Effective Utilization Of A PC Monitoring Ploughing Vehicle

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Abstract

The autonomous systems are gaining rapid popularity in today's technically advanced world. The farmers are using different ploughing methodologies to plough their agricultural field. In the existed ploughing methods, the farmer has to plough the field manually using mouldboard or tractors. In this project, we designed a ploughing prototype that will plough the field through PC control. The aim of this project was to develop a ploughing vehicle usually like tractors used to plough a field and it can be controlled automatically or manually through PC. The vehicle has combination of wireless camera used to see the video where the ploughing action can be done and RF transceiver is used to transmit commands from the controlling section (or) receive commands in vehicle section by using L293D drivers and mini dc gear motors, the vehicle will move. The AV Receiver is used to capture the video from the vehicle through tuner card in the controlling section.

Keywords – Microcontroller, RF Transceiver, AV Receiver, Motors, Wireless camera

1. Introduction

The plough or plow is a tool used in farming for initial cultivation of soil in preparation for sowing seed or planting. It has been a basic instrument for most of recorded history, and represents one of the major advances in agriculture. The primary purpose of ploughing is to turn over the upper layer of the soil, bringing fresh nutrients to the surface, while burying weeds, the remains of previous crops, and both crop and weed seeds, allowing them to break down. It also aerates the soil, allows it to hold moisture better and provides a seed-free medium for planting an alternate crop.

In modern use, a ploughed field is typically left to dry out, and is then harrowed before planting. Ploughs were initially pulled by oxen, and later in many areas by horses (generally draught horses) and mules. In industrialised countries, the first mechanical means of pulling a plough were steam-powered (ploughing engines or steam tractors), but these were gradually superseded by internal-combustion-powered tractors. In the past two decades plough use has reduced in some areas (where soil damage and erosion are problems), in favour of shallower ploughing and other less invasive village techniques.

2. Existing System

Nowadays, mostly all the devices working automatically from household to industry applications. In the existed ploughing methods, the farmer has to lift up the oxen and has to go along the field where the ploughing has to be done in the mouldboard ploughing and in the case of tractors. The farmer has to spent money for the fuel and driver to plough the agricultural field. To overcome this situation, this project has been implemented where the farmer need not go along the vehicle and can control the ploughing vehicle by sitting in the home.

3. Proposed System

We design a ploughing vehicle that will automatically plough the particular field and the ploughing action can be seen by the farmer in PC through RF communication. This ploughing vehicle can plough the field and through wireless camera ,the farmer can sit in a different place which is 15 meters away from the vehicle can see the ploughing action in the PC through Video capture card placed in PCI slots of PC. The vehicle has three mini 9V dc gear motors which is used to move the vehicle, lift up (or) down the plougher and the motors can be driven by L293D motor driver.

4. System Implementation

The block diagram of the entire system is as shown in the Figure 1 and 2. This vehicle is radio operated and controls like a normal car. A motor is connected to lift up and down the ploughing device when required. Wireless camera will send real time video and audio signals, which could be seen on a remote monitor, and work can be done accordingly.

Microcontroller acts as master controller decodes all the commands received from the transmitter and give commands to motor driver and also generates PWM pulses for the speed control. The Microcontroller and robot will behave as follows

- Moves in Forward direction
- Moves in Backward direction
- Moves in clockwise and anticlockwise direction
- Speed controls in Both the direction

4.1. Transmitting unit (or) controlling section

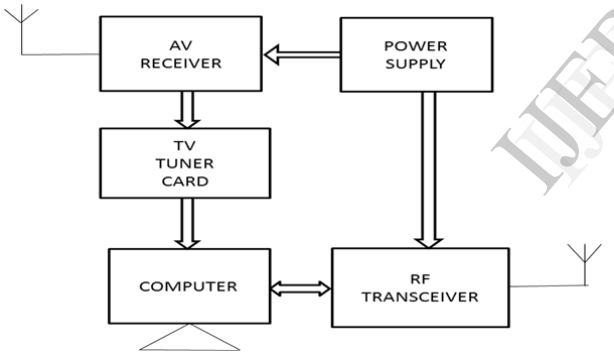

Fig1: Diagram of Controller Circuit

The farmer can sit in the home and give commands from the PC through HyperTerminal and through serial communication, the commands transmitted to the ST232 line driver .The R5F2127 MCU receives the commands and sent to the RF Transceiver. The RF Transceiver transmit the commands to the RF Transceiver in Ploughing vehicle and the vehicle will move accordingly .The AV receiver is used to capture the video from the wireless camera and separate power supply given to the AV receiver .A video cable is connected from the AV receiver to the tuner card present in PC. The tuner card is used to see the video on the PC which is received from the AV receiver

