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**“Smart ATM Security System By Using  
PIC18F4520”**

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# INTRODUCTION

- An automated teller machines, also widely known as ATM machine is a computerized telecommunication device that offers the customers of financial companies access to performing financial transactions publicly in the absence of a human clerk or a bank teller.
- With ATMs, customers are able to access their bank accounts for making cash withdrawals, transferring money, and checking their account balance, as well as paying electronic bills.
- While they offer convenient options there are issues they face regularly including security and fraud.
- This project aims to address the issues related with looting and attachment of external devices to the ATM machine along with providing aid to the crime force.



# OBJECTIVES

- To implement an effective and improved ATM security system.
- To build a reliable system that reacts to breaking, stealing, or attachment of an external device to the ATM machine.
- To assist the Police force in prevention and detection of crime and hence maintaining public order.
- To ensure safety of pedestrians by making them aware of the situation.



# LITERATURE SURVEY

- **SURVEY 1: “ATM SECURITY USING MEMS MODULE”.** The MEMS is a device that identifies any tilt produced by the ATM machine. This system takes input of MEMS sensor and sends the signal to the LPC2148 microcontroller to carry out an action against the theft by sending an sms using a gsm module to the vigilance system. The drawback of this system is that it can only detect the tilt occurring due to irregular movement of ATM machine.
- **SURVEY 2 : “Smart ATM supervision system using GSM”.** This system is built around the ATMEGA328 microcontroller which belongs to the ATMEL family. The system continuously monitors its surroundings by sensing temperature changes, force and orientation of the ATM using the sensors. If someone tries to hit on the ATM Machine, force sensors sense the pressure, then buzzer will be activated and send a message to the concerned person through the GSM. The applied force is greater than the threshold value, the above operation will be activated.

