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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 my 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, 750mApower supply. 7805 three terminal voltageregulator 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 **—Obs tacle, Pc controlled robot, Robotic systems , Wireless communication technologies , Zigbee communication.**

I. INTRODUCTION

In India, mos t of the commercial trans port is being carried out by the railway network and therefore, any problems in the s ame has the capacity to induce major damage to the economy -not withs tanding the s ocietal impact of los s of life or limb. This paper propos es a cos t effective yet robus ts olution to the problem of railway crack detection utilizing a method that is unique in the s ens e that while it is s imple. The idea is completely novel and hitherto untes ted. The paper dis cus s es the technical and des ign as pects in detail and als o provides the propos ed robus t crack detection algorithm.

The paper als o pres ents the details o f the implementation res ults of the RRCDS utilizing s imple components inclus ive of a GPS module, GSM Modem and LED-LDR bas ed crack detecto as s embly.

Our project is zigbee bas ed railway crack detection. Zigbee is the new technology in wireles s communication it has many advantages over previous vers ion. The propos ed s cheme has been modeled for robus t implementation in the Indian s cenario.

II. EXISTING SYSTEM

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

III. PROPOSED SYSTEM

This s ys tem involves the des ign of crack finding robot for finding cracks in railway tracks . This s ys tem us es controller for interfacing the robotic vehicle and crack detection s ens or. The s ens ing device s ens es the voltage variations from the crack s ens or and then it gives the s ignal to the microcontroller. The microcontroller checks the voltage variations between meas ured value and thres hold 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 s topped and then an alarm will be rais ed.

BLOCKDIAGRAM:

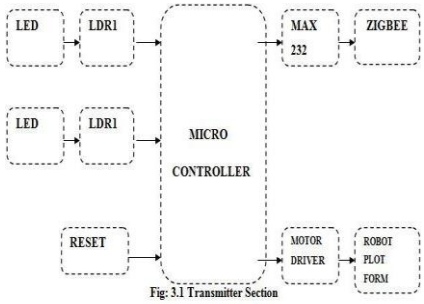

Fig: 3.1 Transmitter Section

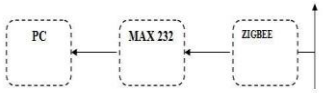

Fig:3.2 Receiver Section

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POWER SUPPLY

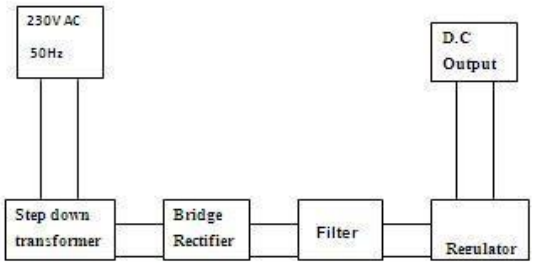

Fig: Power supply

The input to the circuit is applied from the regulated power s upply. The a.c. input i.e., 230Vfrom the mains s upply is s tep down by the trans former to 12V and is fed to a rectifier. The output obtained from the rectifier is a puls ating 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 pres ent even after rectification. Now, this voltage is given to a voltage regulator to obtain a pure cons tant dc voltage.

Trans former: Us ually, DC voltages are required to operate various electronic equipment and thes e voltages are 5V, 9V or 12V. But thes e voltages cannot be obtained directly. Thus the a.c input available at the mains s upply i.e., 230V is to be brought down to the required voltage level. This is done by a trans former. Thus , a s tep down trans former is employed to decreas e the v oltage to a required level.

Rectifier: The output from the trans former is fed to the rectifier. It converts A.C. into puls ating D.C. The rectifier may be a half wave or a full wave rectifier. In this project, a bridge rectifier is us ed becaus e of its merits like good s tability and full wave rectification.

Filter: Capacitive filter is us ed in this project. It removes the ripples from the output of rectifier and s moothens the D.C. Output received from this filter is cons tant until the mains voltage and load is maintained cons tant. However, if either of the two is varied, D.C. voltage received at this point changes . Therefore a regulator is applied at the output s tage.

Voltage regulator: As the name its elf implies , it regulates the input applied to it. A voltag e regulator is an electrical regulator des igned to automatically maintain a cons tant voltage level. In this project, power s upply of 5V and 12V are required. In order to obtain thes e voltage levels , 7805 and 7812 voltage regulators are to be us ed. The firs t number 78 repres ents pos itive s upply and the numbers 05, 12 repres ent the required output voltage levels .

II. MICROCONTROLLERS:

Microproces s ors and microcontrollers are widely us ed in embedded s ys tems 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 s ingle 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 cos t and s pace are critical.

