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Development of Fault Diagnosis and Information Providing System for Go-Kart Vehicles

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***Abstract:*-- All the racing vehicles faces some minor or even major problem during racing specifically go-karts but the problems can be noticed by driver but cannot be informed as soon as the problem occur, in that case the project that we have done will save the driver and both a lot of time. Since the time is a curtail factor in every racing event that time can be saved by our project. The driver passes information by a system from vehicle to the receiving system of technical team (i.e. system is a combination of microcontroller and GSM connection) in a distance. the signal is transferred by means of GSM connected to the microcontroller system in the vehicle to the LCD screen of the receiving end of technical team the LCD lists the proper tool to diagnose the fault when the vehicle is brought to the technical team. Then the team members can work the problem without wasting time on finding the problem and finding the right tool for the job since the driver had informed before reaching the pit.**

2.1 INTRODUCTION

The most common problem faced by a driver of an racing vehicle specifically go-karts and formula vehicles is when a major problem occur in the vehicle while driving in complex situations like endurance, autocross, skip pad etc. he or she (the driver) will not have the time to inform the specific problem because even microseconds

count as value points for the respective team. To avoid this we are using a simple yet but very elegant innovation to inform the fault or failure that has been occurred while racing. This system's work is to inform the fault or failure that had occurred during racing which is detected by the driver, is passed as information to the racing pit or the racing crew who has the respective tools, which can be kept ready for the diagnostic this saves a lot of time for the crew members to diagnostic the problem. There are more advanced diagnostic and live monitoring system out there for racing vehicles but the cost of manufacturing and maintenance is very high, so instead of lively monitoring the problem the diver can inform when needed.

2.2 NEED OF THIS PROJECT

- To save time while racing
- To avoid unnecessary panic to the crew members
- Can be used for other commercial application.

DESCRIPTION OF COMPONENTS

3.1ARDUINO MEGA 2560 MICROCONTROLLER

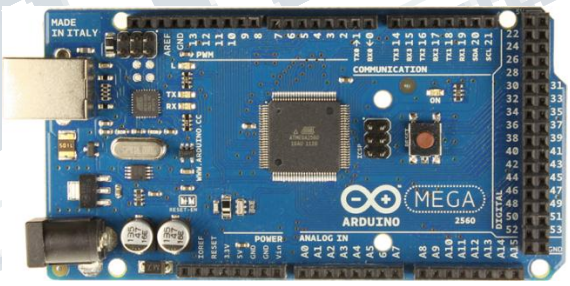

Fig.3.1. Arduino mega 2560 microcontroller

This is the main component of the innovation which controls the entire operation of our product. Arduino is an open source, computer hardware and software company, project, and user community that designs and manufactures microcontroller kits for building digital devices and interactive objects that can sense and control objects in the physical world. The project's products are distributed as open-source hardware and software, which are licensed under the GNU Lesser General Public License (LGPL) or the GNU General Public License (GPL), permitting the manufacture of Arduino boards and software distribution by anyone. Arduino boards are available commercially in preassembled form, or as do-it-yourself kits.

Arduino board designs use a variety of microprocessors and controllers. The boards are equipped with sets of digital and analog input (I/O) pins that may be interfaced to various expansion boards (shields) and other circuits. The boards feature serial communications interfaces, including Universal

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Serial Bus (USB) on some models, which are also used for loading programs from personal computers. The microcontrollers are typically programmed using a dialect of features from the programming languages Cand C++. In addition to using traditional compiler tool chains, the Arduino project provides an integrated development environment(IDE) based on the Processing language project.

The Arduino project started in 2003 as a program for students at the Interaction Design Institute Ivrea in Ivrea, Italy, aiming to provide a low-cost and easy way for novices and professionals to create devices that interact with their environment using sensorsand actuators. Common examples of such devices intended for beginner hobbyists include simple robots, thermostats, and motion detectors.

The name Arduino comes from a bar in Ivrea, Italy, where some of the founders of the project used to meet. The bar was named after Arduino of Ivrea, who was the margrave of the March of Ivrea and King of Italy from 1002 to 1014

3.2 BATTERY

Fig.3.2battery

The battery which is used in this system is 12v 7amps battery to power up the transmitter system which is the Go kart vehicle. The battery is used to power the Arduino mega 2560 microcontroller and from the controller the power is supplied to the GSM module.

3.3GSM module(SIM 900A GSM GPRS Module)

Fig.3.3GSM

3.3.1SIM 900A GSM GPRS Module

We have used the SIM900A is a complete Dual-band GSM/GPRS solution in a SMT module which can be embedded in the customer applications. Featuring an industry-standard interface, the SIM900A delivers GSM/GPRS 900/1800MHz performance for voice, SMS, Data, and Fax in a small form factor and with low power consumption. With a tiny configuration of 24mmx24mmx3mm, SIM900A can fit in almost all the space requirements in user applications, especially for slim and compact demand of design.