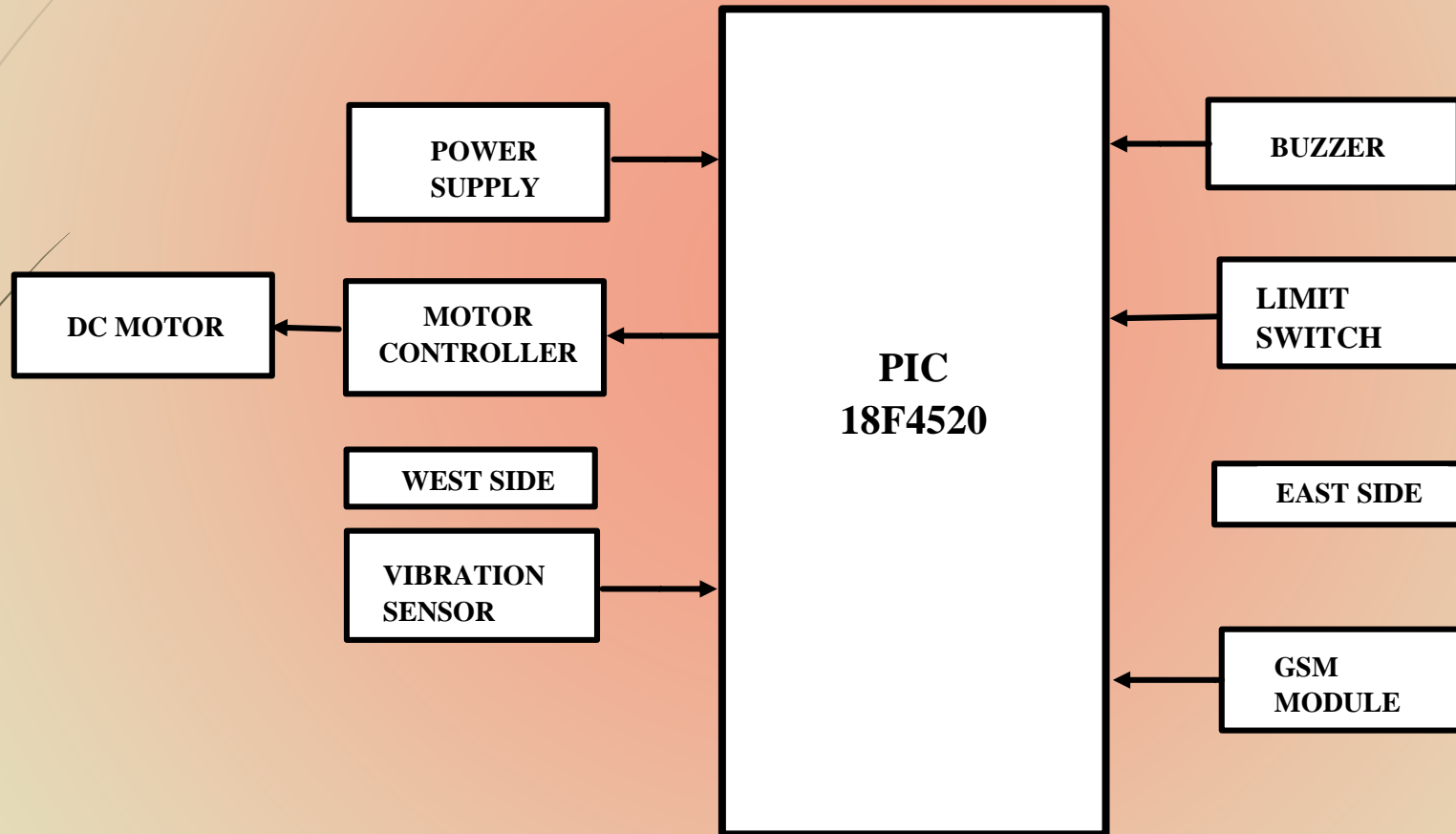


# LITERATURE SURVEY

- **SURVEY 3 : “Smart monitoring of ATM related theft”** Arduino Uno Microcontroller is interfaced with sound detecting sensor. If a customer undergoes money transaction inside ATM, and whenever a thief gets inside the ATM to rob, the sound sensor identifies or senses the scream (Sound) produced by the Customer. Digital signals produced by the sensor are passed to Arduino and the Security System is alerted and following actions are taken (Message Alert, Door Lock)