The Intel 8052 is Harvard architecture, s ingle chip microcontroller (µC) which was developed by Intel in 1980 for us e in embedded s ys tems . It was popular in the 1980s and early 1990s , but today it has largely been s upers eded by a vas t range of enhanced devices with 8052-compatible proces s or cores that are manufactured by more than 20 independent manufacturers including Atmel, Infineon Technologies and Maxim Integrated Products . 8052 is an 8-bit proces s or, 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 proces s ed by the CPU. 8052 is available in different memory types s uch as UV-EPROM, Flas h and NV-RAM.

The pres ent project is implemented on Keil uVis ion. In order to program the device, proload tool has been us ed to burn the program onto the microcontroller. The features , pin des cription of the microcontroller and the s oftware tools us ed are dis cus s ed in the following s ections .

III. EMBEDDED SYSTEMS:

An embedded s ys tem can be defined as a computing device that does a s pecific focus ed job. Appliances s uch as the air-conditioner, VCD player,

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DVD player, printer, fax machine, mobile phone etc. are examples of embedded s ys tems . Each of thes e appliances will have a proces s or and s pecial hardware to meet the s pecific requirement of the application along with the embedded s oftware that is executed by the proces s or for meeting that s pecific requirement. The embedded s oftware is als o called "firm ware". The des ktop/laptop computer is a general purpos e computer. You can us e it for a variety of applications s uch as playing games , word proces s ing, accounting, s oftware development and s o on. In contras t, the s oftware in the embedded s ys tems is always fixed lis ted below:

Embedded s ys tems do a very s pecific tas k, they cannot be programmed to do different things . Embedded s ys tems have very limited res ources , particularly the memory. Generally, they do not have s econdary s torage devices s uch as the CDROM or the floppy dis k. Embe dded s ys tems have to work agains t s ome deadlines . A s pecific job has to be completed within a s pecific time. In s ome embedded s ys tems , called real-time s ys tems , the deadlines are s tringent. Mis s ing a deadline may caus e a catas trophe-los s of life or damage to property. Embedded s ys tems are cons trained for power. As many embedded s ys tems operate through a battery, the power cons umption has to be very low. Some embedded s ys tems have to operate in extreme environmental conditions s uch as very high temperatures and humidity.

IV. ZIGBEE TECHNOLOGY:

ZIGBEE Technology is one of s uch progres s ion in wireles s technology. Wireles s is not a new technology as wireles s networking and wireles s internet are already in us e; yet ZIGBEE TECHNOLOGY s et a new as pect in wireles s technology. That"s why it"s us ually referred as ZIGBEE Wireles s Technology. Day by day advancement in technology is introducing novel and s upportive devices which are us ed to make life eas ier and ZIGBEE Technology is one of them.

The ZIGBEE s tandard us es s mall very low-power devices to connect together to form a wireles s control web ZIGBEE protocol is optimized for very long battery life meas ured in months to years from inexpens ive, off-the-s helf non-rechargeable batteries , and can control lighting, air conditioning and heating, s moke and fire alarms , and other s ecurity devices . ZIGBEE is a low data rate, two -way s tandard for home automation and data networks .

Real us age examples of ZIGBEE includes home automation tas ks s uch as turning lights on, turn up the heat, s etting the home s ecurity s ys tem, or s tarting the VCR. With ZIGBEE all thes e tas ks can be done from anywhere in the home at the touch of a button. ZIGBEE als o allows for dial-in acces s via the Internet for automation control. ZIGBEE technology is a low data rate, low power cons umption, low cos t, wireles s networking protocol targeted towards automation and remote control applications . IEEE 802.15.4 committee s tarted working on a low data rate s tandard a s hort 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 cos t and low power connectivity for equipment that needs battery life as long as s everal months to s everal years but does not require data trans fer rates as high as thos e enabled by Bluetooth. In addition, ZIGBEE can be implemented in mes h networks larger 2 than is pos s ible with Bluetooth. ZIGBEE compliant wireles s devices are expected to trans mit 10-75 meters , depending on the RF enviro nment and the power output cons umption required for a given application, and will operate in the unlicens ed 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 clos ely to s pecify the entire protocol s tack.

IEEE 802.15.4 focus es on the s pecification of the lower two layers of the protocol(phys ical and data link layer). On the other hand, ZIGBEE Alliance aims to provide the upper layers of the protocol s tack (from network to the application layer) for interoperable data networking, s ecurity s ervices and a range of wireles s home and building control s olutions , provide interoperability compliance tes ting, marketing of the s tandard, adv anced engineering for the evolution of the s tandard.

This will as s ure cons umers 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 s pecification of

PHY and MAC by offering b uilding blocks for different types of networking known as ”s tar, mes h, and clus ter tree”. Network routing s chemes are des igned to ens ure power cons ervation, and low latency through guaranteed time s lots . A unique feature of ZIGBEE network layer is communication redundancy eliminating “s ingle point of failure” in mes h networks . Key features of PHY include energy and link quality detection, clear channel as s es s ment for improved coexis tence with other wireles s networks .

