

Intelligent Spy Robot using Zigbee

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Abstract: -- The wireless communication technologies are rapidly spreading to many new areas, including the automation and the importance of the use of wireless technologies in the data acquisition, building control, monitoring systems and automation of manufacturing processes will grow. Intelligent mobile robots and cooperative multi - agent robotic systems can be very efficient tools to speed up search and research operations in remote areas. Robots are also useful to do jobs in areas and in situations that are hazardous for human. They can go anywhere that is not reachable by humans and can go into gaps and move through small holes that are impossible for humans and even trained dogs. Our preliminary aim in this project is to build an pc controlled robot, which could be able to send the environmental status, the temperature condition, and if there is any obstacle on its path, and what is the obstacle in any remote place which is not reachable by the humans and it will be controlled by ZIGBEE communication. This project uses regulated 5V, 750mA power supply. 7805 three terminal voltage regulator is used for voltage regulation. Bridge type full wave rectifier is used to rectify the ac output of secondary of 230/18V step down transformer.

Index Terms — Obstacle, Pc controlled robot, Robotic systems, Wireless communication technologies, Zigbee communication.

I. INTRODUCTION

In India, most of the commercial transport is being carried out by the railway network and therefore, any problems in the same has the capacity to induce major damage to the economy -not withstanding the societal impact of loss of life or limb. This paper proposes a cost effective yet robust solution to the problem of railway crack detection utilizing a method that is unique in the sense that while it is simple. The idea is completely novel and hitherto untested. The paper discusses the technical and design aspects in detail and also provides the proposed robust crack detection algorithm.

The paper also presents the details of the implementation results of the RRCDS utilizing simple components inclusive of a GPS module, GSM Modem and LED-LDR based crack detector assembly.

Our project is zigbee based railway crack detection. Zigbee is the new technology in wireless communication it has many advantages over previous version. The proposed scheme has been modeled for robust implementation in the Indian scenario.

II. EXISTING SYSTEM

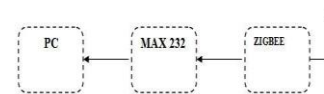
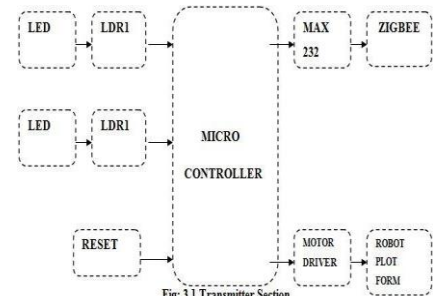
The finding of cracks in railways tracks takes time consumption due to manual checking. It reduces the accuracy too. This method of design have limited intelligence.

III. PROPOSED SYSTEM

This system involves the design of crack finding robot for finding cracks in railway tracks. This system uses controller for interfacing the robotic vehicle and crack detection sensor. The sensing device senses the voltage variations from the crack sensor and then it gives the signal to the microcontroller. The microcontroller checks the voltage variations between measured value and threshold value and controls the robot according to it.

The robotic model is interfaced with the microcontroller with the help of SPDT relays and driver IC. If any crack occurs in the rail, the robot will be stopped and then an alarm will be raised.

BLOCKDIAGRAM:



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POWER SUPPLY

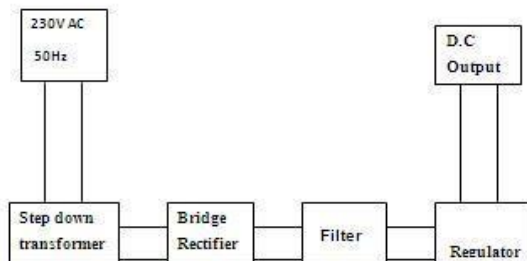


Fig: Power supply

The input to the circuit is applied from the regulated power supply. The a.c. input i.e., 230V from the mains supply is step down by the transformer to 12V and is fed to a rectifier. The output obtained from the rectifier is a pulsating d.c. voltage. So in order to get a pure d.c. voltage, the output voltage from the rectifier is fed to a filter to remove any a.c. components present even after rectification. Now, this voltage is given to a voltage regulator to obtain a pure constant d.c. voltage.

Transformer: Usually, DC voltages are required to operate various electronic equipment and these voltages are 5V, 9V or 12V. But these voltages cannot be obtained directly. Thus the a.c. input available at the mains supply i.e., 230V is to be brought down to the required voltage level. This is done by a transformer. Thus, a step down transformer is employed to decrease the voltage to a required level.

Rectifier: The output from the transformer is fed to the rectifier. It converts A.C. into pulsating D.C. The rectifier may be a half wave or a full wave rectifier. In this project, a bridge rectifier is used because of its merits like good stability and full wave rectification.

Filter: Capacitive filter is used in this project. It removes the ripples from the output of rectifier and smoothes the D.C. Output received from this filter is constant until the mains voltage and load is maintained constant. However, if either of the two is varied, D.C. voltage received at this point changes. Therefore a regulator is applied at the output stage.

