A Segway for Smart Motion Detection using Mega Arduino

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Abstract- *In this paper we design a Segway using Arduino which operates in two mode such as manual and automatic mode. . In manual mode it operated by user for patrolling and monitoring purpose. In automatic mode it moves using line following concept and motion detection occurs using IR and PIR sensors. In automatic mode when obstacle detects it send a message to user through GSM module.*

Keywords- Arduino, GSM Module, IR Sensor, Motor, PIR Sensor

I. INTRODUCTION

Segway name is derived from the word "segue" which means "follows". The Segway is a electric vehicle used as a convenient way to travel around towns and cities. It describes the design and Construct of Segway using sensors, mega- arduino development board and battery powered electric motor. Segway operated in two modes using SPST switch. Segway are driven standing up and handle according to joystick in manual mode. It operates in forward, reverse, left, right and stop. In automatic mode two IR sensors are used for line following and another one IR and three PIR are used for obstacle detection. When obstacle is detected to alert user GSM sends a message or call to user.

II. LITERATURE REVIEW

Mikael Arvidsson, Jonas Karlsson et.al. explained [1] this kind of vehicle is interesting since it contains a lot of technology relevant to an environmentally friendly and energy efficient transportation industry. This thesis describes the development of a similar vehicle from scratch, incorporating every phase from literature study to planning, design, vehicle construction and verification. The main objective was to build a vehicle capable of transporting a person weighing up to 100 kg for 30 minutes or a distance of 10 km, whichever comes first. The rider controls are supposed to be natural movements; leaning forwards or backwards in combination with tilting the handlebar sideways should be the only rider input required to ride the vehicle.

M.A.Clark, J.B.Field, S.G.McMahon, P.S.Philps et.al. explained [2] the Segway HT is a vehicle which has two coaxial wheels driven independently by a controller that balances the vehicle both with and without a rider.

The aim of the project was to investigate, research, design, and build aself-balancing, coaxial scooter loosely based around the commercially available Segway HT. From this short design brief, 'EDGAR - a self-balancing scooter' was born. EDGAR is an acronym which literally stands for Electro-Drive Grav-Aware Ride. It was important that EDGAR be of easy manufacture,use off-the-shelf parts where possible, provide adequate balancing and be aesthetically pleasing. A person of average weight and height must be able to ride EDGAR for at least one hour at half of the peak load. It should also provide adequate safety measures to ensure the safety of the rider.

Advantages of system:

1. These balancing scooters are specially designed to be both convenient and lightweight.
2. Most importantly Segway vehicles have been designed taking into consideration every age group.
3. Being electric-powered it is eco-friendly in nature and thus run on low cost.
4. The specialty of this device is that these run on batteries that are rechargeable.
5. More Security
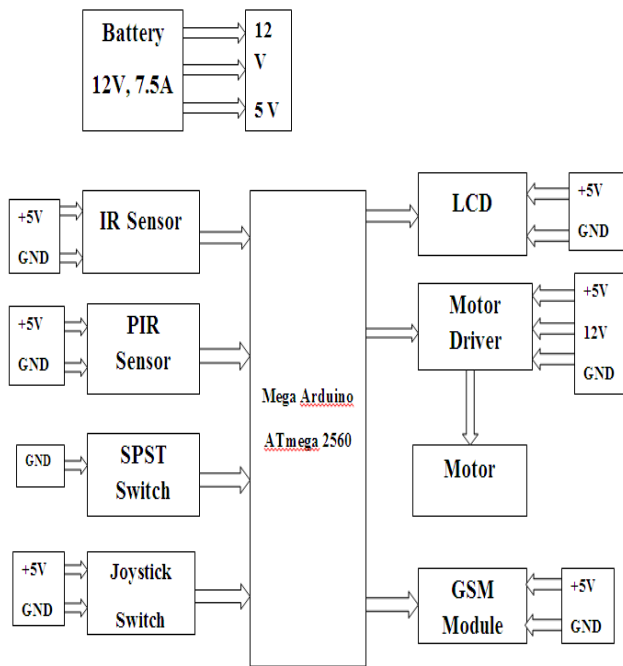6. Easy Commuting

