# SMART MISSILE NAVIGATION IN DEFENCE SYSTEM USING RC4 ALGORITHM TO DETECT TARGET

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## Abstract

*In today's world enemy warfare is an important factor of any nation's security. The national security mainly depends on army (ground), navy (sea), air-force (air).The important and vital role is played by the army's artillery such as missile, guns etc. This system come up with an idea of detecting the incoming obstacle whether it is enemy or friendly with the help of higher encryption and decryption routine using wireless module. This system develops ultrasonic based radar system which detects obstacles continuously. To identify obstacle is friend or enemy RC4 algorithm is used which is implemented in ARM7. The main factors in RC4's success over such wide range applications are its speed and simplicity which efficiently implemented in both software and hardware. Ultrasonic based radar model will rotate 360 degree with the help of DC motor.it send ultrasonic distance transmitter.PC including software to display orientation of obstacle. If obstacle crosses the set range the transmitter will send encrypted frame to incoming unit which acts as receiver over IR transceiver module. If decrypted frame is received from the incoming unit then the obstacle is friend.*

***Keywords:*** *Ultrasonic based RADAR model, RC4 Algorithm, ARM 7, IR module, Visual Basic software*

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## 1. INTRODUCTION

Navigation is a field of study that focuses on the process of monitoring and controlling the movement of a craft or vehicle from one place to another. Navigation is very important in defence system. The field of navigation includes four general categories: land navigation, marine navigation, aeronautic navigation, and space navigation. It is also the term of art used for the specialized knowledge used by navigators to perform navigation tasks. All navigational techniques involve locating the navigator's position compared to known locations or patterns.

Cryptography plays very important role in security system.it keeps any data Confidential between sender and receiver so no one can hack this data easily.

In defence system we come with idea using the combination of navigation technique and cryptography concept for detect target accurately. The missile's target accuracy is a critical factor for its effectiveness. Guidance systems improve missile accuracy by improving its "Single Shot Kill Probability" (SSKP).The system develops ultrasonic based RADAR model for tracking the incoming object and RC4 based Encryption and Decryption system for detecting incoming object is friend or enemy.

## 2. BACKGROUND AND RELATED WORK

In paper [1], air mine is designed to deal with various types of planes in the civilian or air forces of the enemy. This mine is act as a receiver which is operated by wirelessly to the transmitter side .in this ultrasonic technique is used for object detection. AES algorithm is implemented between transmitter and receiver for authentication. In paper [2] as per the RC4 is better than AES.RC4 is well suited for real time processing.it is fast and energy efficient for encryption and decryption.

In paper [3], how to secure wireless sensor network by using cryptography is mentioned. Authentication can be defined as a security mechanism, whereby, the identity of a node in the network can be identified as a valid node of the network. Subsequently, data authenticity can be achieved; once the integrity of the message sender/receiver has been established. Consider the military. Secrecy is part of its nature; and data (sensed/disseminated/stored) is required to remain confidential. This is critical to the successful operation of a military application. Enemy tracking and targeting are among the most useful applications of wireless sensor networking in military terms. The most current work can be found in the Defence

Advanced Research Projects Agency (DARPA) website [4, 5] In paper [6], author is proposed a mechanism based on clustering and cryptography which is capable if detecting and defending the DOS attacks.it provides the security in WSN environments.

In paper [7], examines several Homeland Defence applications, including perimeter monitoring, disaster recovery, and counter terrorism. The wireless

communications requirements for Homeland Defence are compared against those of unattended ground sensor systems in an effort to identify ways in which UGS technology can be applied to Homeland Defence applications.

In paper [8], how ultrasonic sensor work in air, detail information of ultrasonic sensors are mentioned. Ultrasonic sensor transform an electrical signal into ultrasonic waves and vice versa. Same sensor is used for transmitter and receiver.in some application it is used to calculate distance of the object. Ultrasonic sensors is applicable in many areas, for example in private housing, health care, defence system [1,9], traffic, industry and engineering and science [10]

## 3. PROPOSED SYSTEM

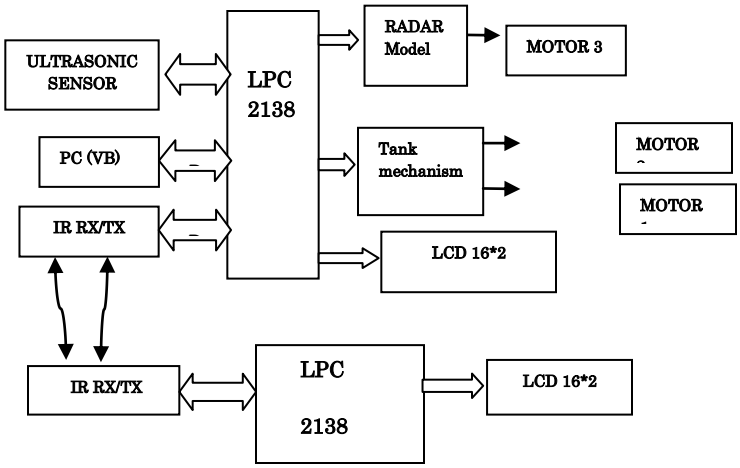


**Fig 1:** Block diagram of system

Figure shows the block diagram of proposed system in which top of diagram is transmitter side which consist ultrasonic radar model for tracking obstacle, arm for encryption, LCD for displaying obstacle is friend or enemy, and IR for transmitting encrypted frame. The bottom part of figure is receiver side.it consists arm for decryption, LCD for displaying output and IR for sending decrypted frame back to the transmitter.

