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"Speech Authenticated Automatic Industry Sway"

Engineering

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ABSTRACT

"Speech Authenticated Automatic Industry Sway" is a project which is based on voice recognition technique, mainly useful for the industries which deal with flaming retardants. This project gives exact solution to avoid the accidents that occur due to electric spark in chemical industry where inflammable gas, liquid gas, compressed gas are being used or manufactured. Generation of spark from electric rocker switches is one of the example, to avoid generation of sparking, speech authenticated switching is the best solution. In this project first step is to delineate the zigbee based speech authenticated kit. Voice recognition kit is interfaced with the microcontroller (SST 89E51) along with zigbee. This voice recognition kit (NSK98 281114) is firstly trained with a particular voice through microphone. Zigbee(802.15.4) is used as wireless protocol to reduce complicated wired network and make the circuit much simpler. This system can be implement in existing industry environment without any changes in present infrastructure.

KEYWORDS:

Voice Recognition Circuit(NSK98 281114), Microcontroller(SST 89E51),Zigbee(4214A-XBEE2)(IEEE 802.15.4)

1.Introduction

Many a times it happens so that while dealing with the flaming retardants in industries accidents take place, to evade such wrecks the idea of "Speech Authenticated Automatic Industry Sway" is excogitated. The wrecks that occur in industries proves to be hazardous to the workers working in the industries (some face death and some get badly injured).

"Speech Authenticated Automatic Industry Sway" is invented to terminate the dangerous accidents that occur in industries due to electric spark generation by rockers switches. This project is an integrated system to facilitate workers in the industry with fully operated system based on speech commands. The system is portable and constructed in a way that is easy to install, configure, run, and maintain.

The Indian State Government's ambitious project involves digitalization of all the details in all sectors whether it may be educational sector, medical sector, transport sector, industrial sector, etc. So this project is to reinforce the 'Digital India Mission' by digitalizing the sway of industry through "Speech Authenticated Automatic Industry Sway"

2.Related work

The vital part of "Speech Authenticated Automatic Industry Sway" is to control the entire industry with an authenticated voice commands. Usually industries appliances are controlled or operated by labours i.e. man power. Various workers are assigned for various sectors. The industries such as Indian Oil Corporation, Bharat Petroleum, Reliance Petroleum Limited, Hindustan Petroleum handle blazing retardants like oil, Liquefied Petroleum Gas(LPG), petrol etc are very hazardous, if a single mistake takes place then it leads to perilous blast.

The Bhopal disaster, also referred to as "The Bhopal Gas Tragedy", was a gas leak incident in India, considered the world's worst industrial disaster. It occurred on the night of 2-3 December 1984 at Union Carbide India Limited(UCIL). The government of Madhya Pradesh confirmed a total of 3,787 deaths related to the gas release.[2]

Recent incident that occurred on 26th January,2017 a contract labourer died and five were severely injured following a gas leak in a blast furnace in Rourkela Steel Plant. Officials said six contract workers, who were engaged by a private firm for maintenance of a blast furnace, came in contact with hot gas that leaked from the furnace. All of them were admitted to a hospital. The condition of the injured was said to be critical.[1]

To avoid such dangerous incidence and loss of life this system is been introduced. "Speech Authenticated Automatic Industry Sway" is brought in industrial sector considering the safety of the workers working in the industries

3.Working methodology

"Speech Authenticated Automatic Industry Sway" consists of Voice Recognition Circuit (NSK98 281114),Microcontroller(SST 89E51), Zigbee (802.15.4)(4214A-XBEE2) etc. The input supply to the voice recognition kit is 12VDC/2AM. The microcontroller (SST 89E51) operates on 5 volts. 3.3 volts is required to the zigbee.

There are five buttons on the voice recognition kit. These five buttons provide various function for the patron

- 1st button (TRAIN1) is provided on the kit to record first group
- 2nd button (TRAIN2)is provided on the kit to record second group (each group stores 7 voices)
- 3rd button is provided on the kit to load the trained voice from the first group voices
- 4th button is provided on the kit to load the trained voice from the second group voices
- 5th button is to reset the voice recognition kit

"Speech Authenticated Automatic Industry Sway" system allows one to control industrial appliances from centralized unit which is wireless. The system is given voice as input through microphone. The overall system is controlled from a microphone which is connected to speech recognition chip. The voice recognition chip record the voice and compares whether it with the authenticated recorded voice, if the voice matches then this voice recognition chip sends the voice commands in binary sequence to microcontroller. The microcontroller takes the decisions and sends the command to the receiver section by wireless protocol i.e. zigbee. The receiver section receives through zigbee and performs the requested function.