Here a variable frequency oscillator 1 is used for modulating the frequency i.e. to be transmitted and has its output frequency oscillator 2 for generating a carrier wave. The carrier wave is then radiated into space by the antenna. The farmer sends the commands to the ploughing vehicle using the PC through RF Transceiver and the AV receiver is used to receive the video of the ploughing vehicle direction. To display the video on the computer, a video capture card placed in PCI slots of CPU.

4.2 Receiving Unit (or) Vehicle section

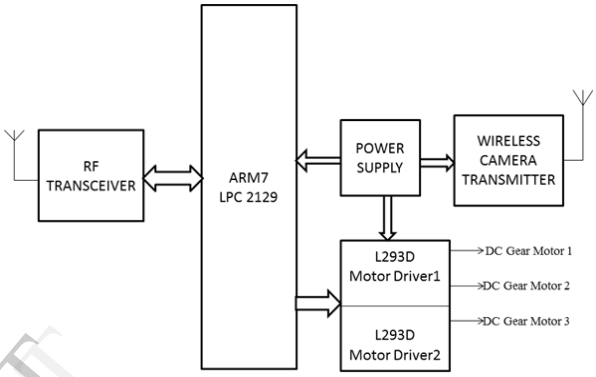

Fig2: Diagram of Vehicle Controller Circuit

The RF Transceiver on the ploughing vehicle receive commands sent from the farmer and passed the commands to the micro control unit .The micro control unit transmit the commands to the ST-232.

Here the receiving antenna is connected to a tuned wave detecting circuit for detecting the waves transmitted by transmitter antenna. The output of the tuned wave detecting circuit is connected to amplifier which in turn has its output connected to the input of the high pass frequency as well as the filter to a low pass frequency filter.

The received signals from the RF Transceiver are sent to the microcontroller gives the inputs to the motor driver to make move of dc gear motors connected to ploughing vehicle in a particular direction. The wireless camera which is separated from the microcontroller mounted on the vehicle to capture the video, where the vehicle is going.

5. Hardware Resources

5.1 Power Supply

The power supply is used to provide required power for their operation. For the LPC2129 has an on-chip regulators which provide 1.8V,3.3V & 5 Volts is required for core CPU +3.3 V for on-

chip peripherals +5v for input, output devices. The wireless camera & AV receiver requires 9V supply can be provided through rechargeable battery.

5.2 RF Transceiver

The RF Transceiver acts as a transmitter on the controlling section, which is used to transmit the commands from the controlling section and make to move the vehicle accordingly .commands transmitted from RF Transceiver in vehicle section are received by the RF Transceiver in vehicle section and sent to the LPC 2129 in Vehicle section which drives the motor through L293D motor driver

5.3 AV Receiver with wireless camera

AV Receiver is used to route video signals to the PC or TV from the source like wireless camera. The Wireless camera connected to the vehicle captures the video where the vehicle has to plough the field and the video transmits wirelessly to the controlling section where the farmer can see the ploughing action but camera has not interfaced with microcontroller in vehicle section. The wireless cameracan record video at resolutions of 30 frames / second

5.4 TV Tuner Card

TV tuner card is a kind of television tuner that allows television signals to be received by a computer.

5.5 LPC 2129

The LPC 2129 microcontroller takes commands from the RF Transceiver and gives inputs to the motor driver to drive the motor in a specified direction.

5.6 L293D Motor Driver

The L293D dual H-Bridge motor driver interfaced to two dc gear motors which can control the vehicle in both clockwise and anticlockwise direction and another L293D motor drive us used to lift up and down the ploughing prototype.