V. BLOCK DIAGRAM

Fig.1 Block Diagram
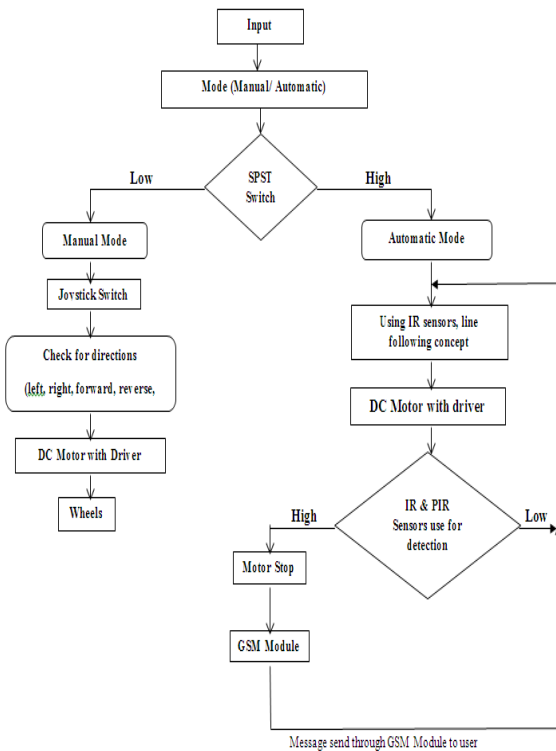
VI. FLOW CHART

Fig.2 Flow Chart

VII. HARDWARE USED

1. ARDUINO MEGA 2560:

Fig. 3: Arduino mega 2560

The Arduino Mega 2560 is a microcontroller board based on the ATmega2560. It has 54 digital input/output pins out of which 14 can be used as PWM outputs, 16 analog inputs, 4 UARTs-hardware serial ports, a 16 MHz crystal oscillator, a USB connection, a power jack, an ICSP header, and a reset button. simply it connect with a computer, a USB cable or power it with a AC-to-DC adapter or battery to get started. The Arduino Mega2560 can be powered through the USB connection or with an external power supply. External power can come either from an AC-to-DC adapter or battery. Leads from a battery can be inserted in the Gnd and Vin pin headers of the POWER connector.The board can operate on an external supply of 6 to 20 volts. If supplied with less than 7V, however, the 5V pin may supply less than five volts and the board may be unstable. If using more than 12V. The recommended range is 7 to 12 volts.

2. GSM MODULE:

GSM Modem-RS232 is built with Dual Band GSM engine-SIM900a, works on the frequencies 900/1800 MHz The modem is coming with RS232 interface, which can connect PC as well as microcontroller with RS232 chip.

Fig. 4: GSM Module

Using this modem, we can make audio calls, SMS, Read SMS, attend the incoming calls and internet etc. by using AT commands.
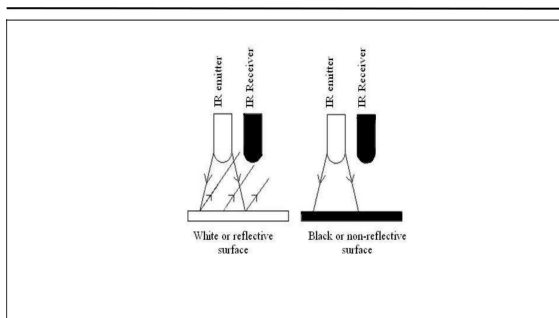
.3. IR SENSOR:

Fig. 5: IR Sensor

IR is obstacle sensing device which sense the object from the distance up to 10-30 cm long. This sensor can be most indoor applications where no important ambient light is present. The infrared light through IR LEDs, which is then reflected by an object in front of the sensor.

6. MOTOR:

Fig. 6: DC Motor

A DC motor is designed to run on DC electric power. The DC motor will get operated based on the gestures. When the hand is moved to corresponding direction due to the variation in flex sensor produces a variation in resistances. Thus by those variations the corresponding motor will be activated. Here the motor is provided with motor driver circuit to operate motor with more voltage.

6. PIR SENSOR:

Fig. 7: PIR Sensor

PIR sensors allow you to sense motion, it used to detect whether a human has moved in or out of the sensors range. For that reason they are commonly found in appliances and gadgets used in homes or businesses.PIRs are basically made of a pyroelectric sensor , which can detect levels of infrared radiation. Which emits some low level radiation, the more radiation is emitted through this sensor.The two halves are wired up so that they cancel each other out. If one half sees more or less IR radiation than the other, the output will swing high or low.

IX. RESULT AND DISCUSSION

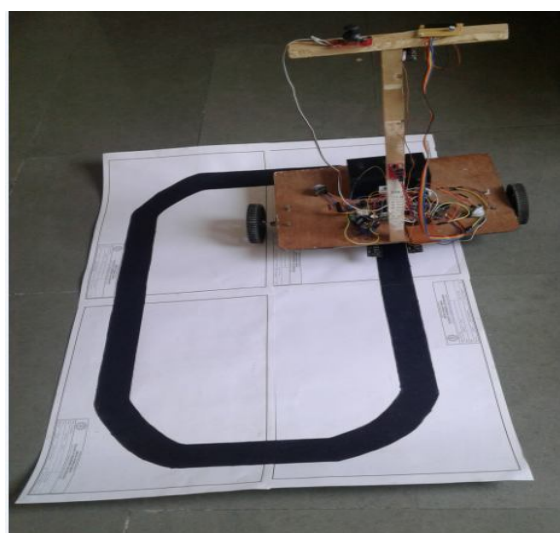The robot moves in 4 directions as per hand gesture

Fig. 8: Expected Result

When moving the Segway in corresponding direction the line following robot also moves to the desired direction. Thus the above proposed system defines the controlling of Segway through IR and PIR sensors using various advance techniques.

X. CONCLUSION

This project is implemented with the ideas to find an effective solution for the transportation purpose. The main objective is to minimize space utilization and fuel consumption especially for short distance communication.

XI. ACKNOWLEDGMENT

are grateful to the Head of the Department (ENTC) Prof. Mrs. Raut Dhanashri M. for providing all facilities to carry out this project work and whose encouraging part has been perpetual source of inspiration.

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