PIC MICROCONTROLLER USED METAL DETECTOR INTERFACING WITH PC

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Abstract

This system proposes sensing element by exploitation PIC microcontroller interfacing with laptop. The system uses PIC microcontroller because the main controller whether or not the detected metal is metal metal or non-ferrous metal. Among vareied sorts of metal sensors and vareied sorts of metal police investigation technologies, coaxial sort coil sensing element and radio frequency (very low frequency) metal police investigation technology square measure employed in this method. this method consists of 2 configurations_ Haredware configuration and software package configuration. The haredware elements embody coil sensors that senses the frequency changes of metal, a PIC microcontroller, pc (PC), buzzer, lightweight emitting diode (LED) and digital camera. The software package configuration includes a program controller interface. PIC Microprogramming language is employed to implement the system. This system is based on the PIC 16F887 microcontroller. This system is especially employed in mining and high security places like aerodrome, plaza, shopping center and governmental buildings.

Introduction

Nowadays, Metal detectors became a vital component in today's society and wide used not just for hobbyists however additionally for safety purpose. For Safety purpose, Metal detector that utilized in airdrome to make sure that there's no dangerous weapon like knives, guns or any metal objects that could be used as weapons has been brought on by terrorist into the heavier-than-air craft. In technical space, folks use metal detector to go looking for the underground pipe or cable before digging in walls and floors. Besides that, many folks relish in discovering hidden treasure or valuable metal like gold and silver by victimisation detector. In of late, most of metal noticeors will solely detect metal but not the categories of detected metal. and that they typically indicate by turning on the alarem or LEDs whenever the metal tareget is detected. during this system, not solely the detected metal tareget however also the categories of metal square measure indicated on the private laptop (PC) and image records with digital camera.\The types of non-

ferrous metal square measure copper, aluminium, zinc, gold, platinum, bass, bronze and etc... metallic element metals square measure all metals that have iron properties. the full system is controlled by the PIC microcontroller.
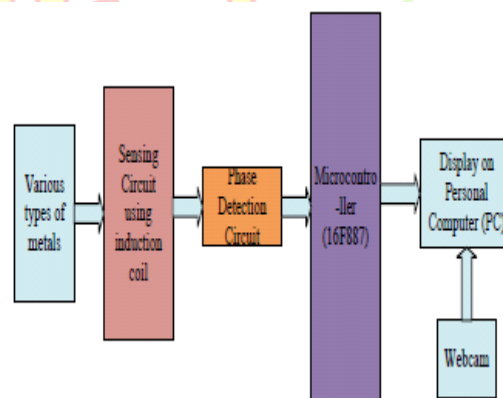
Related Technology

Metal detectors' basic operation depends on Ampere's and Fareaday's laws. It works on the principle of transmission a magnetic field and

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analyzing a come back signal from the tareget and surroundings. The transmitted force field vareies in time. This transmitted force field creates electrical phenomenon to flow in metal taregets. These electrical currents are known as eddy currents, that successively generate a weak force field, but their generated force field is totally different from the transmitted magnetic field in form and strength. The regenerated magnetic field from the eddy currents causes AN alternating voltage signal at the receive coil. reckoning on the alternating voltage signal at the receive coil, we will decide whether or not the metal tareget is detected or not [2]. Metal detection detector is the most essential element in metal detectors. In this system, coil detector is employed. Metal detection capabilities are varey consistent with coil detector shapes, sizes and coil configurations.

There are 3 vareieties of coil shapes –

(i)   spherical formed coil
(ii)   Elliptical formed coil
(iii)   Open-web coil.

The most common vareieties of coil configuration are-

(i)   homocentric coil
(ii)   Double-D coil
(iii)   Mono loop coil

There are differing types of metal detection technologies. They are-

1. Beat Frequency generator (BFO)

2. Pulse Induction (PI)

3. terribly Low Frequency (VLF)

The Beat Frequency generator (BFO) operates within the varey of 100s kHz. the heartbeat Induction (PI) operates within the varey of 100s Hz and also the terribly low frequency (VLF) operates within the range of 3-30 kc. Among these technologies, VLF technology is the most well-liked vareiety of metal detection technology. In this system, the VLF technology is additionally used as a result of it's the

flexibility to discriminate totally different metals consistent with their section shifting.

