Mobile Vehicle using Surveillance System & Sensors with Advance Controls

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Abstract: *This paper is related to experimental study and result related to robotics, arduino and surveillance system which is arranged on the mobile robot. We have named it as inspectobot because it does inspection. Here the zigbee technology is used for controlling the inspectobot by using laptop. While we have added the speed control of inspectobot & one metal detector. Using RF camera video transmission is done. This system is very useful for surveillance in areas where there is no internet connection. Also the internet connection or communication system collapse during any disaster.*

Keywords: Survelliance; arduino, mobile robot, metal detector, Zigbee, PWM, AV RF camera

1. Introduction

Most of the conventional surveillance systems are installed in fixed locations, and have only simple visual processing capabilities. One major drawback of these systems is that once the interested objects are obscured or in the blinds pots, it is not possible to acquire their image information. Moreover, the whole area monitoring for an environment is also not feasible. The general approach to cope with this problem is to increase the number of cameras for multi-view surveillance. However, the costs for the hardware and the system development will both increase.

Our project will be actually on robotic vehicle, in that inspection systems are provided like surveillance AV camera which is wirelessly connected with metal detector (metal Detector) & also we can operate that vehicle wirelessly using zigbee with controlling speed using Pulse width modulation (PWM) therefore named as inspectobot which is my given name still research is going on. In this project there are two parts Transmitter & Receiver which is discussed below.

2. Literature Review

Michael et al. (2006): As previous research as in paper 2006 [11], the systems which were using still it were permanent at one place using distributed cameras. The cameras in this system were fixed and one major drawback of these systems is that once the interested objects are obscured or in the blinds pots, it is not possible to acquire their image information. Moreover, the whole area monitoring for an environment is also not feasible.

Mr. Sabarish Chakkath , S.Hariharansiddharath, B. Hemalatha (2010) : [13] This paper is related to coal mine application, here they have used sensors for detecting CO2, etc. Inspiring to this we have placed metal detector instead of particular gas sensor. The coal tunnels are narrow and for surveillance of O2, CO, CO2, and Temperature in tunnels, they have made this system using robotic.

M. Selvam (2014): [6] In this paper the author has experimented with android phone and controller. He has controlled the robot using bluetooth and android app for that certain strings are required to store in program, similar strings are created by android app and by synchronizing all together the robot is controlled using smart phone.

Chinmay et al. (2014): [2] As this is latest research paper published by IEEE in which the surveillance robot is made by using arduino but still in this project there is use of internet for application in military use at such situations on military camps there is no possibility of internet so this system is not useful.

As seen in all papers & previous researches that they are using web cams. Web Cams requires the internet, one of our application is surveillance under tragedies or terrorist attacks [2]. Internet or communication system fails at this situations because of traffic so there is no use of web cams so here We are using AV camera which do not depend on third party We are making its own network. Also we have seen in many previous research papers [4] [5] that they have constant speed for buggies but here We are using my project second application for metal detection so here speed control requirement is also important so We are going to use PWM technique to control speed. For long distance communication according to previous papers [6][8] they have used internet or bluetooth controlling buggy, but bluetooth has only 10 meter range instead of bluetooth zigbee is best solution.

3. Scope of the Proposed Work

Previous experimentation we seen that for every application they are depending on third party i.e. internet [2]. Also some experiments they used Bluetooth but have very low range maximum 10 meters [5]. My scope is to make surveillance system that will not depend on internet or third party with sufficient range. Also we have to include metal detector & speed control, still the research is going on electronic nose but after research it can be implemented on this system so we want to make this system already advanced & compatible with feature researches.

4. Proposed Work

- *Aurdino uno:*

The Arduino Uno is a microcontroller board based on the ATmega328P [15]. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz ceramic resonator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started.

The main reasons for choosing arduino platform are
1) Our requirement is of PWM pins
2) Works on low power as well as further modifications are possible
3) Sufficient number of I/O pins.
4) Small size which can be easily assembled & works on open source platform.

- *Zigbee Technology:*

The zigbee Modules were engineered to meet IEEE 802.15.4 standards and support the unique needs of low-cost, low-power wireless sensor networks. The modules require minimal power and provide reliable delivery of data wirelessly between devices. The modules operate within the ISM 2.4 GHz frequency band and are pin-for-pin compatible with each other. Here we will use zigbee for controlling the speed of motors its speed ant for receiving signals from inspectobot.

