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REMOTE SENSING AND SMS CAPABLE VIDEO SURVELIENCE ROVER

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***Abstract*-- This project deals with the design of a rover which is capable of tracking the current location, sending an SMS about the current location and can provide a video surveillance of that particular location in which rover is present. This rover can be thought of as a combination of GPS, Geographic alarm and a video surveillance device. Tracking system consists of a GPS, GSM modem and an ARM processor. GPS receiver gets the current location in the form of latitude and longitude and this information is processed by ARM processor and it will be sent to the user/owner who owns the GSM Modem. The angle of the camera and the direction of the rover can be controlled by stepper motors which in turn or controlled by ARM processor. RF video transmission is used for the video transmission process. The motion of the rover and camera angle are basically controlled by the cellphone .This rover is a project with low investment and finds application in many a field like Anti-theft applications, military applications. The main components of the rover include GSM MODEM, GPS RECIEVR, LCD DISPLAY, CAMERA, A MOBILE PHONE, DTMF UNIT, 5v regulated power supply (for modules) and 3.3 volts for LPC2148.**

Index terms: GPS, GSM-SMS, Microcontroller, LED Indicator, GSM Modem.

1. INTRODUCTION

Video surveillance has become widely known and very good research area especially in 21st century. There is also increase in the usage of video surveillance because of the availability of affordable sensors and processors. Through general video surveillance devices are used in many applications, the usage is limited by the single camera and its fixed direction. In order to monitor a wide area or to track a moving object we need a camera which is flexible. This project overcomes this limitation by providing a stepper motor to control the direction of camera. In addition to the flexible camera, this has a strong GSM-SMS capability. The video surveillance rover in combination with SMS capability comes handy in many a field like homeland security, military applications and in monitoring patients.

II.WORKING

The block diagram of the rover is as shown in the figure. It contains a mobile device, owned by a user, connected to arm processor through DTMF decoder unit. An LCD display is attached to display the longitude and latitude of the location. Rover wheels are connected to the ARM processor through DC motors and H Bridge. Camera is also connected to the arm processor through DC motors. The main objective of this project is to design a highly efficient multipurpose rover with low cost.

This rover is a prototype of mars land rover but for simplicity communication is made through GSM. There are mainly two modules in the project i.e. the communication module and controlling module. Both are handled by the ARM processor.

A. Communication Module:

This module is solely responsible for communication between the rover and the user. This consists of a ARM processor, GPS module, GSM module and a Camera.

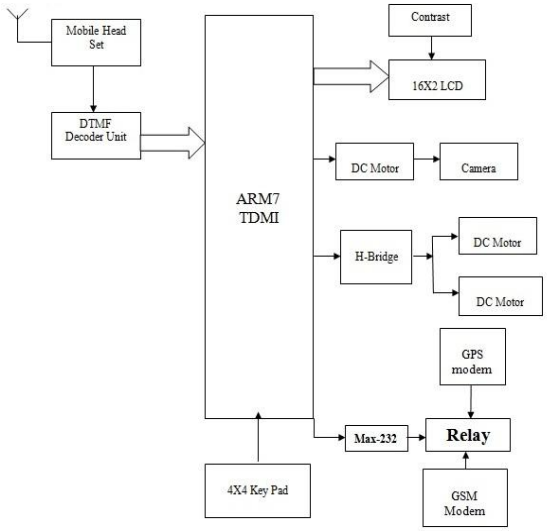

Fig1: Block Diagram

ARM processor is specially chosen for its feature of low power consumption and higher reliability, since it is designed for remote applications where battery consumption is a vital factor and gets the exact location of vehicle pointed out on the Google maps.

i. Tracking/Pointing the current location:

GPS module continuously monitors the 24 orbiting satellites and tracks its location in terms of latitude and longitude. The GPS module sends the data to ARM processor. The longitude and latitude is displayed on an LCD screen on the rover for further applications.

ii. Sending current location as SMS**:**

This system is provided with a chip called "Onboard Module" which resides in the vehicle to be tracked and a "Base Station" that monitors data of different vehicles . The On-Board module consists of GPS receiver, a GSM modem. We insert a GSM SIM in the rover. Whenever the user wants track the exact location of the rover, he just has to send an SMS to that SIM and the coordinates of latitude and longitude are collected from the GPS receiver and sent to the arm processor which will be sent to the GSM modem.

