



# MEMS Technology assisted Digital Class Room

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**ABSTRACT:.** This paper presents an accelerometer-based digital pen to make note. This digital note making system assists students while presentation. As this system is wireless, digital notes can be scribbled on the board instead of being standing nearer to the board. After the completion of class, we can mail the information to the students. So, this will reach to all the students even though if they are absent.

## I. INTRODUCTION

Nowadays, the growth of miniaturization technologies in electronic circuits and components has greatly decreased the dimension and weight of consumer electronic products, such as smart phones and handheld computers, and thus made them more handy and convenient. This project work uses ARM processor, MEMS technology and wireless medium. MEMS technology based accelerometer is used to make the digital note. MEMS accelerometer sensor can change its voltage signals outputs with respect to the angle change. The acceleration signals measured from the tri-axial accelerometer are transmitted to a computer via the wireless module. These digital notes will be displayed on a special monitoring system. The notes transmitted to the computer can be saved at the end of each class and can be mailed to the students.

## II. EXISTING SYSTEM WHITEBOARD:

A white board is a non-electronic variation of the traditional "rewriteable" schoolroom black board, but is white instead of black and of a material that can be written on with coloured markers.

## INTERACTIVE WHITE BOARD:

An interactive white board is a large interactive display that connects to a computer. A projector projects the desktop onto the board's surface where users control the computer using a pen, finger, stylus, or other device.

## III. PROPOSED DESIGN.

Proposed design is an accelerometer-based digital pen to make note. This digital note making system assists students while presentation. As this system is wireless, digital notes can be scribbled on the board instead of being standing nearer to the board. After the completion of class, we can mail the information to the students. So, this will reach to all the students even though if they are absent.

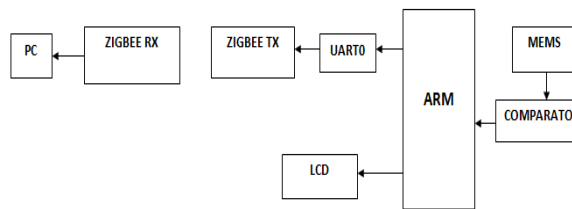


figure 1:Block diagram

MEMS technology based accelerometer is used to make the digital note. MEMS accelerometer sensor can change its voltage signals outputs with respect to the angle change. The acceleration signals measured from the tri-axial accelerometer are transmitted to a computer via the wireless module. These digital notes will be displayed on a special monitoring system. The notes transmitted to the computer can be saved at the end of each class and can be mailed to the students.

### THREE AXIS MEMS ACCELEROMETER

MEMS (Micro-Electro Mechanical System)-based accelerometers are devices that measure the proper acceleration. In relativity theory, proper acceleration is the physical acceleration experienced by an object. The psychical acceleration is measurable by sensors. In this project the accelerometer sense three direction of motion (x, y, z) and measure the corresponding analog voltage at the range of 2 to 3V. The output of the MEMS accelerometer apply to the ARM processor through the comparator.

### COMPARATOR

The main function of comparator is that compare the analog voltage and the output of comparator is binary digital output. In our project we use LM 324 it can on by minimum voltage.

### ARM PROCESSOR

The ARM7 is part of the Advanced RISC Machines (ARM) family of general purpose 32-bit microprocessors, which offer very low power consumption and price for high performance devices. The architecture is based on Reduced Instruction Set Computer (RISC) principles, and the instruction set and related decode mechanism are much simpler in comparison with microprogrammed Complex Instruction Set Computers. This results in a high instruction throughput and impressive real-time interrupt response from a small and cost-effective chip.

