RTOS-CAR USING ARM PROCESSOR

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ABSTRACT

The paper aims to design a driverless car, which could be started and driven remotely from an android Smartphone. It gives the user an additional retrieving facility. Remote door control is introduced. When the car is parked remote alert is automatically energised. 3-axis motion sensor has been fixed in the car. As soon as the car senses an motion of abnormal, the amount of motion is noted and if it is a gentler one, a simple warning alarm is generated and if the motion is very much abnormal it activates much louder alarm warning and sends an alert SMS to the user mobile. The parking assist is energised by simply pressing a button either on the smart phone or dashboard on the car. A special android APP running on our Android Smartphone makes this possible. One push of the button is all it takes. The car drives it into parking areas. For stopping the maneuver, another push button is used on the Smartphone. A similar interface is available for retrieving modes too. Bluetooth communication is used between android Smartphone and the car. The car unit is joined with the Smartphone via Bluetooth to remove most of the security problems. A open source Real time operating System (RTOS) is selected, to demonstrate on a smaller robotic vehicle. This is multitasking RTOS running on the ARM Processor is used to coordinate each task of the system.

Key words: ARM Processor, Driverless Car, Smart phone, RTOS.

INTRODUCTION

The objective this project is to construct a system that takes control of the car and drives itself to a nearby parking space automatically. In retrieve mode the car drives itself out of the parking space to a fixed place where the user would normally be available or to the place where the user got out of it before the auto park process started. The system can be fully controlled from a Smartphone within 10 meter range. The user need not be present inside the car like some of the previous generation systems. Instead the park and retrieve system can now be fully controlled from a user standing outside with his/her Smartphone.

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This Paper aims to design a driverless car that could be started and driven remotely from an android Smartphone. This will give the user an additional facility, particularly while retrieving. Remote door control is another feature that helps the user to open the car door for him when it reaches him. Remote alert is automatically activated as long as the car is parked.

Proposed system block diagram and functionality

Sonar, android smart phone, bluetooth, GSM, three axis MEMS accelerometer, DC motor, graphics LCD, dash board push button, door servo motor, steering wheel servo motor and LPC 1764 are the components in the blocks in our system.
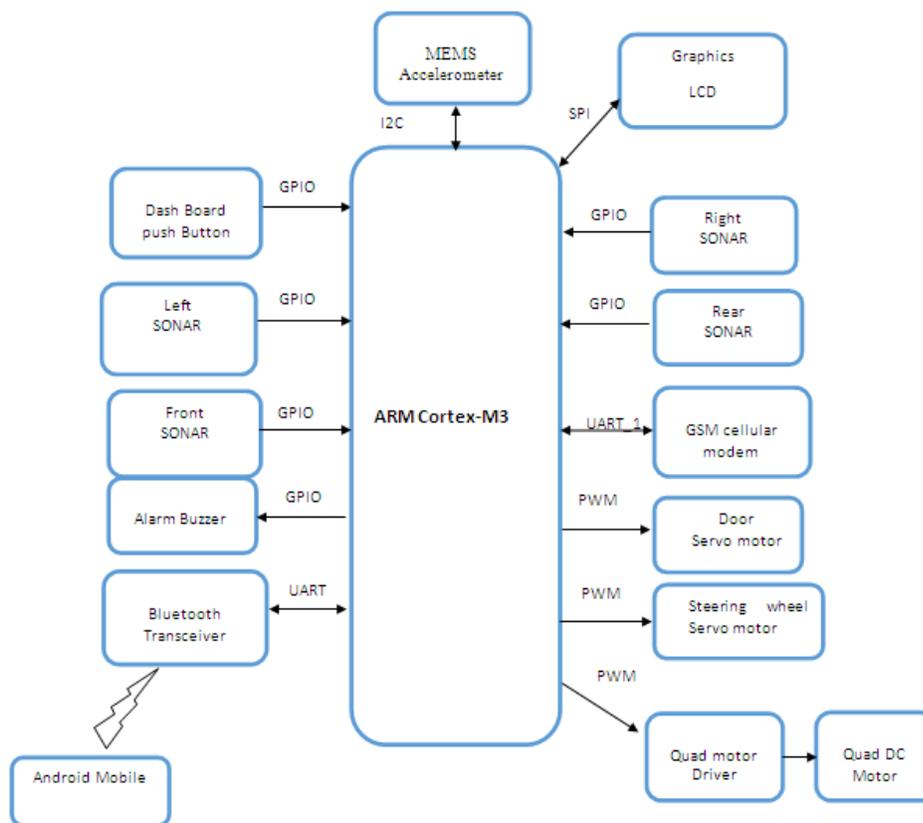