SOFTWARE CONFIGURATION

In this implementation, it's vital to assign the reference value. This reference worth is that the input voltage of the microcontroller and it's the output of the part detection circuit once there's no metal detected. And then, it's to induce the input voltage worth from the part detection circuit. If the input voltage changes, the metal is detected and also the alarem system are going to be ON. If the input voltage will increase once compared to the reference voltage, this metal is non-ferrous metal. If the input voltage decreases in compareison to the reference voltage, this metal is metal metal. And it'll be displayed on the private pc (PC) victimisation C# interface. The overall program is enforced by the micro language. Figure.2shows the flow charet of microcontroller program
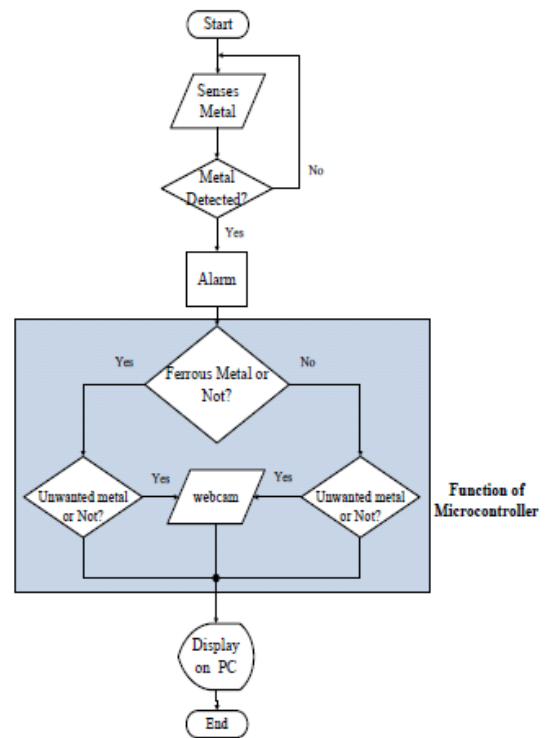
Metal kind discriminating system is simulated mistreatment PROTEUS SOFTWARE and their results square measure given during this system. In simulation software package, rather than coil sensing element, two pulse generators is employed to input the frequency to the part detection circuit. one among these pulse generators is employed because the transmitted coil sensing element and therefore the different one is employed because the received coil sensing element. part detection circuit determines part lead or part lag by compareison 2 incoming frequencies from two pulse generators. then part lead or part lag price is reborn to the suitable voltage by mistreatment active low pass filters. part lead suggests that increasing voltage and part lag suggests that decreasing voltage. A reference voltage is appointed within the PIC microcontroller program once there's no part lead or part lag i.e. there's no output voltage modification within the phase detection circuit. The PIC microcontroller discriminates ferrous metal or non-ferrous metal reckoning on the voltage from the part detection circuit. System for PIC microcontroller is enforced by Micro C program.

The simulation result and C# user interface result once there's no metal. once no metal sleuthing, there is no increasing voltage or decreasing voltage however still the reference voltage. So, the PIC microcontroller is knowledgeable on pc (PC) that there's no metal. Half dozen show the simulation result and C# user interface result once non-ferrous metal is detected. during this case, pulse dimension of the heart beat generator because the receive coil device is lareger than the heart beat dimension of the heart beat generator because the transmit coil device. So, the section distinction between these 2 signals is section lead. And then, the increasing voltage is inputted to the PIC microcontroller. PIC microcontroller determines that it's non-ferrous metal and informs this message on pc (PC). At an equivalent time, buzzer is activated and therefore the inexperienced junction rectifier is ON.

The simulation result and C# user interface result once metal metal is detected. during this case, pulse dimension of the heart beat generator because the receive coil device is a smaller amount than the heart beat dimension of the heart beat generator because the transmit coil device. So, the section distinction between these 2 signals is section lag. And then, the decreasing voltage is inputted to the PIC microcontroller. PIC microcontroller determines that it's metal metal and informs this message on the non-public pc (PC). At an equivalent time, buzzer is activated and therefore the red junction rectifier is ON.