5.7 Brushed DC Gear Motors

The DC Brush Motor is one of the earliest of all electrical motor designs. It is usually the motor of choice for the majority of torque control and variable speed applications. The L293D motor driver drives these motors to move the vehicle in a particular direction.

6. Software implementation

For the software implementation, we deploy two software packages. First one is the Keil µVision 3.0. Second one is the Flash magic simulator. The Keil µVision Debugger accurately simulates on-chip peripherals (I²C, CAN, UART, SPI, Interrupts, I/O Ports, A/D Converter, D/A Converter, and PWM Modules) of LPC 2129 device. Simulation helps to understand hardware configurations and avoids time wasted on setup problems.

With simulation, we can write and test applications before target hardware is available. The system program written in embedded C using KEIL IDE software will be stored in Microcontroller. Keil development tools for the Microcontroller Architecture support every level of software developer from the professional applications engineer to the student for learning about embedded software development. The industry-standard Keil C Compilers, Macro Assemblers, Debuggers, Real-time Kernels, Single-board Computers, and Emulators support all ARM7 derivatives. The Keil Development tools are designed to solve the complex problems facing embedded software developers.

Flash magic is used to dump the code to microcontroller from PC. Flash Magic is a free, powerful, feature-rich Windows application that allows easy programming of Philips FLASH Microcontrollers. Build custom applications for Philips Microcontrollers on the Flash Magic platform! Use it to create custom end-user firmware programming applications, or generate an in-house production line programming tool.

The Flash Memory In-System Programmer is a tool that runs under Windows Versions. It allows in-circuit programming of FLASH memories via a serial RS232 link. Computer side software called Flash Magic is executed that accepts the Intel HEX format file generated from compiler Keil to be sent to target microcontroller. It detects the hardware connected to the serial port. The flowcharts depicting the Ploughing Vehicle movement is shown in Figure 5.3

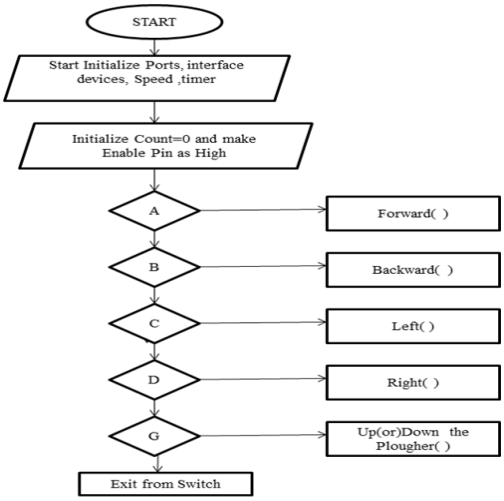

Fig3: Flowchart for ploughing vehicle movement

7. RESULTS

The ploughing vehicle on the field is shown in the figure 4 .Finally the farmer can give the commands to the vehicle to move in a particular direction and the video where the vehicle is going is shown in the figure 5

Fig4: Ploughing vehicle On The Field

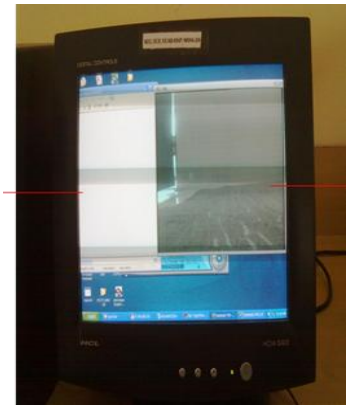

Fig5: Video from the remote vehicle

8. CONCLUSION

The present system can prove to be extremely useful in agricultural field and through this system ,the farmer can able to control the ploughing vehicle and the video of the agricultural field can be seen in PC through TV tuner card

The system can be easily implemented in all kinds of four wheelers and can be easily used without requiring much of the technical knowledge. The various sensors used are readily available and inexpensive. The processor used LPC2129 is based on ARM7 and is highly reliable and has a high processing speed even for complex systems. All these factors combined make the system Reliable and a good choice to be used for agricultural purpose

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