Fig. 1: Block diagram of RTOS used in the proposed system

System-on-chip solutions based on ARM embedded processors address many different market segments including enterprise applications, automotive systems, home networking and wireless technologies. The ARM Cortex™ family of processors provides a standard architecture to address the broad performance spectrum required by these diverse

technologies. The ARM Cortex family includes processors based on the three distinct profiles of the ARMv7 architecture; the A profile for sophisticated, high-end applications running open and complex operating systems; the R profile for real-time systems; and the M profile optimized for cost-sensitive and microcontroller applications. The Cortex-M3 processor is the first ARM processor based on the ARMv7-M architecture and has been specifically designed to achieve high system performance in power- and cost-sensitive embedded applications, such as microcontrollers, automotive body systems, industrial control systems and wireless networking, while significantly simplifying programmability to make the ARM architecture an option for even the simplest applications.

In any electric motor, operation is based on simple electromagnetism. A current-carrying magnetic field. As you are well aware of from playing with magnets as a kid, opposite (North and South) polarities attract, while like polarities (North and North, South and South) repel. The internal configuration of a DC motor is designed to harness the magnetic interaction between a current-carrying conductor and an external magnetic field to generate rotational motion.
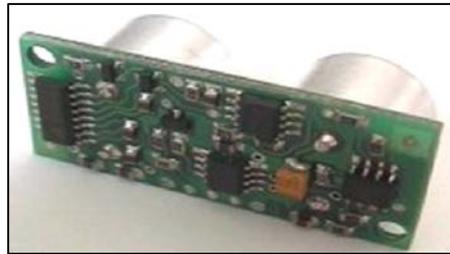

Fig. 2: SRF04-Ultra-Sonic Ranger

The SRF04 was designed to be just as easy to use as the Polaroid sonar, requiring a short trigger pulse and providing an echo pulse. Your controller only has to time the length of this pulse to find the range. The Servo Motors come with three wires or leads. Two of these wires are to provide ground and positive supply to the servo DC motor. The third wire is for the control signal. These wires of a servo motor are color coded. The red wire is the DC supply lead and must be connected to a DC voltage supply in the range of 4.8 V to 6V. The black wire is to provide ground. The color for the third wire (to provide control signal) varies for different manufacturers. It can be yellow (in case of Hitec), white (in case of Futaba), brown etc. A power supply provides a constant output regardless of voltage variations.

RESULTS AND DISCUSSION

The design of RTOS car model is shown in Fig. GSM card system is attached with the system. The output is shown as result of the work.
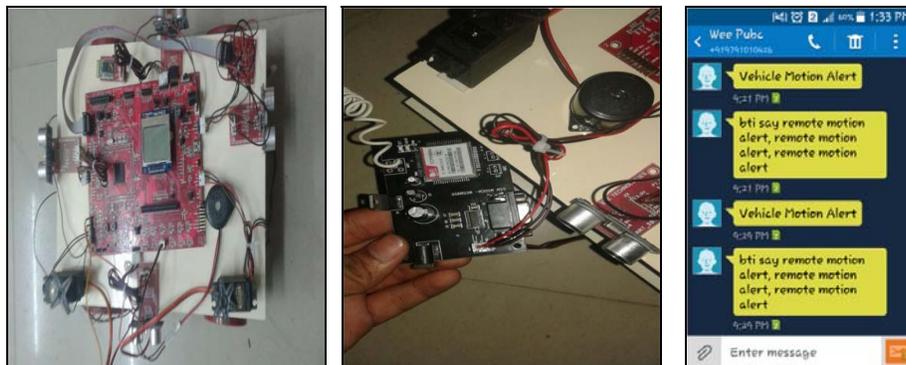
Fig. 3: RTOS Hardware model, GSM card system and output result

CONCLUSION

A driverless car using multitasking RTOS is designed. The prototype is made and shown. It gives the user an additional retrieving facility. Remote door control is introduced. Remote alert is automatically activated as long as the car is parked. 3-axis motion sensor has been fixed in the car.

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