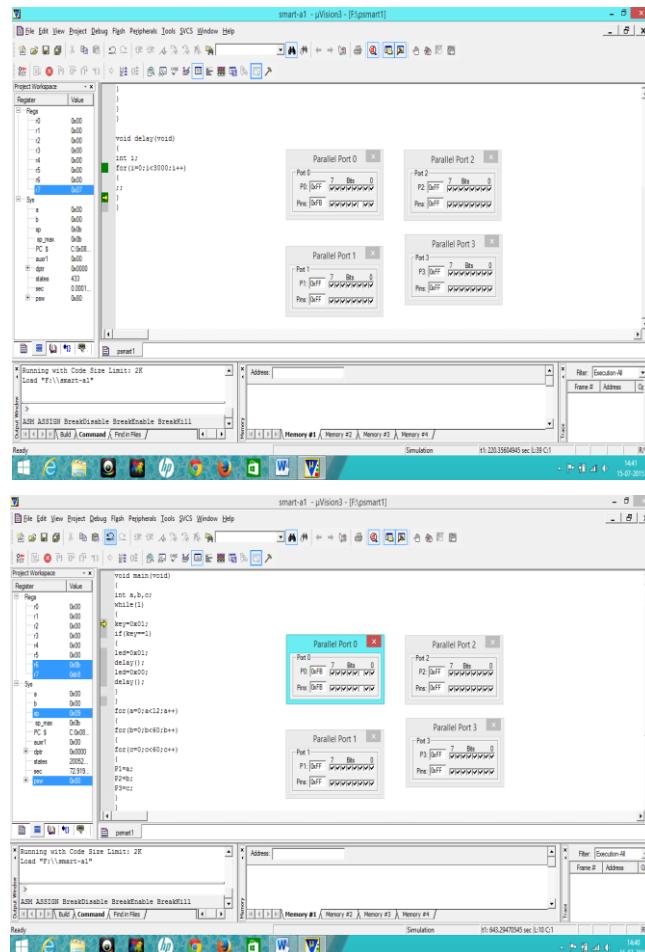


IR sensor, ultrasonic sensor, dc motor, servo motor, LED and LCD, light, fan, door, window is represented as application end points or objects as follows,

Se (i) – Sensors; i=1 to n and

A (i) – Actuators; I = 1 to n

D-B(i) – machine prototype development board, i=1 to n where i can vary from Raspberry PI, PIC , 8051, Arduino, Beagle bone, ARM, etc. If any student enters the class room the corresponding object detects the student entry and the count and his or her personal information is updated and the total present and absentees details are displayed in the classroom using 7-segment LED or LCD along with date and time. Also SMS message is triggered to the parents using IoT technology. Also the device can monitor the class room ambience and guides the students in such a way the light and fan usage will be optimum. The innovative to creative learning techniques are important for efficient learning in classroom. Here the supervised learning model with the intelligent machine is studied for class room implementation. The problem to start the automation of intelligent machine to control the classroom is done with the following 8051 microcontroller simulator which is illustrated as follows: The testing is done in our class room environment using embedded device with 8051 microcontroller. The Keil micro vision simulator result snap-shot is attached here as followed in figure 03. Here any port pin of microcontroller can be programmed in input and output mode to interpret the class room environment.



**Figure 03: Output Snap Shot**

## V. SUMMARY AND CONCLUSION

The education methodologies are changing and it is important for the technical developers to identify more and more user friendly methods for education purpose. In this paper we have studied how to design smart class room for learning environment which can help students, teachers, and parents in an automated way. The testing and implementation of the above using micro device prototype model is challenging and it is in progress which can be recommended to society in near future. The students and teachers comfort in teaching and learning along with energy saving is necessary in every advanced classrooms. This is possible by monitoring more than one parameter using various sensors in the classroom. In every education centres the teachers and trainers pay more and more attention for the class room environmental observation in order to improve the teaching and learning methodology. An attempt is made to make the classroom automation in this study. Here the intelligent machine model to control the flow of students data and take decision based on classroom ambience is studied, which can be extended for better education and administrative purpose in collaboration with industry prototype model.

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### AUTHOR PROFILE



**Prof. M.Narayana Moorthi**, is currently working as Associate Professor, in School of Computing Science and Engineering, VIT University Vellore. His area of Research Interest includes embedded systems, Parallel Computing, High Performance Computing and Advanced Computer Architecture. He has conducted many workshops and Faculty development Programme.