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Remote Vehicle Supervise and Control using Global System for Mobile Communication

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***Abstract* - Cellular and mobile technology is having its own significance to cater the needs of the vehicle regulating mechanism. Guided vehicle control with applied cellular and mobile technology is the new era to regulate vehicle directions, speed and to monitor its movement. Global System for mobile communication (GSM) is adopted to transmit the appropriate messages to the vehicle to be guided. The vehicle is designed to withstand at high temperature in order to move in hazardous environment. This work was focused to observe the environment in coal mine zone. Flash magic software is used to feedback the status of the vehicle and to enable the guiding messages using GSM. An obstacle detection sensor is used to clear the path of the vehicle. Temperature, humidity and Co2 sensors are housed to the vehicle for further analysis. ARM 7 microcontroller is used to regulate the mechanism.**

Keywords: GSM, Flash magic, Sensors, ARM7

1. INTRODUCTION

Sattupally is located at coal mine area. Open cast is one of the conventional coal extract phenomena. Majority of the incidents took place while working in underground mines. Underground mine environment detection is significantly challenging to safe guard the human working in coal mine at a depth of 550 meters. The vehicles used to travel at such environment are alarming the growing electronic technology. The command signals to guide the movement of the vehicles is possible by adopting the cellular mobile technology. Short message service (SMS) is used in the proposed work. In order to move the vehicle forward, backward, turn right; turn left, the commands sent in the form of messages using GSM technology.

2. LITERATURE SURVEY

K. Kishore Kumar, M.Siva Krishna, D.Ravitej, D.Bhavana described an automatic guided vehicle using EM78P156ELP microcontroller to regulate the movement directions of the robot [1].

Pravada P. Wankhade1 and Prof. S.O. Dahad proposed a methodology to navigate the vehicle. Global positioning system (GPS) is adopted to estimate the stolen vehicle location and its altitude and the same will be transmitted to the controller room using Global system for mobile communication (GSM) [2].

Aditi Dakhane, Manish. P. Tembhurkar prposed a vehicle routing mechanism using raspberry pi controller. This work focused to provide the communication between the control room and the vehicle. The vehicle request transmitted to the control room will be acknowledged by enabling the routing process for directing the vehicle to move forward [3].

Madhuri Unde, Bharat Borkar described a mechanism for remote vehicle tracking using GSM Technology. This paper also summarizes the vehicle interfacing with the internet to receive the information about the state of the vehicle and its position

R. Mohanapriya , L. K. Hema , Dipeshwarkumar Yadav ,Vivek Kumar Verma proposed a methodology to promote Driverless Intelligent Vehicle for Future Public Transport Based On GPS. GSM technology is adopted to receive the SMS from the Remote vehicle. The control station can lock the engine, may stop the engine by enabling the password remotely.

3. METHODOLOGY

GSM supported mobile phone is used as transmitter to transmit the command signals to move forward, backward, turn right, turn left and to stop. An IR Sensor is used to detect the obstacle. All objects emit infrared radiation in the infrared spectrum. An infrared sensor is used to detect the emitted radiation. IR light emitting diode and IR detector acts as emitter and receiver respectively. The resistance of the Photo diode will change when light signal falls on it. The change of resistance is to be measured in terms of its voltage. Continuous IR rays will be transmitted by the IR sensor. The IR receiver output signal changes to the corresponding rays received.

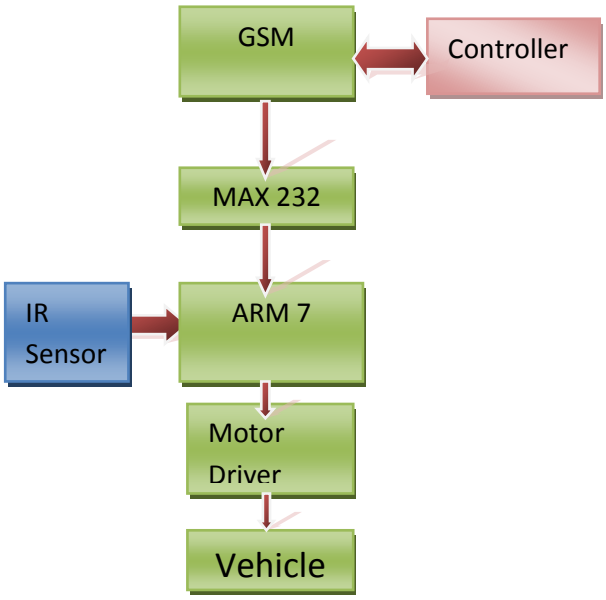

Fig1. Block Diagram of the proposed methodology

The measured change of this signal is considered as an object nearer to the moving vehicle. This signal is interfaced to the ARM 7 Microcontroller for further processing. The microcontroller cause to enable the GSM device to transmit the present state of the vehicle information to the Control room. Using Short message service the recommended messages will be transferred to the mobile. The cellular mobile phone then enables the Remote vehicle with the guided signals transmitted by the operator at the control room. The GSM modem is interfaced to the ARM Processor using MAX 232 driver. L293D motor driving circuit is used to drive the vehicle.