Voltage regulator: As the name itself implies, it regulates the input applied to it. A voltage regulator is an electrical regulator designed to automatically maintain a constant voltage level. In this project, power supply of 5V and 12V are required. In order to obtain these voltage levels, 7805 and 7812 voltage regulators are to be used. The first number 78 represents positive supply and the numbers 05, 12 represent the required output voltage levels.

II. MICROCONTROLLERS:

Microprocessors and microcontrollers are widely used in embedded systems products. Microcontroller is a programmable device. A microcontroller has a CPU in addition to a fixed amount of RAM, ROM, I/O ports and a timer embedded all on a single chip. The fixed amount of on-chip ROM, RAM and number of I/O ports in microcontrollers makes them ideal for many applications in which cost and space are critical.

The Intel 8052 is Harvard architecture, single chip microcontroller (μC) which was developed by Intel in 1980 for use in embedded systems. It was popular in the 1980s and early 1990s, but today it has largely been superseded by a vast range of enhanced devices with 8052-compatible processor cores that are manufactured by more than 20 independent manufacturers including Atmel, Infineon Technologies and Maxim Integrated Products. 8052 is an 8-bit processor, meaning that the CPU can work on only 8 bits of data at a time. Data larger than 8 bits has to be broken into 8-bit pieces to be processed by the CPU. 8052 is available in different memory types such as UV-EPROM, Flash and NV-RAM.

The present project is implemented on Keil uVision. In order to program the device, proload tool has been used to burn the program onto the microcontroller. The features, pin description of the microcontroller and the software tools used are discussed in the following sections.

III. EMBEDDED SYSTEMS:

An embedded system can be defined as a computing device that does a specific focused job. Appliances such as the air-conditioner, VCD player,

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DVD player, printer, fax machine, mobile phone etc. are examples of embedded systems. Each of these appliances will have a processor and special hardware to meet the specific requirement of the application along with the embedded software that is executed by the processor for meeting that specific requirement. The embedded software is also called "firmware". The desktop/laptop computer is a general purpose computer. You can use it for a variety of applications such as playing games, word processing, accounting, software development and so on. In contrast, the software in the embedded systems is always fixed listed below:

Embedded systems do a very specific task, they cannot be programmed to do different things. Embedded systems have very limited resources, particularly the memory. Generally, they do not have secondary storage devices such as the CDROM or the floppy disk. Embedded systems have to work against some deadlines. A specific job has to be completed within a specific time. In some embedded systems, called real-time systems, the deadlines are stringent. Missing a deadline may cause a catastrophe - loss of life or damage to property. Embedded systems are constrained for power. As many embedded systems operate through a battery, the power consumption has to be very low. Some embedded systems have to operate in extreme environmental conditions such as very high temperatures and humidity.

IV. ZIGBEE TECHNOLOGY:

ZIGBEE Technology is one of such progress in wireless technology. Wireless is not a new technology as wireless networking and wireless internet are already in use; yet ZIGBEE TECHNOLOGY sets a new aspect in wireless technology. That's why it's usually referred as ZIGBEE Wireless Technology. Day by day advancement in technology is introducing novel and supportive devices which are used to make life easier and ZIGBEE Technology is one of them.

The ZIGBEE standard uses small very low-power devices to connect together to form a wireless control web. ZIGBEE protocol is optimized for very long battery life measured in months to years from inexpensive,

off-the-shelf non-rechargeable batteries, and can control lighting, air conditioning and heating, smoke and fire alarms, and other security devices. ZIGBEE is a low data rate, two-way standard for home automation and data networks.

Real usage examples of ZIGBEE includes home automation tasks such as turning lights on, turn up the heat, setting the home security system, or starting the VCR. With ZIGBEE all these tasks can be done from anywhere in the home at the touch of a button. ZIGBEE also allows for dial-in access via the Internet for automation control. ZIGBEE technology is a low data rate, low power consumption, low cost, wireless networking protocol targeted towards automation and remote control applications. IEEE 802.15.4 committee started working on a low data rate standard a short while later. Then the ZIGBEE Alliance and the IEEE decided to join forces and ZIGBEE is the commercial name for this technology. ZIGBEE is expected to provide low cost and low power connectivity for equipment that needs battery life as long as several months to several years but does not require data transfer rates as high as those enabled by Bluetooth. In addition, ZIGBEE can be implemented in mesh networks larger than is possible with Bluetooth. ZIGBEE compliant wireless devices are expected to transmit 10-75 meters, depending on the RF environment and the power output consumption required for a given application, and will operate in the unlicensed RF worldwide (2.4GHz global, 915MHz Americas or 868 MHz Europe). The data rate is 250kbps at 2.4GHz, 40kbps at 915MHz and 20kbps at 868MHz. IEEE and ZIGBEE Alliance have been working closely to specify the entire protocol stack.