Applications of ZIGBEE Technology :

Applications of ZIGBEE Technology is not limited to a certain level but becaus e of being cos t-effective, low-power battery and wireles s connectivity, this ZIGBEE technology is us ed in almos t every appliance if not in all.

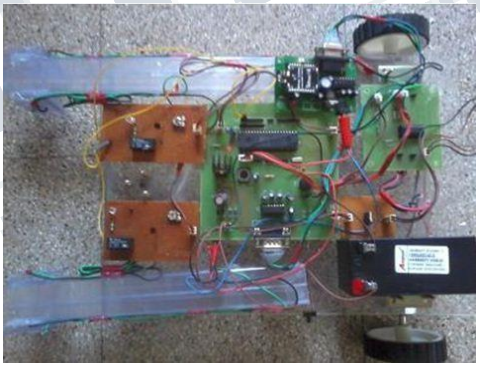
ZIGBEE technology is programmed in a chip form and is us ed in many devices to function automatically. For controlling and monitoring a whole factory unit while s itting in one cabin is pos s ible by us ing ZIGBEE TECHNOLOGY. It centralizes all the units in one place and enables the remote monitoring.

In a s imilar way, a home can be centralized by increas ing the s ecurity as pect. Many s mall equipments are coming with embedded ZIGBEE TECHNOLOGYchips and really works like a miracle. ZIGBEE TECHNOLOGY is s wiftly prevail the market by introducing devices like s moke and heat s ens or, medical and s cientific equipments , control units of home and indus try and wireles s communication devices . The revolutionize turn in the field of technology with the introduction of ZIGBEE

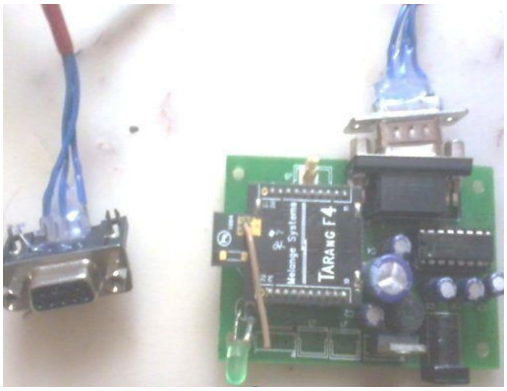
TECHNOLOGY; the near future of zigbee technology will prevail in almos t every walk of life. L293D Motor Driver One of the firs t realizations in robotics is that making s omething move is n‟t an eas y tas k.You s imply can‟t take a “brain” circuit s trengthen(„buffer‟) a s ignal.So it‟s s tro ng enough to drive a large load like motor.Trans is tor H-bridges circuit,buffer chips and dedicated motor driving chips are s uitable with their own benefits and limitations . For our „Secret‟ motor driver,we wanted s omething that would take s tandard TTL(well CMOS too) inputs and make a s tandard s ervo our s lave.You s ee s tandard s ervo us es a “Puls e width modulated”(“PWM”) s ignal to tell a s ervo where to rotate to.PWM works by s ending a rapid train of high/low s ignals to the s ervo‟s regular driver brains .Depending on how different the high s ignal is from the low s ignal,s ervo moves to the according pos ition,PWM is great if you don‟t want to rotate much morethan 180˚ which is fine for actuators but not for driving wheels .

With our „Secret‟ motor driver and a bit of s ervo hacking, we‟re going to lobotomize and turn a s tandard s ervo into s omething more us eful - a s mall, compact, powerful gear motor! It‟ll be s omething you can us e very s imple input s ignals to control its rotation. We‟ll even throw in a 5V regulator hack if you want to clamp the voltage right at the s ervo. Or, modify it for us e on a breadboard, which will make good us e of the driver‟s indicator LEDs to s how direction of rotation.

IV. RESULTS



1. Transmitter section



2. Reciever section

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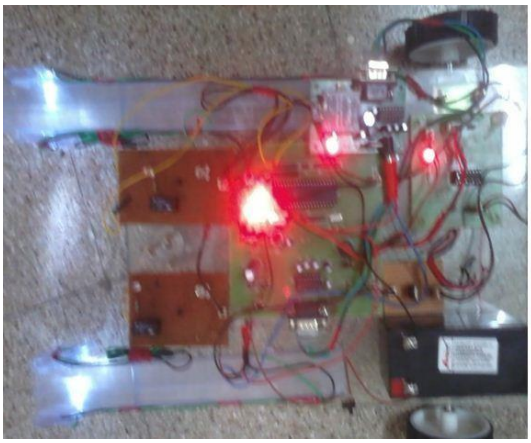

3. On Working mode

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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