## 4. HARDWARE DESCRIPTION

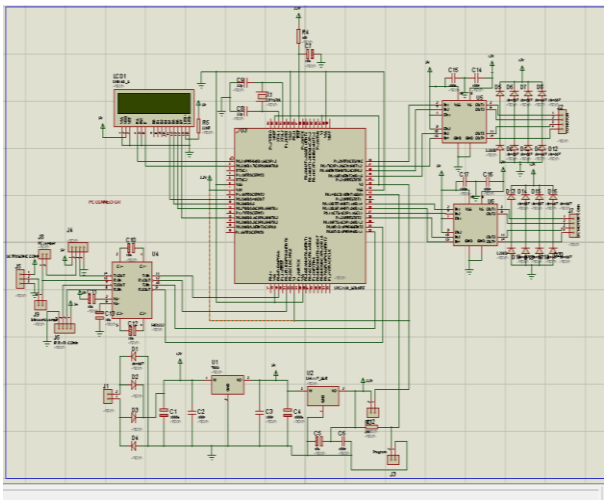

**Fig 2:** Circuit Diagram of Transmitter side of system

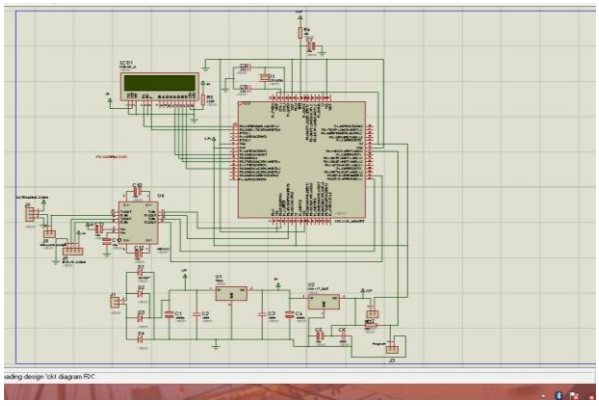

**Fig 3:** Circuit Diagram of Receiver side of system

Here we are making an ultrasonic based Radar model. With the help of DC motor the ultrasonic based radar model will continuously rotate 360 degree. The ultrasonic sensor will continuously send and receive the ultrasonic waves. The distance is calculated using the Doppler Effect and directly given to the ARM. The ARM receives the distance from the ultrasonic sensor serially and transmits it to the LCD. If the distance is less than the set point, it will automatically send a frame to the ARM. The ARM will send encrypted frame to the incoming obstacle via IR transceiver. Then if incoming obstacle decrypt this frame then the obstacle is friend otherwise it is enemy. Also PC shows the orientation of obstacle by using visual basic software on PC

## 5. SOFTWARE DESCRIPTION

The signal captured from ultrasonic based radar model is to be transmitted to transmitter .signal is to be sent to IR module through UART. Hence once the signal is captured ARM7 is initialized which is reference voltage 3V. This signal is then

given to UART of ARM7 .Also, LCD is used to display word output. All this that is initialization of UART, Timer and LCD is done in Embedded C using Kiel µvision3.RC4 algorithm is done in Embedded C using Kiel uvision 3 in which 256 state and 4 bit key is used for encryption and decryption