# BLOCK DIAGRAM



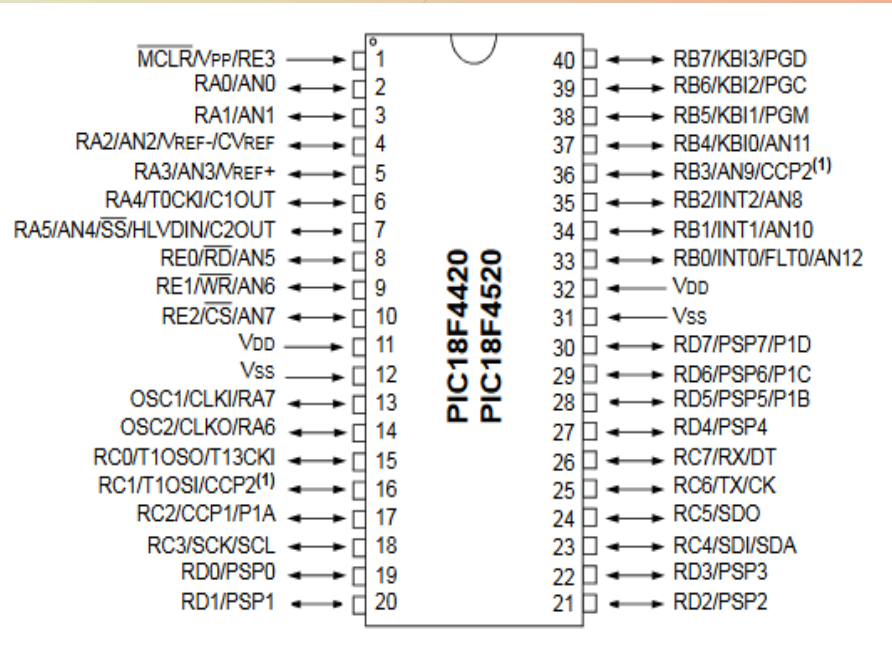
# BLOCK DIAGRAM DESCRIPTION

- This ATM security system makes use of a microcontroller PIC18F4520, vibration sensor SW 420, SIM 900A GSM module, limit switch, buzzer, a DC motor, L293D IC.
- This PIC18f4520 microcontroller consists of a 40 pin IC containing Ports – A,B,C,D,E which have multiplexed functionality. We interface our different peripheral sensors and devices to this microcontroller. It's operating voltage is 5.5V.
- Vibration sensor SW 420 module uses LM 393 comparator to detect the vibrations on the ATM machine above a particular threshold value and produces a digital signal of logic 1. It is connected to Port B, pin 5 of the controller. It operates on 3.3 - 5V.
- GSM stands for Global System for Mobile communications. This GSM SIM 900A module which operates on 3.4- 4.5 V enables us to send SMS via UART using AT commands to the Police station present in the locality. It's receive pin is connected to the controller's Port C pin 6 and transmit pin to Port C pin 7.
- Buzzer is an audio signalling device used to set of an alarm while the ATM shutter shuts down. It is connected to Port C pin 1 and it produces an alarm as soon as signal is provided across this pin.
- DC Motors requires 12V supply and 300mA current, moreover interfacing DC Motors directly with Microcontrollers may affect the working of Microcontroller due to the Back EMF of the DC Motor. Thus, it is not a good idea to interface DC Motor directly with Microcontrollers. The solution to above problems is to use H-bridge circuit.
- L293D is the most commonly used H bridge driver IC to interface a motor to a microcontroller. It consists of four switching elements. When these switches are turned on in pairs, motor changes it's direction accordingly.
- A limit switch is an electromechanical device having an actuator attached to a set of contacts which make or break the circuit. The actuator will come in contact with the shutter once it is completely closed. The set the contacts connected to this actuator will complete a circuit and a signal will be produced at Port D pin 0 of microcontroller.



# BASIC COMPONENTS

## MICROCONTROLLER PIC18F4520



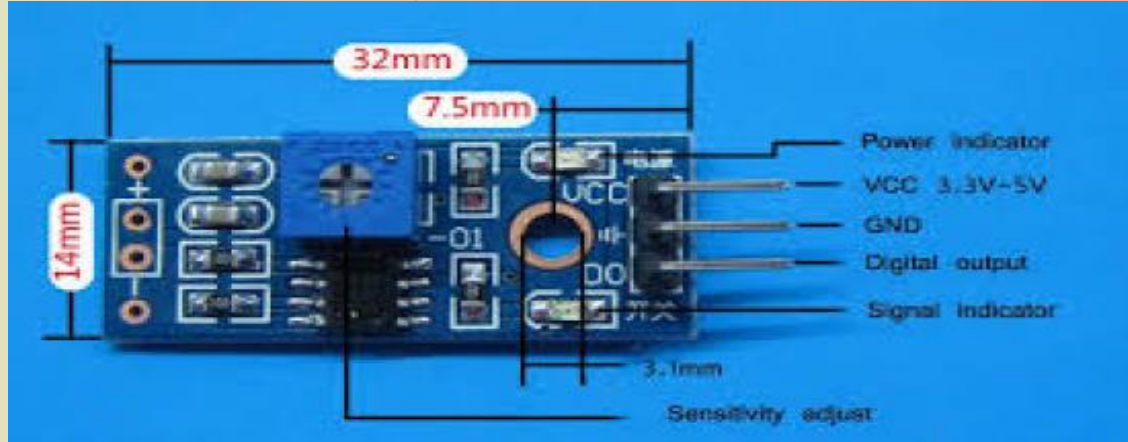
Name	Value
Program Memory Type	Flash
Program Memory Size (KB)	32
CPU Speed (MIPS/DMIPS)	10
SRAM Bytes	1536
Data EEPROM/HEF (bytes)	256
Digital Communication Peripherals	1-UART, 1-SPI, 1-I2C 1-MSSP (SPI/I2C)
Capture/Compare/PWM Peripherals	2 CCP
Timers	1 x 8-bit, 3x 16-bit
ADC Input	8 ch, 10-bit
Temperature Range (C)	-40 to 125
Operating Voltage Range (V)	2 to 5.5
Pin Count	40