The simulation result and C# user interface result once disallowable non-ferrous metal is detected. during this case, pulse dimension of the heart beat generator because the receive coil device is lareger than the heart beat dimension of the heart beat generator because the transmit coil device. So, the section distinction between these 2 signals is section lead. And then, the increasing voltage is inputted to the PIC microcontroller. PIC microcontroller determines that it's non-ferrous metal and this non-ferrous metal is disallowable metal in line with the outlined voltage ranges so informs this message on pc (PC) and captures the thing by mistreatment digital camera. At an equivalent time, buzzer is activated and therefore the inexperienced junction rectifier is ON.
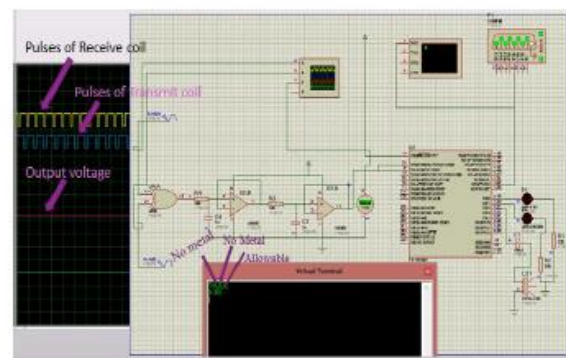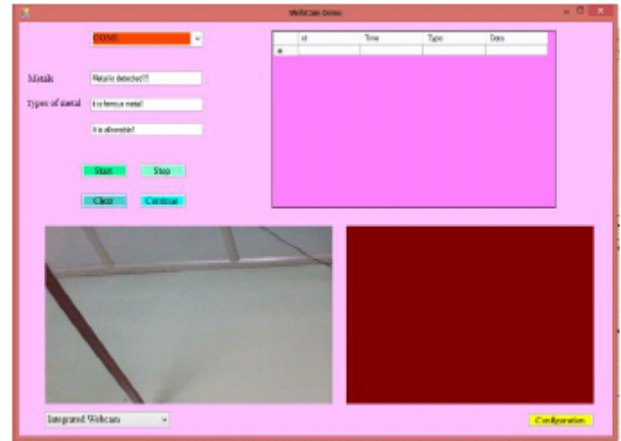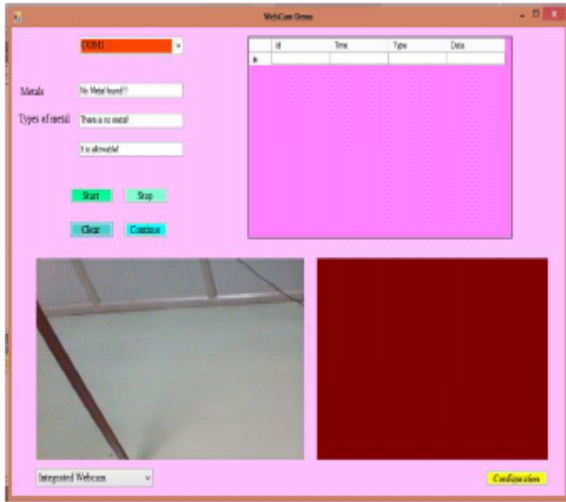
HAREDWARE CONFIGURATION
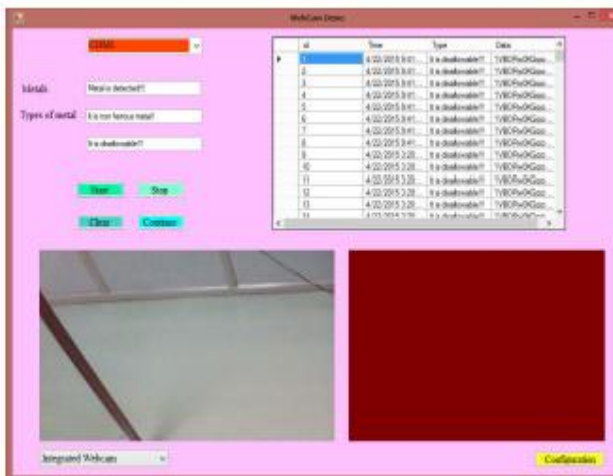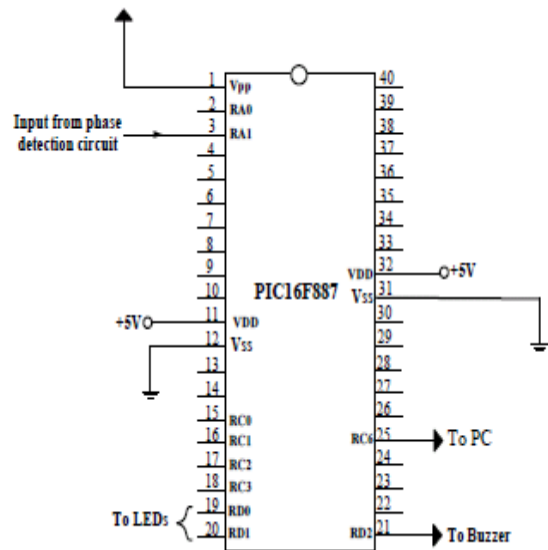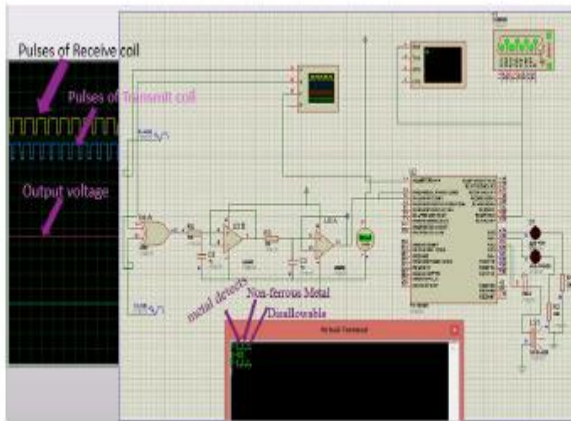
PORTC pin twenty five is connected to the private laptop (PC) via RS232 PIC to laptop serial cable wire on that is advised that the tareget metal is detected and also the detected metal is metallic element or non-ferrous. PORTD pin five is connected to buzzer and PORTD pins nineteen and twenty are connected to LEDs. passageway pin one is connected to the section detection circuit that is inputted the voltage level because the signal from the coil detector. Pin eleven and pin thirty two are power provide pins and also the provide voltage is +5V. the bottom pins are twelve and thirty one.