- *As considering fig. 1:*
1) This project aims on concentrates on experimental study of Arduino & controlling input/ output devices on C language programming. Here we have selected arduino because there are sufficient I/O pins also further modifications are possible without changing platform.
2) Initial step is to provide specific power supply to Arduino as well as motor driver & motors. Proper interfacing of I/O devices like LCD 16 x 2, motors, indicators metal detectors. By using instruction "*digitalWrite(xPin, HIGH);*" any GPIO pin will be accessed.
3) Here firstly interfacing of motor we will choose Arduino PWM (pulse width modulation) controlled pins by which we can control the speed of motors for that there are 3,5,6,9,10,11 pins can be used. Instruction used for access this pin is "*analogWrite(9,127*);" in this instruction 9 is pin number & 127 is baud rate we can change it according to application by making change in program. Secondly interfacing is of zigbee which will be interfaced to UART pins of Arduino, there are pin number 0 & 1 available as UART (Rx & Tx) for serial communication.
4) Metal detector interfacing will be done by using GPIO also it will send signals to trans-receiver according to signals. AV Camera will be placed on mobile robot that will send modulated signals to trans-receiver.
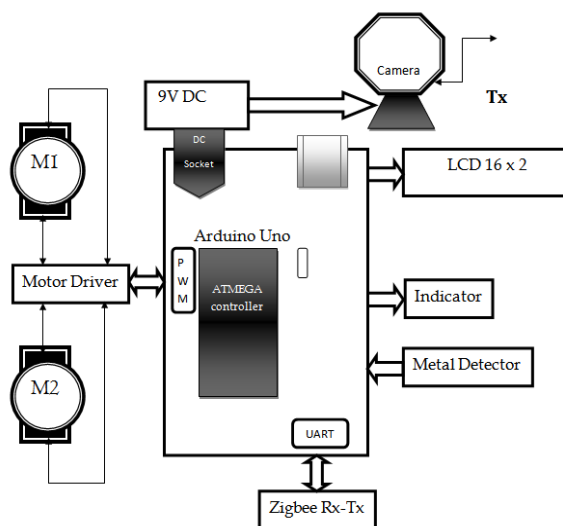

Figure 1: Buggy using arduino, zigbee & I/O interfacings.

Figure 1(a): Metal Detector

- Fig 1(a) Shows the metal detector used in the project which is connected to one of Arduino pin no. 12 as an simple input device. It requires +3.3V supply. When any metal comes near to the detector voltage varied and is detected by Arduino. If it is HIGH (Approx 3V) for LOW (0 V) this voltage goes to pin no 12, then according to voltage arduino decides metal is detected or not.

Figure 1(b): Actual Receiver Project Photograph

Fig 1(b) Shows actual project image which is buggy on that all devices are interfaced as we discussed previous.

- *As considering fig. 2:*
1. Here fig. b is actually laptop which will act as trans-receiver on that initial interfacing is of zigbee, the zigbee will be connected to USB port of laptop using USB to TTL. By which we can receive signals from zigbee also

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will send control signals to buggy by using hyper-terminal software.

2. Second interfacing with laptop is T.V. tuner card which will be connected to USB port, the AV receiver antenna will be interfaced with T.V tuner. By using this configuration laptop will receive video signals & will display on screen.
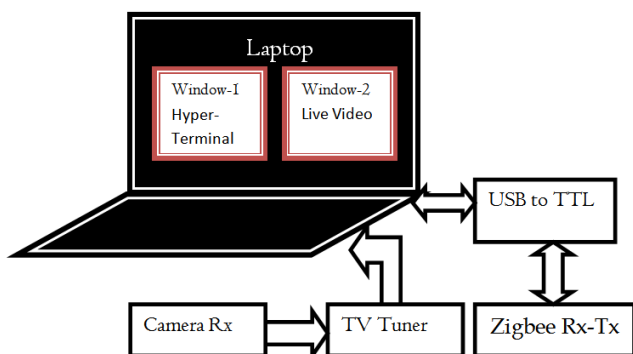