PIC is a Peripheral Interface Microcontroller. It is controlled by software and programmed in such a way that it performs different tasks and controls a generation line. PIC microcontrollers are used in different new applications such as smart phones, audio accessories and advanced medical devices.

The PIC microcontroller is based on RISC architecture. Its memory architecture follows the Harvard pattern of separate memories for program and data, with separate buses.

# BASIC COMPONENTS

## VIBRATION SENSOR MODULE SW 420



Vibration Sensor that used in this project is SW 420 which has 3 pins to interface with microcontroller. The Vibration Switch SW – 420 is based on the vibration sensor SW – 420 and Comparator LM393 to detect if there is any vibration that beyond the threshold. The threshold can be adjusted by the on – board potentiometer. When there is no vibration, this module output logic LOW the signal indicate LED light and vice versa.

### Features of The Vibration Sensor Module Vibration Switch SW-420:

- Normally closed type vibration sensor SW 420.
- The comparator output, signal clean, good waveform, driving ability is strong, for more than 15 ma.
- The working voltage of 3.3V to 5V.
- Output form: digital switch output (0 and 1).
- Has a fixe bolt hole, convenient installation.
- Small board PCB size : 3.2cm x 1.4cm.
- Use the LM393 wide voltage comparator.

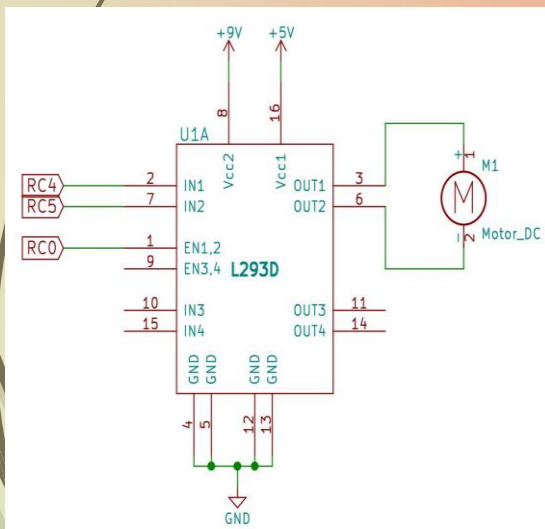
# BASIC COMPONENTS

## GSM MODULE SIM 900A



- ❖ SIM900A is a dual-band GSM/GPRS engine that works on frequencies EGSM 900MHz and DCS 1800MHz.
- ❖ Single supply voltage: 3.4V – 4.5V
- ❖ Supports UART interface
- ❖ Supports single SIM card
- ❖ Communication by using AT commands
- ❖ In this project we use GSM module to send message to nearest police station and respective bank.

## DC MOTOR AND IT'S CONTROLLER L293D



- ❖ Motor Controller L293d is used to controller normal DC motor
- ❖ L293D IC is a typical Motor Driver IC which allows the DC motor to drive on any direction.
- ❖ This IC consists of 16-pins which are used to control a set of two DC motors instantaneously in any direction.
- ❖ It means, by using a L293D IC we can control two DC motors. As well, this IC can drive small and quiet big motors.