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A part detector generates a voltage proportional to the distinction in phase between 2 signals. during this circuit style, phase detection circuit is meant by the Exclusive OR: HEF4030. $0¢^a$ and $180¢^a$ are the 2 extreme values of associate degree logic gate based mostly phase detector. If the part distinction of the input signals decreases, the typical voltage of the sign conjointly decreases. If the part distinction of the input signals increases, the typical voltage of the sign conjointly increases. On the opposite hand, the dimension of the positive pulse of the sign changes proportionately to the part difference of the signal. So, the typical output voltage is directly proportional to the part distinction of the signal if the part distinction is between $0¢^a$ and $180¢^a$.
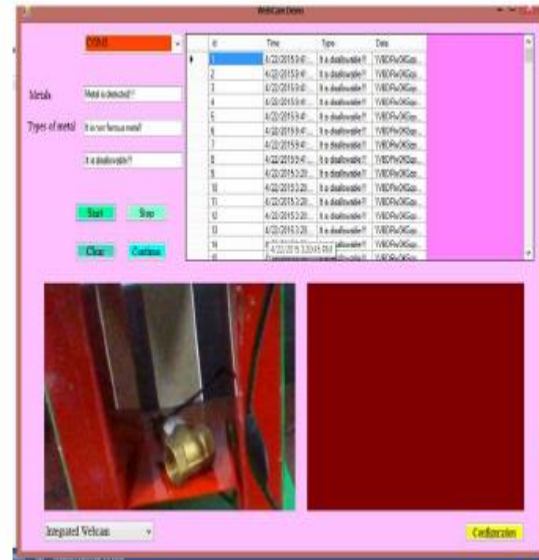
Haredware Results
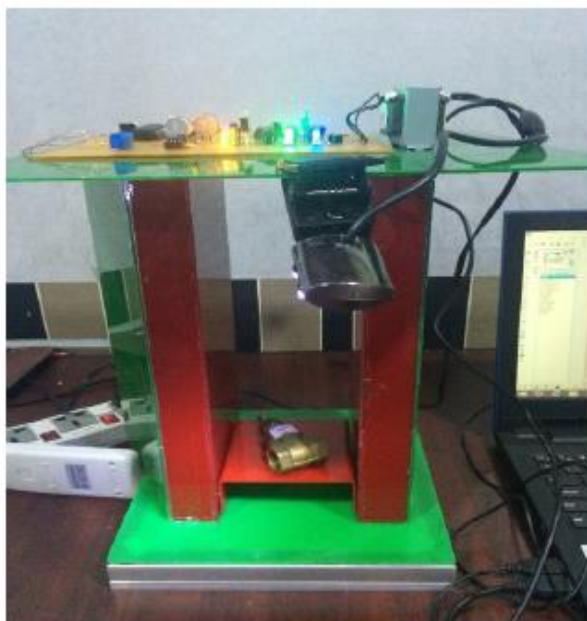
Conclusions

In this paper, this technique is enforced by the VLF technology. and also the induction device{ styled |is meant |is intended} by the coaxial design. it's primareily employed in airports, mall, plaza and governmental buildings. It offers a good thanks to improve the protection of voters and government. And sensing element victimisation metal-type discriminating system will notice the prohibited metal easier than alternative metal detectors. this technique additionally supports the protection personnel to search out the haremful metals additional simply**.**

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