The average temperature in the coal mines at a depth of 550 meters is to be standardized as

35.9° and 36.8° C. this forced to rise the dry bulb temperature to 30°C. The humidity results 95% to 100% at underground work place. The analysis of both body temperature and the underground work place is to be done. The signals acquired from the sensor assembly are fed to microcontroller for further analysis.

4. ALGORITHM

Step1: Initialize the IR sensor port

Initialize the serial port

Initialize the motor assembly port

Initialize the Forward / backward step movement with '2' feet

Initialize the right / left turn with one step angle of 15°

Initialize the distance Travel Max ( )

Initialize the physical parameters = temp, humidity

Initialize the set points: Underground mine temp = 36.8 °C, Humidity = 100%, dry bulb tem =30°C

Initialize Count =12 steps

Step 2: Read the data from the Remote vehicle

If

The vehicle is stopped

Then

Read the data from the sensor

If

The output signal of the sensor is high

Then

Display the message "obstacle detected"

Step 3: Read the parameters

If

The Underground mine Temperature > 36.8° C

Humidity = 100%

Then transmit to the control room

Else go to step 4

Step 4: Release the SMS 1 "go back"

Insert step movement of two feet

Release the SMS 2 "Turn right one step=15° "

If

The IR sensor output is high

Then

Release the SMS 3 “turn left one step”

Else if

The IR sensor output is high

Then

Send the SMS 4” turn left two steps= 30°”

Release the SMS 5 “Go forward two feet”

Step5. If

Distance travelled = max

Then release the SMS 6 “ Stop “

Release the SMS 3 “ turn left one step”

Decrement count by ‘1’

If

Count =0

Then

Go to step 4

Else

Go to Step 5

5. RESULTS AND DISCUSSION

The experiments were conducted to test the developed working model in all possible directions. The velocity of the vehicle is tabulated in table.1. Constant velocity is achieved even in diagonal movement of the vehicle. 100rpm motor is supporting to achieve the constant velocity.

Fig.2 represents the proposed model which was simulated using proteous software. Fig.3 represents the hardware implementation to cater the needs of the underground coal mines.

The experiments were conducted to test the developed model in order to travel with the guiding signals. The GSM adopted for this application is favorable to reach the desired directions. The two parameter values such as temperature nad humidity are alos acquired from the mobile. The undermine temperature and dry bulb temperature values increased in an exponential order while moving from starting point to the destination point. This exponential growth is due to the density of coal mines with saturated humidity levels. The table 1 represents the acquired values to defense the analysis.

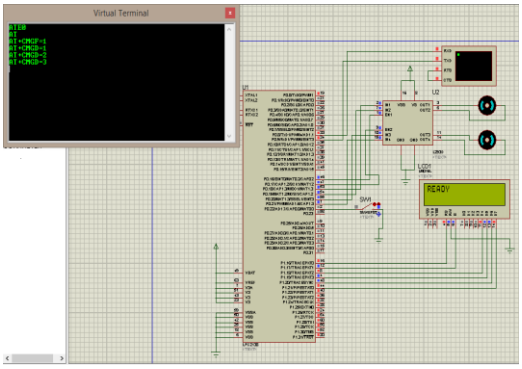

Fig2. Simulated circuit of the proposed model

Fig.3 Developed vehicle working model

Environment	East	West	NE	NW	Velocity (sec)
Rough surface	8	8	8	8	0.125

Table. 1 Comparison metrics Mean values

6. CONCLUSION

The developed working model is well suited for underground mine operations and where the human involvement is a typical issue for monitoring. The velocity of the vehicle is reduced to minimum value while moving the inclined positions. The 100RPM D.C Motor rating is to be improved in future application process.

In future the developed model will be extended by incorporating the optimum path algorithm using knowledge based system.

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REFERENCES

[1] K. Kishore Kumar, M.Siva Krishna, D.Ravitej, D.Bhavana," design of automatic guided vehicles", International journal of mechanical engineering and technology, vol.3(1): 24-32, April 2012.
[2] Pravada P. Wankhade1 and Prof. S.O. Dahad," Real Time Vehicle Locking and Tracking System using GSM and GPS Technology-An Anti-theft System", International Journal of Technology and Engineering System, Vol.2 (30: 272-275, March 2011.
[3] Aditi Dakhane, Manish. P. Tembhurkar," An Autonomous Aquatic Vehicle Routing Using Raspberry PI", International Journal of Advanced Research in Computer Science and Software Engineering, Vol.5 (4):1002-1006, 2015.
[4] Sourangsu Banerji," Design and Implementation of an Unmanned Vehicle using a GSM Network with Microcontrollers", International Journal of Science, Engineering & Technology Research, Vol.2 (2), 2013.
[5] Madhuri Unde, Bharat Borkar," Remote Vehicle Tracking & Driver Health Monitoring System Using GSM Modem & Google Maps" , International Journal of Computer Science and Information Technologies, Vol. 5 (3) , 2014, 2828-2832
[6] R.Mohanapriya , L. K. Hema , Dipeshwarkumar Yadav ,Vivek Kumar Verma, "Driverless Intelligent Vehicle for Future Public Transport Based On GPS" , International Conference on Signal Processing, Embedded System and Communication Technologies and their applications for Sustainable and Renewable Energy, Vol. 3, Special Issue 3, April 2014.

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