The comparator output apply to the pins 16,17,18,19. pin 16,19 are GPIO and pin 17 is GPO, 18 ground. Pin 19 transmitter for UAR0. [3] discussed about Intelligent Sensor Network for Vehicle Maintenance System. Modern automobiles are no longer mere mechanical devices; they are pervasively monitored through various sensor networks & using integrated circuits and microprocessor based design and control techniques while this transformation has driven major advancements in efficiency and safety. In the existing system the stress was given on the safety of the vehicle, modification in the physical structure of the vehicle but the proposed system introduces essential concept in the field of automobile industry. It is an interfacing of the advanced technologies like Embedded Systems and the Automobile world. This "Intelligent Sensor Network for Vehicle Maintenance System" is best suitable for vehicle security as well as for vehicle's maintenance. Further it also supports advanced feature of GSM module interfacing. Through this concept in case of any emergency or accident the system will automatically sense and records the different parameters like LPG gas level, Engine Temperature, present speed and etc. so that at the time of investigation this parameters may play important role to find out the possible reasons of the accident. Further, in case of accident & in case of stealing of vehicle GSM module will send SMS to the



Police, insurance company as well as to the family members.

## ZIGBEE MODULE

The XBee/XBee-PRO RF Modules are designed to function within the ZigBee protocol and support the unique necessities of inexpensive, low-power wireless antenna networks. The modules require minimal power and provide reliable delivery of data between remote devices. The modules activate within the ISM 2.4 GHz frequency band.

It is the short distance transmission wireless communication device, transmission distance is 20 meter. ZigBee transmitter and receiver are paired. It interface with arm processor and transmit the data with RF range.

## LCD DISPLAY

Here LCD display used for special monitoring system and the output of the arm processor display in LCD. In this project four letters are programmed that are T,E,A,M.

## PC

The pc interfaced with ZigBee receiver. In the help of Hyper terminal display the word. This we can be send mail to each student. If they are absent.

## FLOW CHART

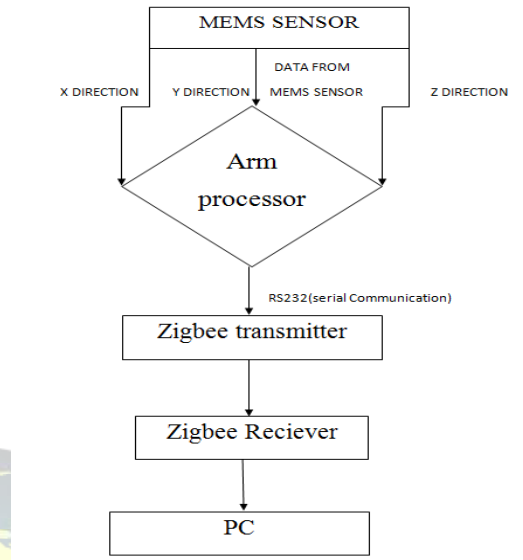


Figure 2 flow chart

MEMS sensor is used to measure the analog voltage values corresponding to the changes in the motion of the sensor with respect to the three axes i.e. X, Y, Z. The corresponding analog values are passed to the ARM processor through the analog input pins. The processor processes the input value and the output is transmitted through the Zigbee transmitter. The transmitted data is received through the Zigbee receiver and is carried to the PC.

## V. RESULT

This digital note making system assists students while presentation. As this system is wireless, digital notes can be scribbled on the board instead of being standing nearer to the board. After the completion of class, we can mail the information to the students. So, this will reach to all the students even though if they are absent.





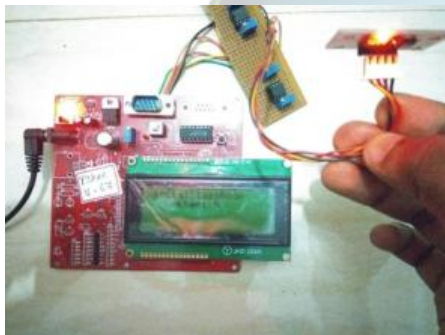
## VI. EXPERIMENTAL PROTOTYPE



(A) Letter 'T' transmission



(D) Letter 'E' transmission



(B) Letter 'M' transmission



(C) Letter 'A' transmission

## VII. CONCLUSION

This paper presents an accelerometer-based digital pen to make note. The digital pen consists of a tri-axial accelerometer, a microcontroller, and a Zigbee wireless transmission module for sensing and get-together the signals of accelerations of handwriting and gesture trajectories. By means of this technology we can put pen to paper & display the characters not including the keyboard for applying the human interaction to the computer.

## VIII. REFERENCE

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