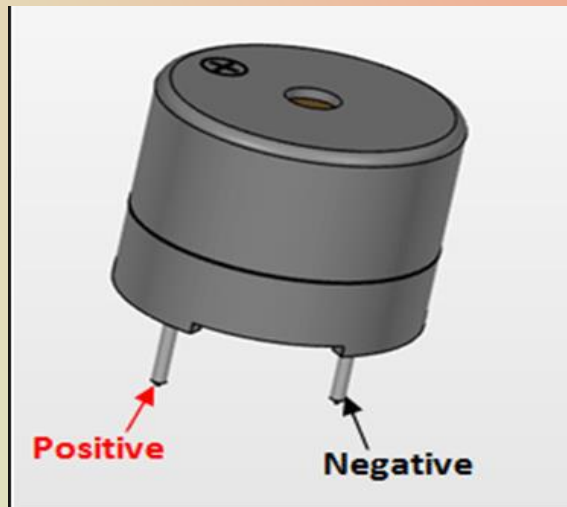
# BASIC COMPONENTS

## LIMIT SWITCH



- ❖ A standard limit switch used in industrial applications is an electromechanical device that consists of a mechanical actuator linked to a series of electrical contacts.
- ❖ When an object (sometimes called the target) comes in physical contact with the actuator, the actuator plunger's movement results in the electrical contacts within the switch to either close (for a normally open circuit) or open (for a normally closed circuit) their electrical connection.
- ❖ When switch is closed due to physical contact it sends a signal to another devices for further operations.

## BUZZER



- ❖ A buzzer or beeper is an audio signalling device, which may be mechanical, electromechanical, or piezoelectric (piezo for short).
- ❖ Typical uses of buzzers and beepers include alarm devices, timers, and confirmation of user input such as a mouse click or keystroke.

# TOTAL COMPONENT COST

Sr. No.	Component's Name	Quantity	Price(Rs.)
1	Pic microcontroller	1	280
2	GSM Module (SIM 900A)	1	850
3	Vibration Sensor (SW – 420)	1	250
4	Capacitor	2	60
5	Resister	4	10
6	Crystal Oscillator	2	4
7	Bridge rectifier	1	10
8	IC shoket	1	15
9	LED	1	2
10	Push Button	1	5
11	ON/OFF Switch	1	5
12	PCB Board	1	500
13	Battery	1	50
14	L293D	1	100
15	Bred Board	1	80
16	DC Motor	1	25
17	Small Buzzer	1	8
18	Push Button	1	2
	TOTAL	23	2256

