

# EMBEDDED BASED MONITORING SYSTEM FOR MENTALLY CHALLENGED PEOPLE

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**Abstract**—Mentally Challenged people can suffer from multiple impairments that interfere with cognitive function. Mentally challenged people living in hospitals may go missing unknowingly. Therefore, it is very important for the hospital authorities to constantly monitor the patients. This project is designed to alert the hospital authorities about the patients, who tries to exit the hospital premises, with the help of wireless communication. This project consists of tracking & monitoring unit, control unit & display unit. The tracking & monitoring unit is designed using RF transmitter, RF receiver, ZigBee module, GPS & GSM module. ARMLPC2148 controller is used for the control unit. The global positioning system (GPS) tracks the patients & sends an alarm signal to the control room, when the patient crosses the hospital premises. Also, the exact location & time of exit of the patient is displayed in the display unit. An alert SMS is also sent to the concerned medical supervisor about the missing patient using GSM. Embedded C is used for programming the ARM Microcontroller.

**Keywords**—ARM-Advanced RISC Machine, GPS-Global Positioning system, GSM-Global System for Mobile Communication, RF-Radio frequency.

## I. INTRODUCTION

Mentally challenged people with intellectual and mental retardation have generalized neuro developmental disorder characterized by significantly impaired intellectual and adaptive functioning. Therefore, the hospital authorities are answerable to the patient's relatives in case of any missing patients and their safety.

## II. OBJECTIVES

This project aims in keeping a track of the mentally challenged patients in a hospital. It is designed to give an alarm signal to the control room authorities whenever they cross the border of the hospital and to display the patient's name, exact location and time of exit. An alert message is also sent to the person in-charge to alert him/her about the missing patient.

## III. BLOCK DIAGRAM

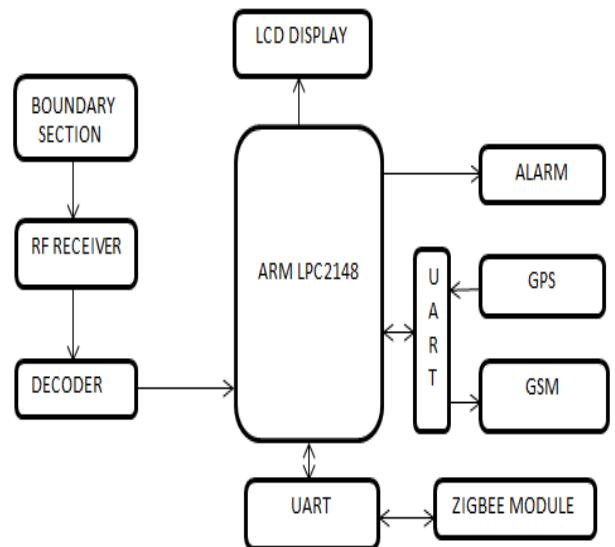


Fig no: 1

#### A. BOUNDARY SECTION

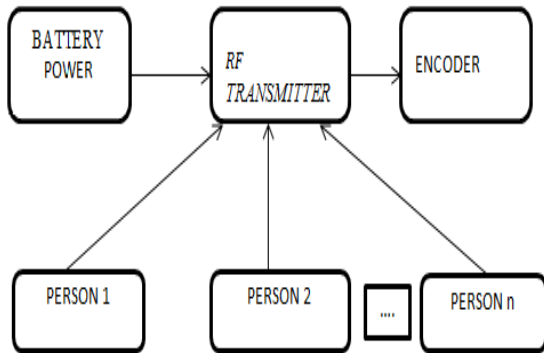


Fig no: 2

### IV. BLOCK DIAGRAM DESCRIPTION

#### A. BOUNDARY SECTION

The boundary section consists of a RF Transmitter and an encoder. The RF Transmitter transmits the signal to the encoder and the encoder encodes the signal and sends to the RF Receiver.

##### 1) RF TRANSMITTER

The radio frequency signals will be transferred from RF transmitter to encoder. The frequency value of the RF transmitter is 434 MHZ with the range of few meters.