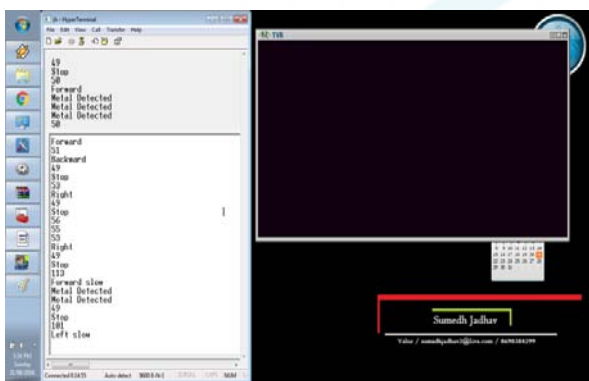**Figure 2:** Trans-Receive Controller using laptop

Figure 2 (a): View on Laptop

- Fig. 2(a) shows the software status on the laptop Left side window is hyper terminal which is used for serial communication. The status on Hyperterminal is the pressed keys for buggy in changing direction as well as the metal detected status on screen. While on right hand side view of laptop shows the received signals from RF camera drivers used for interfacing are UTV 007.

References

[1] Hou-Tsan Lee, Wei-Chuan Lin, Ching-Hsiang Huang, Yu-Jhih Huang., "*Wireless indoor surveillance robot*", IEEE**,** Annual Conference (SICE), 2011, pp. 2164-2169.

[2] Chinmay Kulkarni, Suhas Grama, Pramod Gubbi Suresh.," *Surveillance Robot Using Arduino Microcontroller, Android APIs and the Internet*", IEEE First International Conference on Systems Informatics, 2014.

[3] Dr. Shantanu K. Dixit, Mr. S. B. Dhayagonde.," *Design and Implementation of e-Surveillance Robot for Video Monitoring and Living Body Detection*", International Journal of Scientific and Research Publications, Volume 4, Issue 4, April 2014, pp.2250-3153.

[4] Kunal Borker, Rohan Gaikwad., "*Wireless Controlled Surveillance Robot*", International Journal of Advance Research in Computer Science and Management Studies Volume 2, Issue 2, February 2014 pp. 436-441.

[5] Shoeb Maroof Shaikh,Khan Sufiyan, Asgar Ali, Mir Ibrahim, Prof. Kalpana Bodke., "*Wireless Video Surveillance Robot Controlled Using Android Mobile Device*", International Journal of Advance Foundation And Research In Science & Engineering (IJAFRSE) Volume 1,Vivruti 2015.

[6] M.Selvam.,"*Smart Phone Based Robotic Control For Surveillance Applications*", International Journal of Research in Engineering and Technology, Volume 03 ,Issue 03, Mar-2014,

[7] Donato Di Paola, Annalisa Milella, Grazia Cicirelli, Arcangelo Distante., "*An Autonomous Mobile Robotic System for Surveillance of Indoor Environments*", International Journal of Advanced Robotic Systems, Vol. 7, 2010, pp. 019-026.

[8] Kota Sandeep , Kakumanu Srinath , Rammohanarao Koduri.," *Surveillance Security Robot With Patrolling Vehicle*", Volume-2, Issue-3, May-Jun 2012, pp.546 – 549.

[9] Meng-Shiun Yu, Horng Wu, Huei-Yung Lin., "*A Visual Surveillance System for Mobile Robot using Omnidirectional and PTZ cameras*", SICE Annual Conference 18-21 August 2010, The Grand Hotel, Taipei, Taiwan.

[10] Jan Piwiński, Agnieszka Sprońska.," *Future of the surveillance systems - examining the mobile robots influence on people's collective behaviour in the social area of an international airport*".

[11] Michael Bramberger, Andreas Doblander, Arnold Maier, Bernhard Rinner.," *Distributed Embedded Smart Cameras for Surveillance Applications*", IEEE, February 2006.

[12] Sarath Chandran.C , Anjaly K., *"Real Time Video Controlled Rraction For Surveillance Robots In Coal Mine",* International Journal, Vol. 2, Issue 1, January 2014.

[13] Mr. Sabarish Chakkath , S.Hariharansiddharath , B.Hemalatha., "*Mobile Robot in Coal Mine Disaster Surveillance*", IOSR Journal of Engineering, Volume 2, Issue 10 (October 2012), PP 77-82.

[14] Muhammad Ali Mazidi,Sarmad Naimi,Sepehr Naimi.,"*The AVR Microcontroller and Embedded systems using C*", E-book, Publishing as Prentice Hall, Imprint Pearson,2011.

[15] Manufacturer ATMEL, ATMEGA 328P Datasheet.