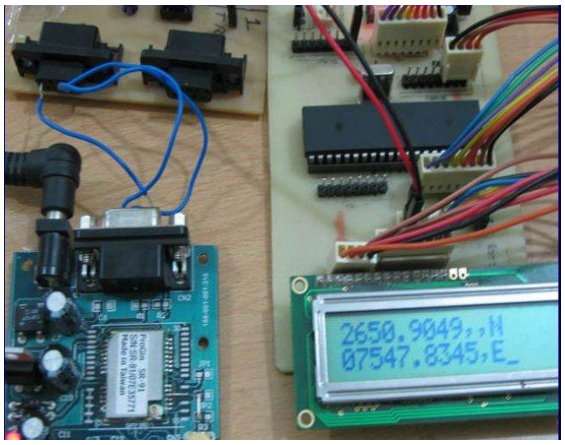

Fig 2: Tracking/pointing the current location

B. Controlling module:

The controlling module mainly consists of a DTMF decoder, motors and a mobile phone. This mode basically includes controlling of rover motion and controlling of the camera direction.

i. Controlling of Camera Direction:

The phone on the rover is kept in auto answering mode. To control the rover we need to make a call to the mobile phone on the rover. As soon as we call the call is lifted. Each number on the operator's mobile phone has specific DTMF frequency that is transmitted to the mobile phone on the rover. The mobile phone on the rover sends these tones to the DTMF decoder. The decoder decodes to a specific binary code and gives as a input to the ARM Processor. The Processor then drives the motors so that the operator's mobile phone one can control and communicate with the rover. RF transmission is incorporated for video transmission. ZigBee frequency range is used for the transmission. Video transmission range is 100 meters.

DTMF KEYPAD FREQUENCIES				
	1209 Hz	1336 Hz	1477 Hz	1633 Hz
697 Hz	1	2	3	A
770 Hz	4	5	6	B
852 Hz	7	8	9	C
941 Hz	*	0	#	D

TABLE 1: DTMF frequencies and respective numbers

ii. Controlling the direction of rover:

The only difference between the control mechanism of camera and rover direction is that camera direction is directly controlled by a dc stepper motor, whereas the direction of the rover is controlled by the H Bridge of a DC motor.

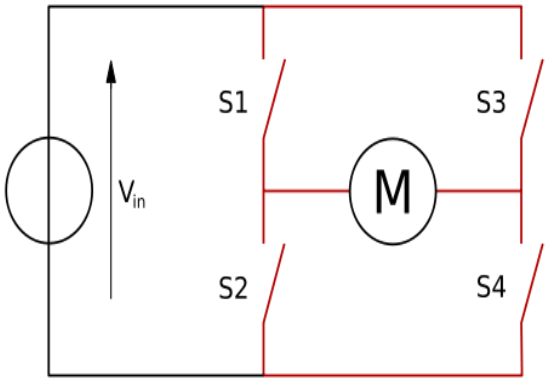

Fig 3. H bridge

III. LITERATURE SURVEY

Video surveillance has been the most researched area in now- a- days. So many video surveillance systems have been proposed by many people so far. Drew Osthemier proposed an automated real time video surveillance in which video feeds are captured from several sources and processed and transmitted over the internet. This system has three module process of video surveillance i.e. work station, control station and a server. Video work stations capture the video, control work stations process the video and the video is registered with the server when it goes online. Taslem Mandrupkar has proposed a system which has is integrated with GSM modem. By using this GSM modem we can send/recieve the videos or photos. This GSM integration will be very useful in monitoring remote areas. However these proposed systems have limitation as the camera angle is fixed. This problem is solved in the current project. The extra feature of SMS capability is also included.

IV. ALGORITHM:

A. Communication Module:

In communication module the rover continuously receives data from GPS and stores it in RAM. If there is any request from the user or owner of the GSM modem through an SMS then it sends the longitude and latitude co-ordinates as the data to the user. Once the data transmission is complete the system starts from the step 1. i.e. it starts receiving data continuously from GPS. If there is no request from the user side, it waits until the request is made.

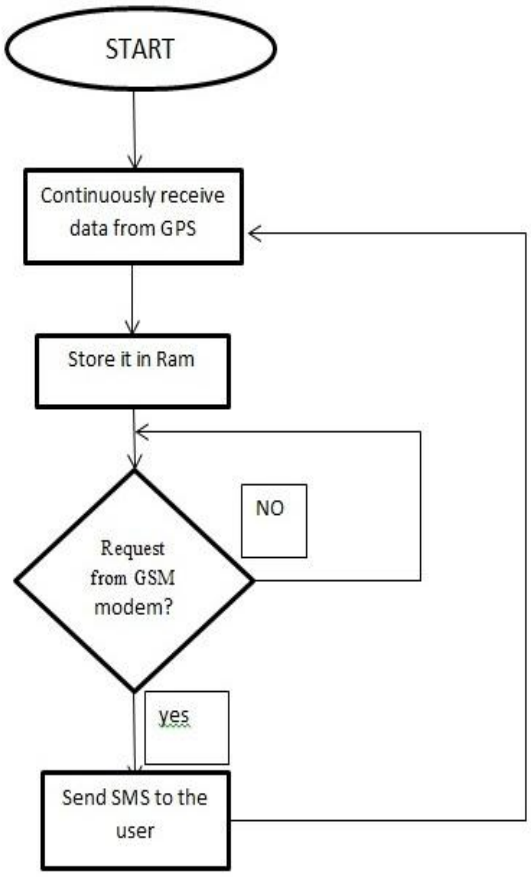

Fig 4 : Flow chart for Communication Module

B. Control Module:

In control mode rover waits for the DTMF decoder output. As soon as the output comes from the decoder it looks into the lookup table to know the corresponding operation to be performed. Then it will move the camera/rover in that particular direction. Once the execution of the look-up table's operation is done then the system goes to the first step. i.e. to wait for the DTMF decoder output.

