An Embedded Based ATM for Blind People

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Abstract:
The system designed is a talking ATM which is a type of automated teller machine (ATM), provides audible instructions so that person who cannot read an ATM screen can independently use the Machine. Deaf blind have difficulty in communicating with others who don't understand sign language, can independently use this talking ATM machine, where a wireless data glove is a normal cloth driving glove fitted with flexes sensors along the length of each finger and the thumb. The output from sensors is a stream of data that varies with degree of bend. The sensor output is analog values, converted to digital and processed by microcontroller, then it given to the voice chip to produce voice using speaker. In this project Flex Sensor Plays the major role, Flex sensors are sensors that change in resistance depending on the amount of bend on the sensor.

Keywords: IRsensor, Comparator, PIC16F887, Voice synthesizer, RFID reader.

I. INTRODUCTION

A cash machine is also known as automated teller machine is an electronic telecommunication device. The Automated teller machine is a self- service machine that dispenses cash and performs human teller functions like balance enquiry, bills payments, mini statements. The introduction of talking automated teller machine provides audible instructions so that persons who cannot read an ATM screen can independently use the machine. Flex sensors are sensors that change in resistance depending on the amount of bend on the sensor. They convert the change in bend to electrical resistance - the more the bend, the more the resistance value. They are usually in the form of a thin strip from 1"-5" long that vary in resistance from approximately 10 to 50 kilo ohms. They are often used in gloves to sense finger movement. Flex sensors are analog resistors. They work as variable analog voltage dividers. Inside the flex sensor are carbon resistive elements within a thin flexible substrate. More carbon means less resistance. When the substrate is bent the sensor produces a resistance output relative to the bend radius. With a typical flex sensor, a flex of 0 degrees will give 10K resistance with a flex of 90 degrees will give 30-40 K ohms. The Bend Sensor lists resistance of 30-250 K ohms. In this system we used microcontroller, a speech IC, display and also a speaker to produce the output.IR sensor checks whether the person is in the correct position and direct them by providing the voice commands via voice synthesizer. When the tag is shown in front, all the information containing bank details in the tag is read by the RFID reader and transmit it to the microcontroller. The supply to the microcontroller is provided by a set of rectifier and regulator unit. 230V AC supply from the power line is fed to the SMPS (switched mode power supply) which rectifies and chops the input to give 12V DC. This 12V is fed to the 7805 regulators to obtain 5V DC which is the required supply of the microcontroller.

Components Required: Microcontroller PIC 16F887, Regulated power supply, Switched Mode Power Supply, FID reader, Flex sensor, IR sensor, Voice synthesizer, Comparator.
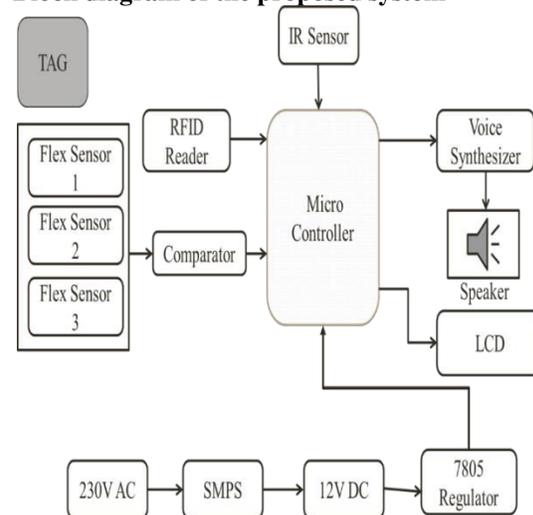
Block diagram of the proposed system

Figure.1. Block diagram.
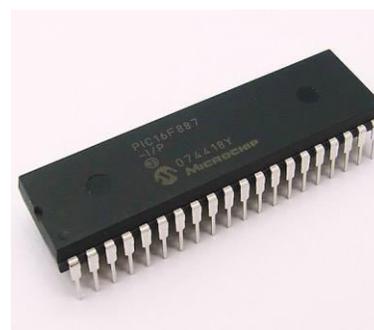
Microcontroller

Figure.2. PIC16F887

Peripheral Interface Controller (PIC) was originally designed by General Instruments. In the late1970s, GI introduced PIC 1650 and 1655 – RISC with 30 instructions.PIC was sold to

Microchip Features are low-cost, self-contained, 8-bit, Harvard structure, pipelined, RISC, single accumulator, with fixed reset and interrupt vectors. A single chip that contains Processor (the CPU), Non-volatile memory for the program (ROM or flash), Volatile memory for input and output (RAM) Clock I/O control unit. Also called a "computer on a chip". Billions of microcontroller units (MCUs) are embedded each year in a large number of products from toys to automobiles. For example: a single vehicle can use 70 or more microcontrollers. Microcontrollers are designed for embedded applications, in contrast to the microprocessor used in personal computers or other general-purpose applications.PIC microcontroller chips from Microchip are the world's smallest microcontrollers.

Flex sensor

Figure.3. Flex sensor

A simple flex sensor 2.2" in length. As the sensor is flexed, the resistance across the sensor increases. The resistance of the flex sensor changes when the metal pads are on the outside of the bend (text on inside of bend). Connector is 0.1" spaced and bread board friendly. Note: Please refrain from flexing or straining this sensor at the base. The usable range of the sensor can be flexed without a problem, but care should be taken to minimize flexing outside of the usable range. For best results, securely mount the base and bottom portion and only allow the actual flex sensor to flex. Flex sensor are analog resistors. Inside the flex sensor are carbon resistive elements within a thin flexible substrate. More carbon means less resistance.