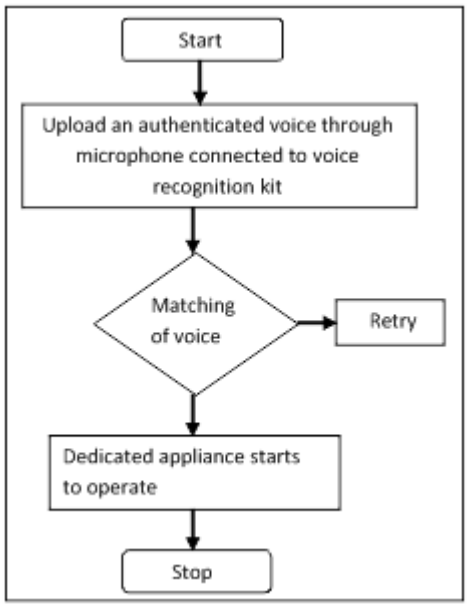

Figure 1: Flowchart of "Speech Authenticated Automatic Industry Sway"

4.Hardware description

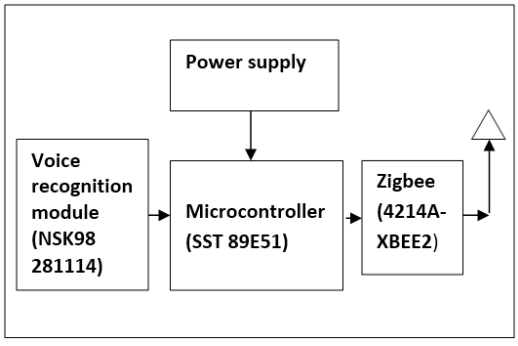

Figure 2 :Transmitter

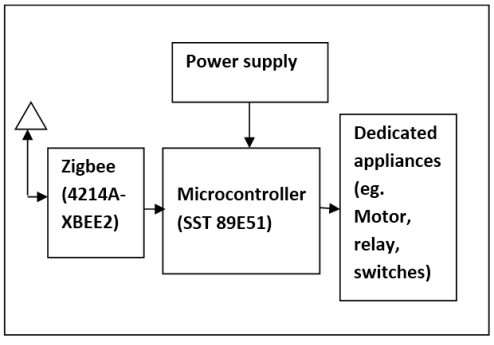

Figure 3: Receiver

4.1 Voice recognition chip(NSK98 281114)

The voice recognition module is a compact and easy-control speaking recognition board. Maximum 7 voice commands could work at the same time. Any sound could be trained as command. User need to train the module first before let it recognizing any voice command.

4.2 Zigbee(4214A-XBEE2)

Zigbee is a low battery, low cost and low data rate device. It supports up to 65,000 nodes connected in network. Zigbee can automatically establish its network. Its frequency band is 2.4GHz. It uses small packets compared with WiFi and Bluetooth. The battery life of zigbee is 100-700 days. The range of zigbee is 1-75 meters. Zigbee has 32-60KB memory

4.3Microcontroller(SST 89E51).

SST89E51 Operates at 0 to 40 MHz at 5V. It consist of 1KByte Internal RAM and Dual Block SuperFlash EEPROM– 8/16/32/64 KByte primary block+8KByte secondary block. It supports external address range up to 64KByte of Program and Data Memory. It consist of three High-Current drive ports (16 mA each)and three 16-bit Timers/Counters. It also consist of Full-Duplex, Enhanced UART, ten interrupt sources at 4 priority levels, Programmable Watchdog Timer (WDT) and Programmable Counter Array (PCA). SST 89E51 has four 8-bit I/O Ports (32 I/O Pins) andOne 4-bit Port. It consist of Low EMI Mode (Inhibit ALE) and SPI Serial Interface.Standard 12 Clocks per cycle, the device has anoption to double the speed to 6 clocks per cycle.