V. IMPLEMENTATION AND RESULTS:

A. OrcadcaptureCIS:

OrCADcapture CIS is a software tool used to design the schematic of an electronic circuit. It's a part of OrCAD software tool kit. Design of PCB for this project is done using OrCad capture tool.

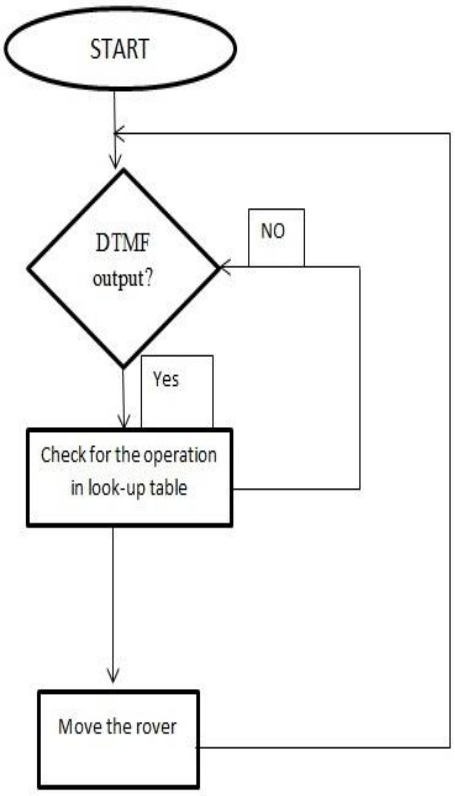

Fig 5 : Flow chart for control Model

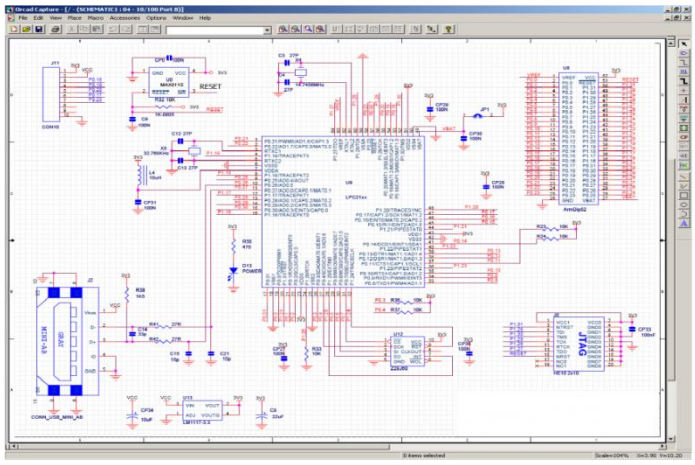

Fig 6 :OrCAD capture of the schematic

B. Hardware:

The final rover after all the design and assembly is as shown in the figure. Depending on the kind of surface rover travelling on we can change the tires. The results of this rover are extremely good. However, if one wants a high clarity and faster operation, then he has to use an advanced processors and high resolution camera.

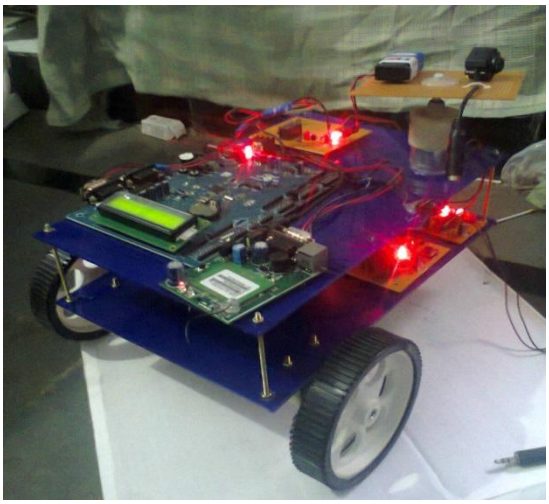

FIG 7: Remote sensing and SMS capable video surveillance Rover

VI. CONCLUSION AND FUTURESCOPE:

This rover is multi-purpose oriented and implemented with a very low cost. This rover can be widely used in military, traffic and surveillance purposes. This can also be used in anti-theft and crime prevention applications. This is a basic model of the multipurpose rover. RF transmission is incorporated for the video transmission which is a basic method. By using 3G technology we can increase its range drastically. By making a few changes this can be used in large scale for many automated processes.

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VIII. BIOGRAPHIES

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