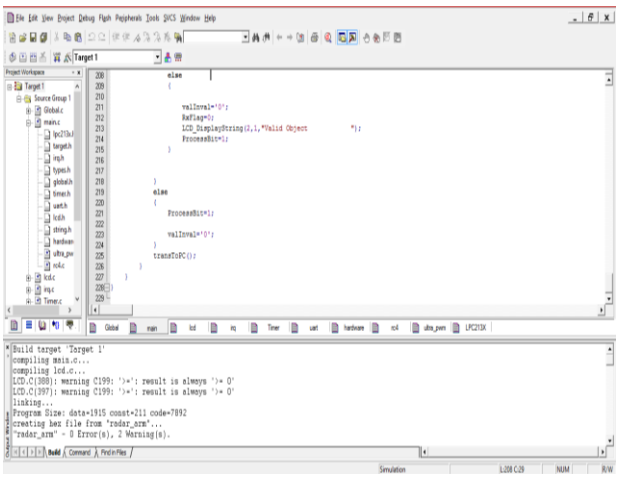

**Fig 4** Snapshot after debugging the code at transmitter side.

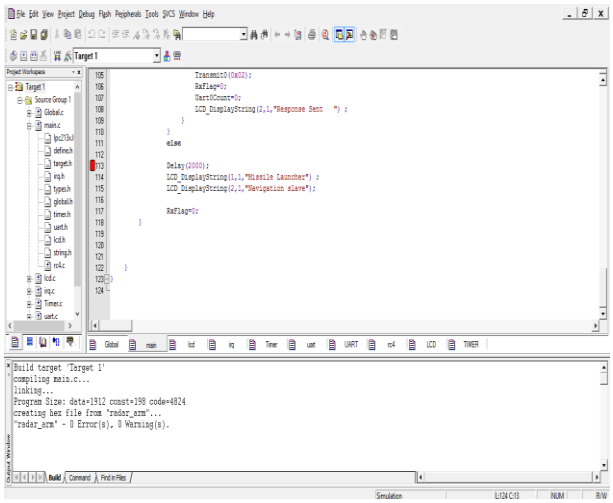

**Fig 5** Snapshot after debugging the code at Receiver side.

## 6. RESULTS

- Ultrasonic based RADAR model that is transmitter side is made which rotates 360 degree with the help of dc motor.so it tracks the obstacle in all direction.

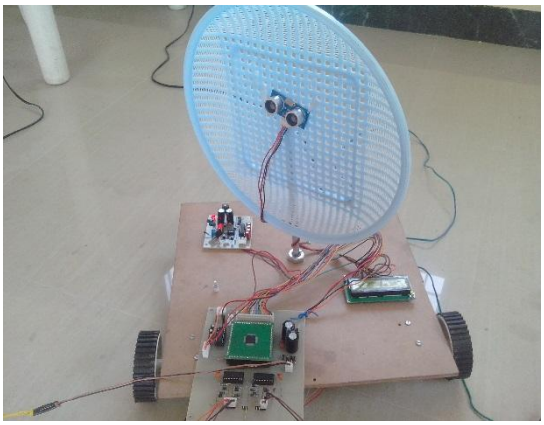

**Fig 6:** Transmitter side of the system

- In this, tracking and monitoring of obstacle is displayed on PC by using visual basic software as shown in figure 7.
- Different ultrasonic sensors are available which have different ranges. Ultrasonic sensor used is having range from 10 cm to 400 cm. We have set 250 cm range, when object crosses the range, transmitter sends encrypted frame to the receiver. If receiver does not send any response then transmitter displays obstacle invalid as shown in figure 8.
- When receiver sends response to transmitter then receiver as shown in figure 9, will display response sent as shown in figure 10.
- When transmitter gets response from receiver it displays obstacle valid as shown in figure 11.

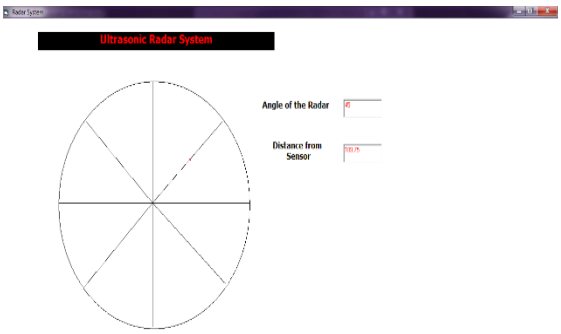


**Fig 7:** PC shows position of obstacle


**Fig 8:** LCD displays invalid object

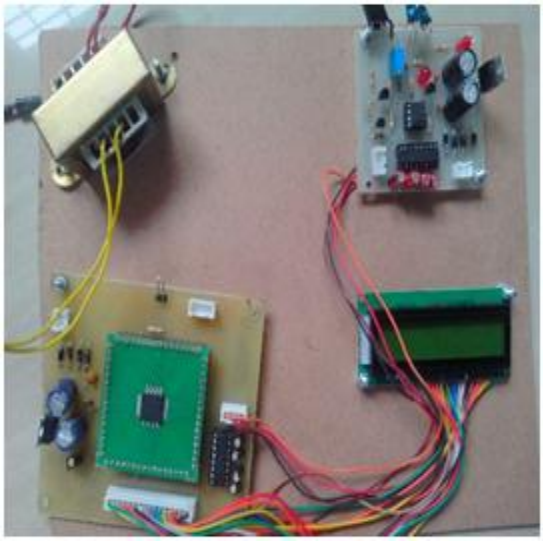

**Fig 9:** Receiver side of the system


**Fig 10:** LCD shows receiver response


**Fig 11:** LCD displays valid object

## 7. CONCLUSIONS

This paper represents accurate tracking and authentication of target. In this project ultrasonic based radar model tracks the target accurately, then with the help of RC4 algorithm which is implemented in arm7 the target is authenticated.RC4 security is depends on number of states and key used for ciphering.RC4 is fast, and it is applicable in real time processing. Transmission and reception between workstation and target is done by IR transceiver.IR performs direct line of sight transmission and it is applicable in night vision. The position of obstacle is monitored on PC by using visual basic software. This system is suitable where the authentication of incoming vehicle, plane, tank etc. is necessary, boundary, and in night situation where the incoming object cannot identified by normal human eyes.

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