##### 2) ENCODER

Before entering into the RF receiver from the encoder, the signals are encoded.

#### A. RF RECEIVER

RF receiver should have the same frequency as RF transmitter for the easy transmission of data from the encoder.

#### B. DECODER

RF receiver sends the signals to the decoder. The decoded signals will be either low or high, which means data value will be 0 or 1.

#### C. ARM LPC2148 MICROCONTROLLER

ARM operates whenever an interrupt has occurred or when the signal from the

decoder becomes low. ARM microcontroller have the architecture as same as ARM microprocessor but the major difference is their peripheral devices. The main specialty of this ARM controller is their two UARTs feature. The ARM sends the data directly to alarm, LCD display and to GPS, GSM and ZIGBEE via UART serial port.

#### D. GLOBAL POSITIONING SYSTEM

It is used for tracking the latitude and longitude location of the patient in the hospital premises. It works based on trilateration principle.

#### E. GLOBAL SYSTEM FOR MOBILE COMMUNICATION

It sends the alert message to the supervisor or family member whenever a patient tries to exit the hospital premises.

#### F. ZIGBEE

It serves the purpose of providing the exit time of the patient whenever a patient crosses the hospital premises.

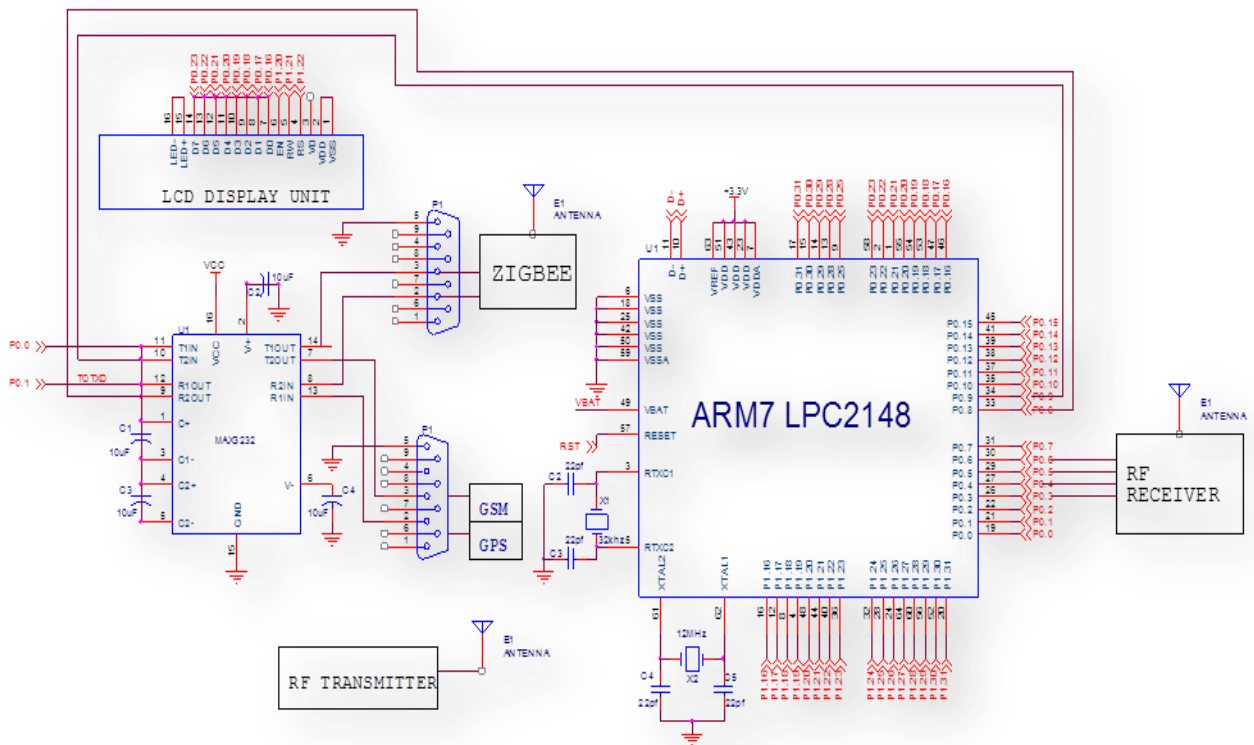
#### G. ALARM

It gives an alert sound to the control room as soon as the signal is provided by ARM controller.