3.3.2Features

- Dual-Band 900/ 1800 MHz
- GPRS multi-slot class 10/8GPRS mobile station class B
- Compliant to GSM phase 2/2+Class 4 (2 W @850/ 900 MHz)
- Class 1 (1 W @ 1800/1900MHz)
- Control via AT commands (GSM 07.07 ,07.05 and SIMCOM enhanced AT Commands)
- Low power consumption: 1.5mA(sleep mode)'
- Operation temperature: -40°C to +85 °C
- Status indicator(D5):It will flash continuously whenever the call arrives otherwise it is left ON.
- Network LED(D6):This led will blink every second which indicates that the GSM module is not connected to the mobile network. Once the connection is established successfully, the LED will blink continuously every 3 seconds.

3.4TFT display (Thin-film-transistor liquid-crystal display)

Fig 3.4 TFTDisplay

A thin-film-transistor liquid-crystal display is a variant of a liquid-crystal display that uses thin-film transistor technology to improve image qualities such as addressability and contrast. A TFT LCD is an active-matrix LCD, in contrast to passive-matrix LCDs or simple, direct-driven

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LCDs with a few segments.

TFT LCDs are used in appliances including television sets, computer monitors, mobile phones, handheld video game systems, personal digital assistants, navigation systems and projectors.[1]

TFT LCDs are also used in car instrument clusters because they allow the driver to customize the cluster, as well as being able to provide a skeuomorphic, analog-like display with digital elements.

3.5 SWITCH

Fig 3.5 Switch

Switch is used to give input to the transmitting system. There are four switch on the transmitting system and one on the receiving system to turn off the notification buzzer.

3.6 SPEAKER

Fig 3.6speaker

A speaker is used with the receiving system to intimate the technical team to look into the subsystem were the fault has occurred Layout and working

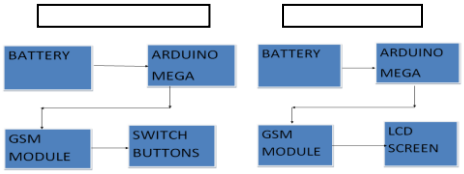

Fig 4.1Working layout

4.1 WORKING

Fault Diagnostic And Information System For Racing VehiclesIn automotive diagnostic and information system there are two systems namely the transmitting system and the receiving system the two system are explained in detail below.

4.2 TRANSMITTING SYSTEM

The transmitting system consists of 12vBattery, controller,GSM module and four emergency switches. The switches denote the subsystems i.e. first switch denotes power train system the second switch denotes steering system the third denote brakes system and the last one denotes the unexpected problem of the vehicle.

While racing when the driver face a problem in the vehicle and want to convey the information to the technical team so that they will be ready with the tools to diagnose the fault occurred in the vehicle before it is brought to them .This is done by pressing the emergency switch in the vehicle .If the driver is able to locate the subsystem in which the fault occurs he can press the particular subsystem switch if the driver is unable to locate where the fault has occurred he can press the unexpected button.

When the driver press any of the emergency switch. what happens is that the controller reads the input from the driver that which subsystem is at problem and passes the information to the receiving system by means of GSM module.

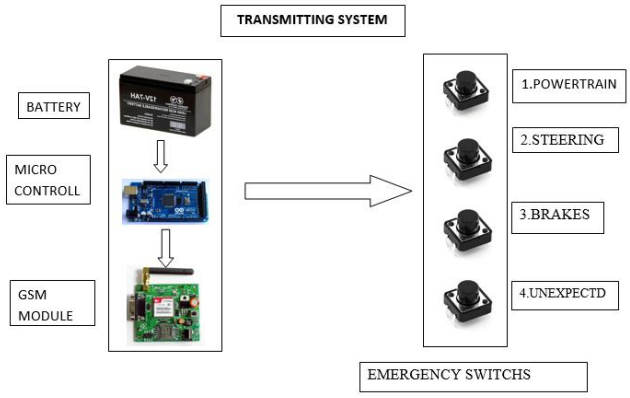

Fig 4.2

4.2.1 TRANSMITTING SYSTEM IN GO KART VEHICLE

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Fig 4.3Transmitting system in go kart vehicle

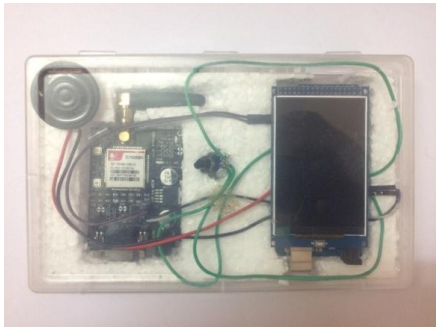

Fig 4.5Receiving system for go kart vehicle

4.3 RECEIVING SYSTEM

The receiving system consist of 12vBattery, controller, GSM module and an LCD display. After receiving the input from the driver about the fault in a particular subsystem through the transmitting system. The receiving system comes to operation.

When the input from the transmitter reaches the receiver, the controller is programmed to display the tools required for diagnose this is done before the vehicle is brought to the technical team. The fault may be in the subsystem 1. power train or in subsystem 2. Steering orsubsystem3. Brakes or 4. Unexpected fault

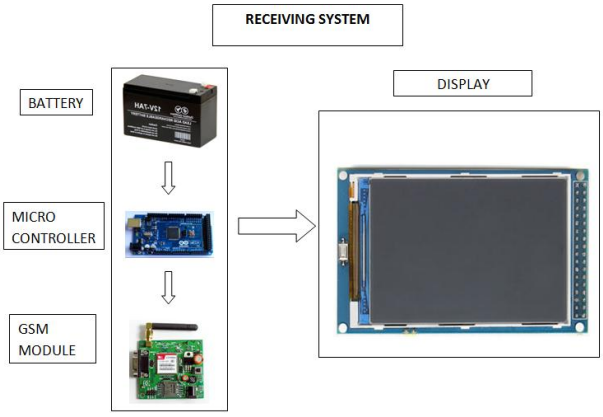

Fig 4.4

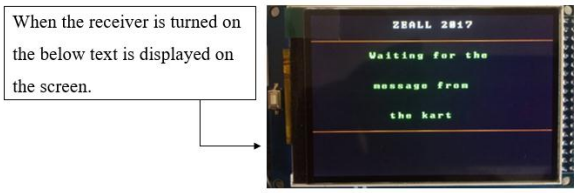

Fig 4.6

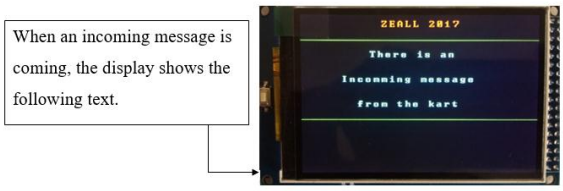

Fig 4.7

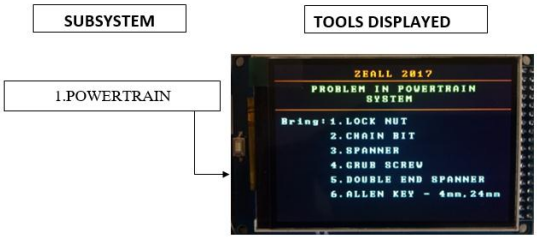

Fig 4.8

4.3.1 RECEIVINGSYSTEM FOR GO KART VEHICLE

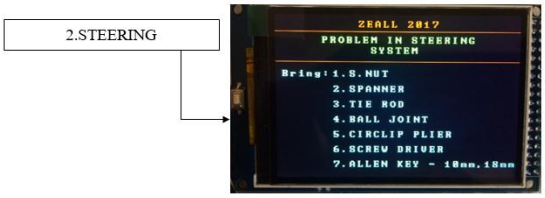

Fig 4.9

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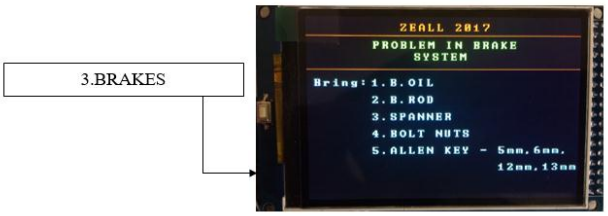

Fig 4.10

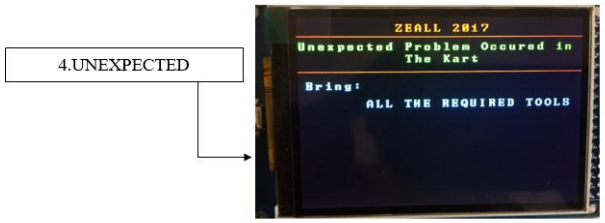

Fig 4.11

5.CONCLUSION

Time decides everything in racing events like formula1, f2, f3, go-kart, off-road vehicle challenge etc… so by implementing this system we can save a lot of time and also avoid unnecessary panic among the racing and pit crew. Other applications like service center to costumer easy contact with a touch of the button, will also reduce the time taken for allotting the bay, also putting a job card, looking for specialize worker for the problem etc… can be reduced. Thus our main aim is to get ready to the problem before its arrival.

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