5.Software description

The microcontroller is programmed using Keil µvision.Keil µvision provides assembly language programming as well as 'C' language programming. This system is programmed using 'C' language programming. Thesimulation helps to understand the hardware configuration. The simulation saves our time by avoiding the time wasted on setup issues.Additionally, with simulation, one can write and test applications before target hardware is available. Program is burnt into the IC using Flash Magic tool and IC burner kit. [4]

6. Experimental validation

The performance of the "Speech Authenticated Automatic Industry Sway" is validated with aid of laboratory prototype that has system parameter shown in Table 1.

Mains	230 V
Voice recognition module	NSK98 281114
Microcontroller	SST 89E51
Zigbee	4214A-XBEE2

Table 1: System Parameter

Figure 4 shows the transmitter section of the "Speech Authenticated Automatic Industry Sway" which consist of voice recognition module, microcontroller and transmitter zigbee.

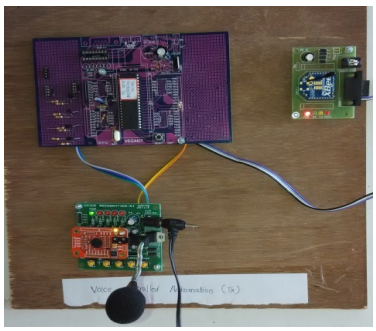

Figure 4: transmitter section

Figure 5 shows the receiver section of "Speech Authenticated Automatic Industry Sway" which consist of receiver zigbee, microcontroller, and dedicated appliances (eg. Motor, relay, switches, bulb).

Figure 5: Receiver section

Figure 6 shows the over all"Speech Authenticated Automatic Industry Sway" system which consist of transmitter n receiver

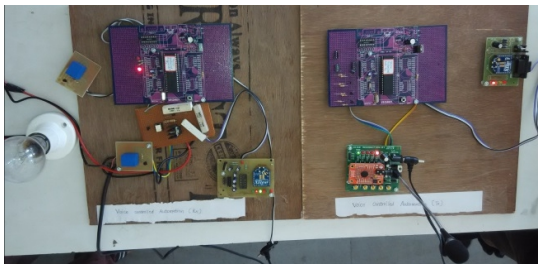

Figure 6:"Speech Authenticated Automatic Industry Sway" system

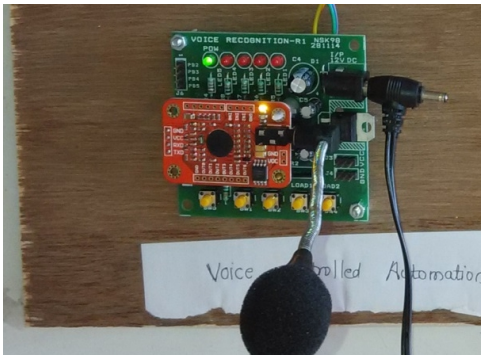

Figure 7: Voice recognition module (NSK98 281114)

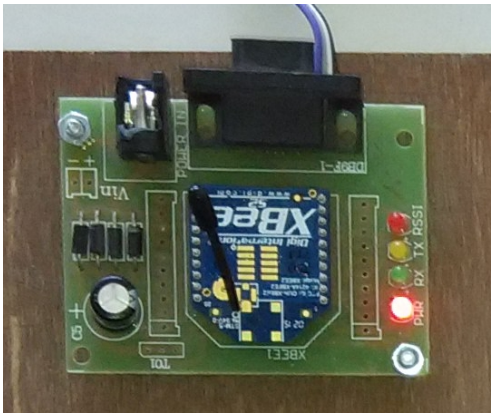

Figure 8: Zigbee (4214A-XBEE2)

7.Conclusion

"Speech Authenticated Automatic Industry Sway" is a system that is used to control an industrial appliances through authenticated voice commands. This system controls an industrial appliances with an authenticated voice which basically provides security to an industry and also avoids the loss of life in the industries that deals with flaming retardants in case of dangerous blasts. This system provides high flexibility so that it can be handled or operated by a technical or a nontechnical user. As the industry is controlled by an authenticated voice there are less number of labours required so the manpower is reduced and hence the wages that are distributed into the labours are saved. This project is basically to enhance the industry sector towards safety and secure while moving towards "MISSION 2020".

8.Reference

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[2] Bhopal Gas Tragedy – Wikipedia
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