IEEE 802.15.4 focuses on the specification of the lower two layers of the protocol (physical and data link layer). On the other hand, ZIGBEE Alliance aims to provide the upper layers of the protocol stack (from network to the application layer) for interoperable data networking, security services and a range of wireless home and building control solutions, provide interoperability compliance testing, marketing of the standard, advanced engineering for the evolution of the standard.

This will assure consumers to buy products from different manufacturers with confidence that the

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products will work together. IEEE 802.15.4 is now detailing the specification of

PHY and MAC by offering building blocks for different types of networking known as "star, mesh, and cluster tree". Network routing schemes are designed to ensure power conservation, and low latency through guaranteed time slots. A unique feature of ZIGBEE network layer is communication redundancy eliminating "single point of failure" in mesh networks. Key features of PHY include energy and link quality detection, clear channel assessment for improved coexistence with other wireless networks.

Applications of ZIGBEE Technology :

Applications of ZIGBEE Technology is not limited to a certain level but because of being cost-effective, low-power battery and wireless connectivity, this ZIGBEE technology is used in almost every appliance if not in all.

ZIGBEE technology is programmed in a chip form and is used in many devices to function automatically. For controlling and monitoring a whole factory unit while sitting in one cabin is possible by using ZIGBEE TECHNOLOGY. It centralizes all the units in one place and enables the remote monitoring.

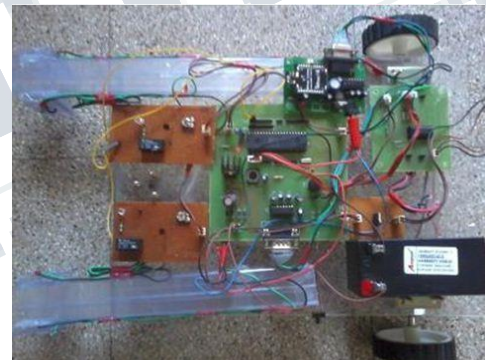
In a similar way, a home can be centralized by increasing the security aspect. Many small equipments are coming with embedded ZIGBEE TECHNOLOGY chips and really works like a miracle. ZIGBEE TECHNOLOGY is swiftly prevail the market by introducing devices like smoke and heat sensor, medical and scientific equipments, control units of home and industry and wireless communication devices. The revolutionize turn in the field of technology with the introduction of ZIGBEE

TECHNOLOGY; the near future of zigbee technology will prevail in almost every walk of life. L293D Motor Driver One of the first realizations in robotics is that making something move isn't an easy task. You simply can't take a "brain" circuit strengthen ("buffer") a signal. So it's strong enough to drive a large load like motor. Transistor H-bridges circuit, buffer chips and dedicated motor driving chips are suitable with their own benefits and limitations. For our "Secret" motor driver, we wanted something that would take standard

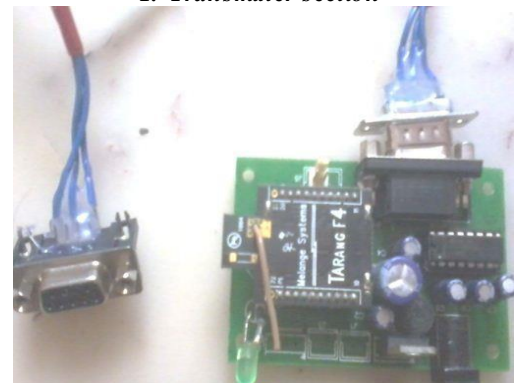
TTL (well CMOS too) inputs and make a standard servo our slave. You see standard servo uses a "Pulse width modulated" ("PWM") signal to tell a servo where to rotate to. PWM works by sending a rapid train of high/low signals to the servo's regular driver brains. Depending on how different the high signal is from the low signal, servo moves to the according position, PWM is great if you don't want to rotate much more than 180° which is fine for actuators but not for driving wheels.

With our "Secret" motor driver and a bit of servo hacking, we're going to lobotomize and turn a standard servo into something more useful - a small, compact, powerful gear motor! It'll be something you can use every simple input signals to control its rotation. We'll even throw in a 5V regulator hack if you want to clamp the voltage right at the servo. Or, modify it for use on a breadboard, which will make good use of the driver's indicator LEDs to show direction of rotation.

IV. RESULTS



1. Transmitter section



2. Receiver section

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3. On Working mode

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V. CONCLUSION

The finding of cracks in railways tracks takes time cons umptions due to manual checking. It reduces accuracy too. This method of des ign is having limited intelligence. In the propos ed s ys tem by us ing led -ldr as s embly we detect the cracks with the help of a pc controlled robot .It works in us ual and unus ual conditions too. With this propos ed s ys tem we can reduce manpower and takes les s time than the exis ting method. It increas es the accuracy too.

Future Scope:

By us ing GSM module, we can s end the latitude and longitude of the crack, updates directly to the controlling pers on's mobile in the form of SMS.

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