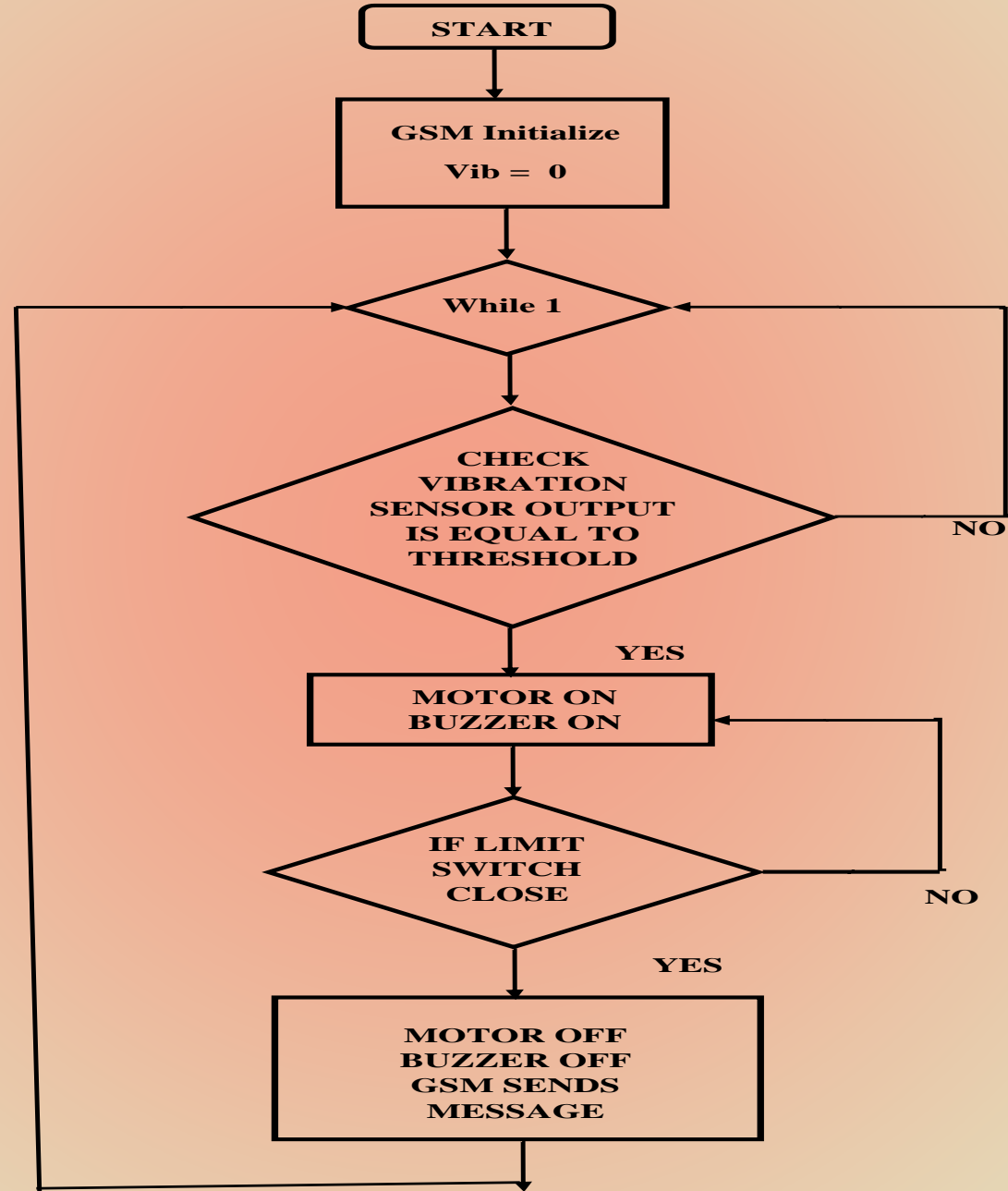




# SOFTWARE SPECIFICATIONS

- **MPLAB Integrated Development Environment (IDE)** was used to write the assembly language for 18F4520. MPLAB is free software provided by Microchip Technologies Ins. It runs as a 32-bit as well as a 64 bits application on Microsoft Windows and provides a host of free software components for application development and debugging. It can convert the source code into a HEX file, which HEX file is needed before it can be program into the microcontroller using HITECH C compiler.

# FLOWCHART





# ADVANTAGES

- Potential reductions of thefts and frauds associated with ATMs.
- Provision to catch the burglar while the police officials reach the location.
- Facility to aware pedestrians about a potential threat through an alarm system.
- Provision to notify the Police officials regarding the situation.
- Time saving methodology.

# APPLICATIONS

- It is useful in any other applications that require security such as jewellery shops, bank lockers, etc.
- It can be used in every location where an ATM machine has been set up.



# CONCLUSION

- Thus, in order to avoid frauds and related crime cases with ATM we have built a dependable ATM security system with appropriate software programming with the help of a PIC microcontroller, a vibration sensor, a GSM module and other peripheral devices.
- It addresses all the prime issues associated with it such as – SAFETY, TIME CONSTRAINTS, PREVENTION OF THEFT and AID TO THE CRIME FORCE.
- This embedded system helps to reduce manpower too. We firmly believe that this project or the principle of this project will definitely be useful in different security systems.

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