Portable Radar system

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Abstract - For over a century, radar has served various purposes, from controlling vehicle speed and managing air traffic to military operations and medical applications like breast cancer detection. Recent years have seen significant radar advancements, particularly in automobile safety and autonomous driving. While radar hasn't evolved as rapidly as some technologies in the past two decades, new developments are poised to enhance its performance through advanced features and signal processing. By seamlessly integrating portable radar technology with IoT, the portable radar system reshapes surveillance, security, and real-time data analysis. This promises to bolster situational awareness for disaster management and environmental monitoring, with tangible results including improved surveillance, data accuracy, and real-time insights. By collecting sensor data, analyzing it, and using the Blynk app, data-driven decisions can enhance accuracy in practical applications.

INTRODUCTION - Early radar systems, based on pulse radar technology and spark gap generators, were relatively simple and limited in scope. However, modern radar systems have evolved significantly, benefiting from advances in hardware, signal processing, and scanning techniques like phased array and Synthetic Aperture Radar (SAR). Looking to the future, researchers are exploring innovative radar concepts, including intelligent signal coding, Multiple-Input Multiple-Output (MIMO) radar, digital beamforming, and matrix imaging. These technologies promise to create smarter, more efficient, and more capable radar systems. Moreover, portable radar systems are on the horizon, enabling deployment in diverse applications like environmental monitoring, disaster response, and search and rescue missions. The future of radar is promising, with technology advancements shaping its continued evolution to address current challenges and offer effective solutions.

WORKING OF RADAR SYSTEMPORTABLE RADAR SYSTEM

Radar systems and portable radar systems operate by transmitting a radio frequency(RF) sending signals toward the target& then receiving reflected signal from target. The delay (Time) between the transmitting and the receiving of the signal, along with the received signal strength, provides information about the distance and direction of the target.

Design

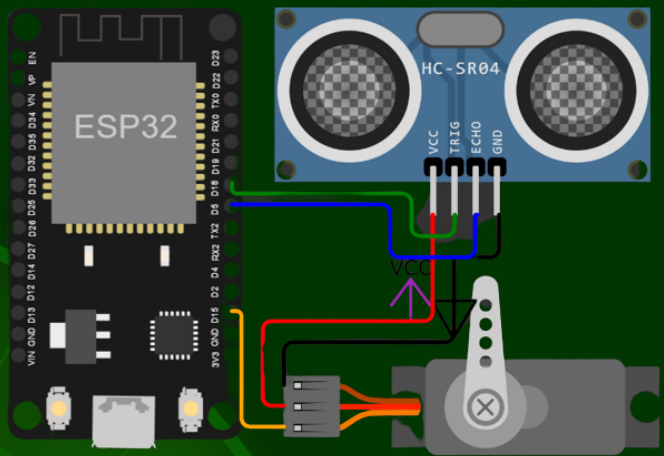

Fig 2: Circuit Diagram

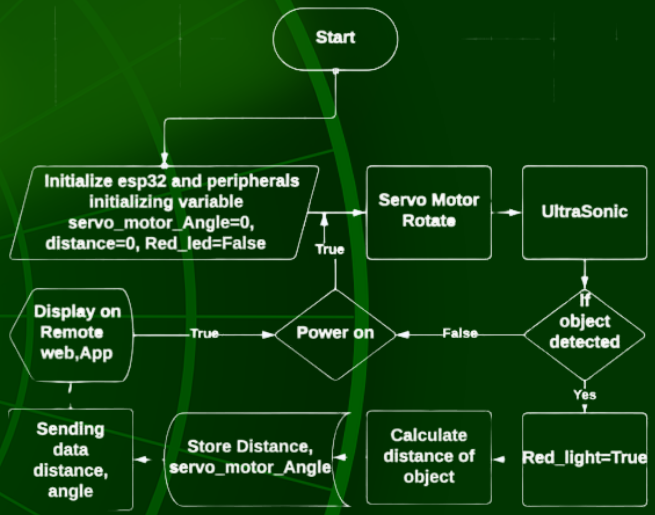

Fig 2: Data Flow Chart

RESULT

After implementing on hardware, esp32 now can sends the data over the internet, this data can be analyzed and can be used further. Currently, we are getting distance from ultra sonic, direction from the servo motor. By this data we can find the object in a particular direction. Here, we are analyzing the data in different formats:

- Object detection Frequency (Ultra Sonic)
- Distance of Object (Ultra Sonic)
- Direction of Object (Servo Motor)

It has much space for the improvement, and more data can be collected by adding other sensors. Here are few output results of the working Portable Radar System: