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A PROTOTYPE OF SELF DRIVING CARS GUIDED BY GPS FOR FORTH COMING PUBLIC TRANSPORT

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ABSTRACT

Now a day's Population growth and rapid urbanization combined together are creating a great challenges for Indian cities. Traffic Congestion is a big problem for everyone in the busy life schedule. Finally it ends up with a road accidents. Driver error is the most common cause of traffic accidents. With cell phones, in-car entertainment systems, more traffic and more complicated road systems, the problem seems bigger than ever.

Driver less car will be one of the solutions to this issue. Self driving vehicles can be used in public transportation. The project aim is to design and demonstrate a prototype of a self driving car that has an onboard GPS equipped with a autopilot system, which is capable of driving the vehicle from one point to another without a human assistance. It consists of a GPS guidance system controlled by a 32-bit MCU, in which functions like GPS guiding, obstacle avoidance and motion control are integrated in it. It shows improved safety (because driver error is eliminated), decreased traffic and decreased pollution because of the reduced traffic.

Key words: Self driving car, GPS, Public transport.

INTRODUCTION

Driverless vehicles can be used in public transportation. Passengers go to a stop and push a button -- just like calling an elevator. When the vehicle arrives, passengers get in and push a button for their destination -- again, just like in an elevator.

The application of GPS is growing fast recently. The Global Positioning System (GPS) is a location system based on a constellation of about 24 satellites orbiting the earth at altitudes of approximately 11,000 miles.

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EXPERIMENTAL

Working

It is implemented as prototype on a "robotic vehicle" which contains a 32-bit MCU. Tilt compensated Digital MEMS Compass (3 axis accelerometer + 3 axis magnetometer) is used to find the vehicle movement and direction. Map info is stored in a 2GB MicroSD memory card. The vehicle is controlled by a 32-bit ARM Cortex-M0 microcontroller that is able to decode the NMEA Packets from the GPS unit to get the position coordinates and runs the Graphics Library to display the route in the LCD. The vehicle has got a 65K Color QVGA TFT Touchscreen Graphics LCD as user interface for selecting destination. The position info is continuously verified with the pre-recorded route map in the memory card and the vehicle path is adjusted accordingly. Obstacles could be sensed and avoided with an Ultrasonic SONAR sensor.

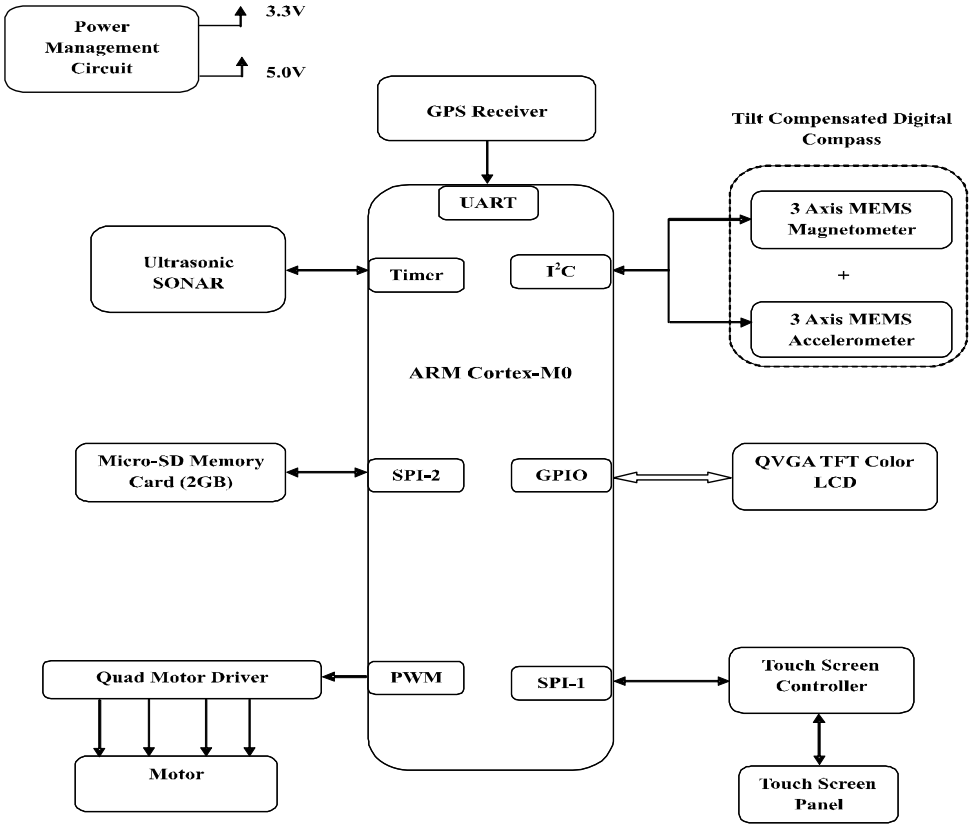


Fig. 1: Block diagram of proposed system

Global positioning system (GPS)

GPS has found its greatest utility in the field of Geographic Information Systems (GIS). GPS tells us the "where". GIS tells us the "what". GPS/GIS is reshaping the way we locate, organize, analyze and map our resources.

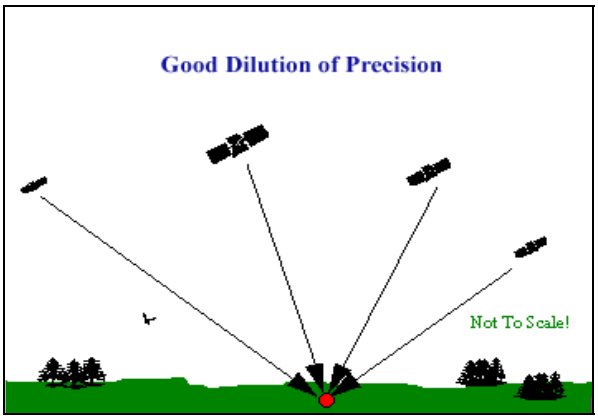


Fig. 2: DOP

RESULTS AND DISCUSSION

The hardware unit consists of 32-bit ARM Cortex-M0 microcontroller, Digital MEMS Compass, 65K Color QVGA TFT Touchscreen Graphics LCD, 2GB MicroSD memory card, GPS unit and Ultrasonic SONAR sensor.

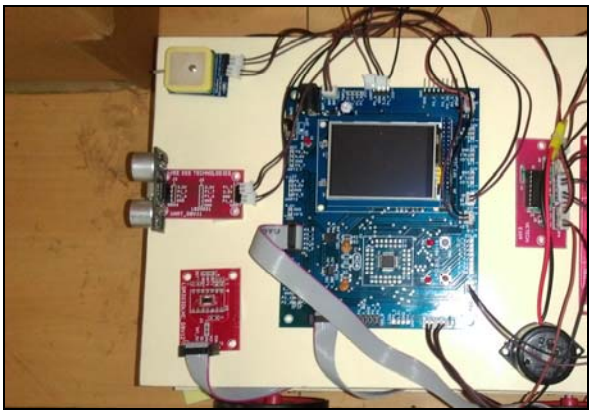


Fig. 3: Hardware module

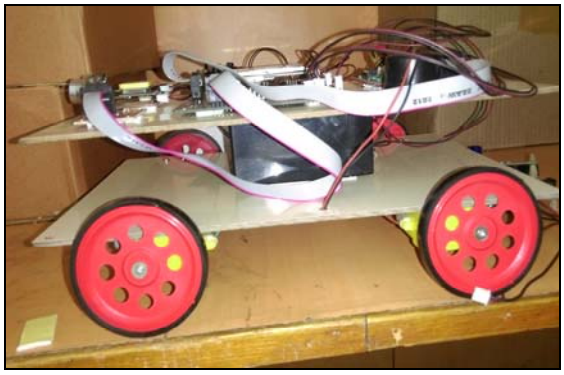
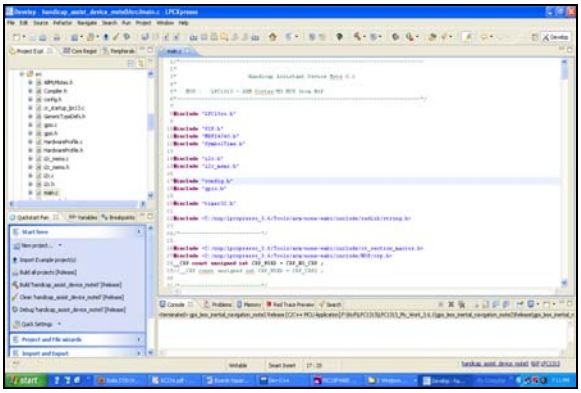


Fig. 4: A Prototype model of self driving car

Simulation output



CONCLUSION

The finally a robot designed for the suggested approach which will be as safe as humanly possible. A low cost GPS guidance system has been designed and implanted, in which the functions of guidance, obstacle avoidance, and wireless communication for monitoring multi- car are realized. Some mid range (less than 1km) transportation applications may adopt the experience of our model, for example, the shuttle bus in airport, the forklift in dock, etc.

Future enhancement

The extended application of this is the future parking lot (outdoor). Combining the GPS guidance system with the “automatic parallel parking system” (another concurrent research of our group), the friendly parking management system can support a service like this.

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