#### H. LCD DISPLAY

LCD display displays the name of the patient who crosses the hospital premises.

## V. CIRCUIT DIAGRAM



### A. WORKING

Always the RF signals send to RF receiver. If the patient may try to exit the hospital premise then the RF signal Receiving will be failed .then the decoder send the data in the form of 0 to ARM LPC2148 controller. So it will send the data to the Alarm unit and LCD display unit and additionally the data will be send to the GPS, GSM, and ZIGBEE by using UART serial port. GPS is used to track the location of the patient; GPS gives in the form latitude and longitude. GSM is used to give alert message to the supervisor or family member of the patient. ZIGBEE is used to give the exit time of the patient. Alarm is used to indicate whenever patient will be exit the hospital. LCD display is shows the patient name, who exit the hospital premises.

## VI. OUTPUT

This project is designed for mentally ill people who are being monitored in the psychiatric hospitals. In case, if the patient tries to cross the premises of the hospital, an alert message along with the time of exit of the patient is sent to the supervisor in the control room. Also, the location of the patient is tracked with the help of GPS System. The LCD display displays the name of the patient who has crossed the hospital premises.

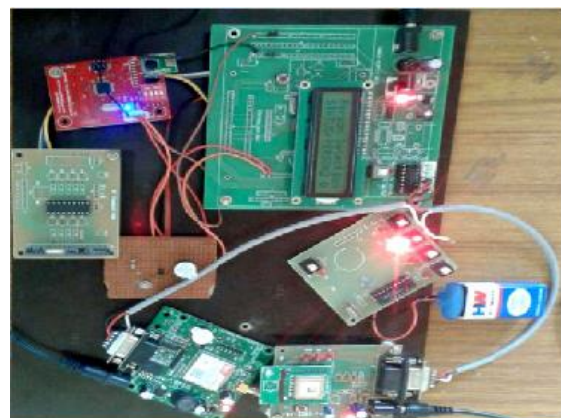


Fig no: 3

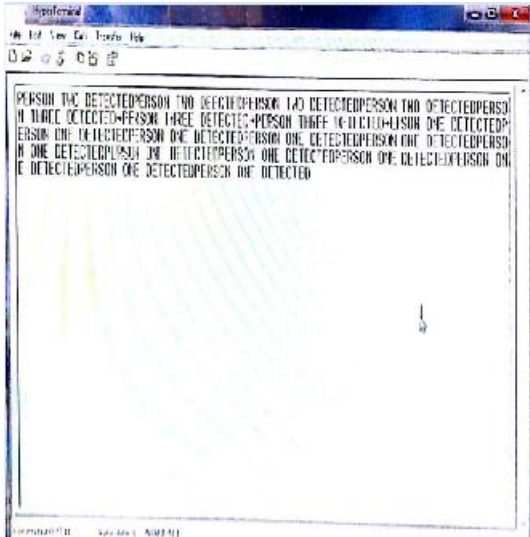


Fig no: 4

## VII. CONCLUSION

A Prototype of the project is done and tested successfully. Here four switches represent four patients in the hand held RF Transmitter module. When the module is kept away at more than a minimum of 10m away from control and monitoring module, an alarm signal comes out on pressing any one of the switches. Also LCD display unit displays the corresponding patient name and an SMS alert signal is sent stating the name of the patient, exact location and time of exit.

## VIII. FUTURE SCOPE

This project in future can be enhanced to be used in international marine borders where fisher men unknowingly crossing the border are penalized. Hence, this project serves as a benefit for those people where a GPS system is attached to the boat which in turn is connected to an alarm device. The GPS receives the topographic location of the boat in the sea and then triggers an alarm if the border of the country is crossed by the boat. Also, it can be used in military and defense applications.

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