RFID reader

Radio Frequency Identification (RFID) Card Readers provide a low-cost solution to read passive RFID transponder tags up to 7 cm away. This RFID Card Reader can be used in a wide variety of hobbyist and commercial applications, including access control, automatic identification, robotics navigation, inventory tracking, payment systems, and car immobilization. The RFID card reader read the RFID tag in range and outputs unique identification code of the tag at baud rate of 9600. The data from RFID reader can be interfaced to be read by microcontroller or PC.
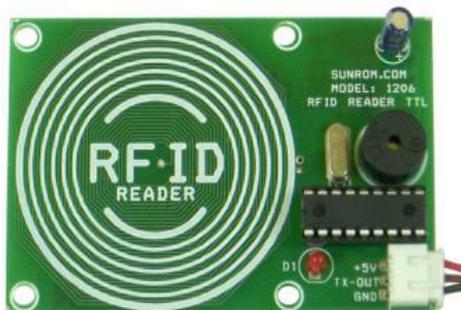
Figure.4. RFID Reader

Voice Synthesizer
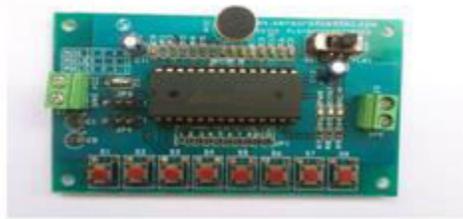
Figure.5.Voice synthesizer

The aPR33A series are powerful audio processor along with high performance audio analog-to-digital converters (ADCs) and digital-to-analog converters (DACs). The aPR33A series C2.0 is specially designed for simple key trigger, user can record and playback the message averagely for 1, 2, 4 or 8 voice message(s) by switch, It is suitable in simple interface or need to limit the length of single message, e.g. toys, leave messages system, answering machine etc. Meanwhile, this mode provides the power-management system. Users can let the chip enter power-down mode when unused. It can effectively reduce electric current consuming to 15uA and increase the using time in any projects powered by batteries.

IR sensor

An infrared sensor is an electronic device, that emits in order to sense some aspects of the surroundings. An IR sensor can measure the heat of an object as well as detects the motion. These types of sensors are measure only infrared radiation, rather than emitting it that is called as a passive IR sensor. Usually in the infrared spectrum, all the objects radiate some form of thermal radiations. These types of radiations are invisible to our eyes that can be detected by an infrared sensor. The emitter is simply an IR LED (Light Emitting Diode) and the detector is simply an IR photodiode which is sensitive to IR light of the same wavelength as that emitted by the IR LED. When IR light falls on the photodiode, Resistances and these output voltages, change in proportion to the magnitude of the IR light received. An infrared sensor circuit is one of the basic and popular sensor modules in an electronic device. This sensor is analogous to human's visionary senses, which can be used to detect obstacles and it is one of the common applications in real time. This circuit comprises of the following components. LM358 IC 2 IR transmitter and receiver pair, Resistors of the range of kilo ohms, Variable resistors, LED(Light Emitting Diode).

Working

IR sensor checks whether the person is in the correct position and direct them by providing the voice commands via voice synthesizer. When the tag is shown in front, all the information containing bank details in the tag is read by the RFID reader and transmit it to the microcontroller. Flex sensor is used as an input to obtain the necessary details like ATM pin, withdrawal amount and other which are actions needed to be performed. According to the degree of bending a voltage would be obtained from the flex sensor this voltage is compared with the predefined threshold voltage. Once a particular threshold is reached, a signal is sent to the microcontroller to perform a specific action. Voice Synthesizer will have a set of stored voice notes to instruct

the visually challenged person. By playing a specific voice note for the specific action via speaker. LCD is used as a display unit to provide visual information that are needed during each process and also aids for hearing impaired persons. The supply to the microcontroller is provided by a set of rectifier and regulator unit. 230V AC supply from the power line is fed to the SMPS (switched mode power supply) which rectifies and chops the input to give 12V DC. This 12V is fed to the 7805 regulators to obtain 5V DC which is the required supply of the microcontroller.

II. CONCLUSION

In this project the system designed is a talking ATM provides audible instructions so deaf and blind people can independently use the Machine. Deaf blinds have difficulty in communicating with others who don't understand sign language, can independently use this talking ATM machine, where a wireless data card is used with flexes sensors. The output from sensors is a stream of data that varies with degree of bend. The sensor output is analog values, converted to digital and processed by microcontroller, then it given to the voice chip to produce voice using speaker. The deaf and blind alone knows the sign language and the easily access the ATM Machine

Future scope
This ATM can be integrated with normal ATMs so that additional cost can be reduced.

III. REFERENCES

[1]. CuongDo,M.M. (2000). United States Patent No.6061666.

[2].Gi-Hong Im,S.m.-J,-c(2001).A blind equalization with the sign algorithm for broad band access. IEEE.

[3].India. T. (2012, June 06).India's first talking ATM for visually impaired inaugurated. Economic Times.

[4].Jeffrey Q.Bao,L.T.(2000).Protocol-aided channel equalization in wireless atm.

[5]. Robby. (2017, November 11). Retrieved from Wikipedia. http: // en.m.wikipedia.org/wiki/ Talking ATM

[6]. Sudhir Rao, R.R, (2015). A high-speed algorithm for identifying a hand gestures for an ATM input system for the blind. IEEE.