

Research

Microcontroller based wireless turn light indication system for trolley of tractor

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Abstract:

In the 21st century engineering teaching learning process of interdisciplinary courses like microcontroller and its applications, there is need to avail the state-of-the-art learning techniques to enhance the student understanding, along with advanced electronic instrumentation which has become affordable to be used for routine academic demonstration. This paper discusses the concept of a Microcontroller based wireless turn light indication system for trolley of tractor. This methodology avails the advanced technology; people try to make use of wireless technologies in different role. In this system uses the IR sensor, transmitter, receiver and micro controller. Main heart of the system is RF Module. It has two parts RF transmitter and RF receiver. The IR sensors use to detect steering wheel movement and gives signal to Encoder. HT12E are used for encoding and HT12D used for decoding the data. The 4-bit data is converted via HT12E encoder IC. Assign serial data to RF transmitter. At the Receiver side, receiver receive the serial data and this data is sent to HT12D decoder IC which converts into parallel data. Use a micro controller and relay channel to control the indicator signal. The proposed paper aimed to detect the steering direction by IR sensors and turn on/off the left and right. vehicle indicators based on the position of the steering wheel read. This switching is done wireless, avoiding bulky wiring in the vehicle. Automatic turn signal control protects users from accidents and driving safety.

Keywords: Steering, Tractor., IR Sensor, RF Module, Receiver, Transmitter.

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Introduction:

In today's environment, one of the issues that many drivers encounter is the absence of signals before turning or changing lanes. The concept is to develop a tractor carriage wireless automatic display system. An Infrared sensor, transmitter and receiver modules, a microcontroller, and a display are all components of this system. Three IR sensors are used to track steering wheel movement. The HT12E encoder module, the transmitter module, receives a signal. The analogue signal is transformed into a coded signal in this transmitter module. An antenna is used to send

this signal to the receiver. The HT12D decoder is used by the receiver. The signal is received by the decoder, which decodes it and turns it into an analogue signal. The microcontroller is supplied with this analogue signal. The signal can be controlled by a microcontroller. The centre indication turns on when there is no steering movement at that moment, the left indicator turns on when the steering is moving to the left, and the right indicator turns on when the steering is moving sideways to the right. Create an automatic cornering light indicator system for a tractor carriage using this idea. a system for preventing accidents.

Literature Review

Varadraj Gidugu, et. al [1] described the purpose of tail lights to indicate the presence of a vehicle ahead and the purpose of the break light to indicate the vehicle ahead is slowing down or stopping. Of these, when the preceding vehicle stops, the closer the distance to the following vehicle is the greater the danger to the following vehicle. In an emergency, distance will decrease faster. It is recommended to use different colors or features to indicate different levels of risk. Amber can be used for tail lights and red can be used for brake lights. These colors are also used to indicate curve liner patterns so the shape of the tail light and brake light can be circular rather than rectangular for turn signals a set of three four-state lights indicating the presence of a moving stationary vehicle can be envisioned by using bi-colour LEDs. Pooja Ajmera, et. al [2] discussed the infrared sensor. It is an electronic device used to sense certain properties of the surrounding by emitting and/or detecting infrared radiation. Infrared sensor measure or observe the heat of objects and detect their motion. An infrared sensor circuit is one of the basic and common sensor modules in electronic devices. According to the publisher, this sensor is similar to human eyes that can be used to detect obstacles, these sensors emit passive IR sensors, and thermal radiation and are invisible to eyes that can be detected only by infrared sensors. It measures infrared radiation only, rather than emitters being just LEDs. Dr Thida Aung, et. al [3] elaborated the system as two main sections. Transmitter and receiver is a new way to overcome the use of wires. Eliminate wire problems, its very efficient, maintained and complex. There is no need to continuously monitor the cable between them during operation also a sight line is not necessary for communication purposes. In addition, the

offer is the fact that the sender and receiver can successfully transfer. Wireless transmitter and receivers can be used in car doors, door controllers and home automation systems. In shorts, you don't need a lot of cable and wires saving you a lot of time and money.

In this article, Mohammed Asadullah Khan, et al. [4] discussed the different types of field sensors. The magnetic signal is transformed into the necessary signal that can be measured using various device kinds and structural elements. Here, the fig compares the surface area, sensor size, and operational steps of conventional magnetic sensors. It's interesting to note that the sensors' sensitivity. The literature focuses more on the GMI sensor, that serves a smaller commercial function.

Methodology

The suggested system intends to fully automate turn signal switch control and accomplish the automation of vehicle signaling systems. Three principles serve as the foundation of this system. The steering position is determined by a Hall sensor or an IR sensor, which is also utilized to transmit a signal to the microcontroller. The turn signal is then activated when the signal has reached the microcontroller. The system's brain is the radio frequency module (RF). Amplitude Shift Key (ASK) is used in this radio frequency communication technology, and both the transmitter and receiver (Tx and Rx) use the 433MHz frequency. The magnetic reed sensor or IR sensor used to detect steering motion. The HT12E encoder received a signal from these sensors. The encoder IC is used on the transmission side, and its primary job is to transform analogue signals into coded signals. This coded signal or data is directed towards the transmitter side of the RF module. The transmitter (Tx) uses an antenna to broadcast this serial data or signal.

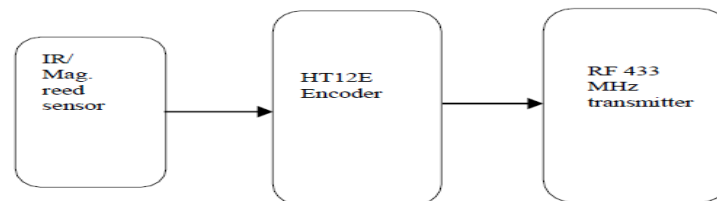


Figure 1. Block diagram of transmitter steering side

The receiver on the opposite side picks up the signal or data. The HT12D decoder is used to convert this serial data into parallel data. Data or a signal delivered to the microcontroller was decoded by this. The 8-bit

AT89C52 microcontroller used in this system is. Relay channel assistance and a microcontroller are used to manage the indicator signals.

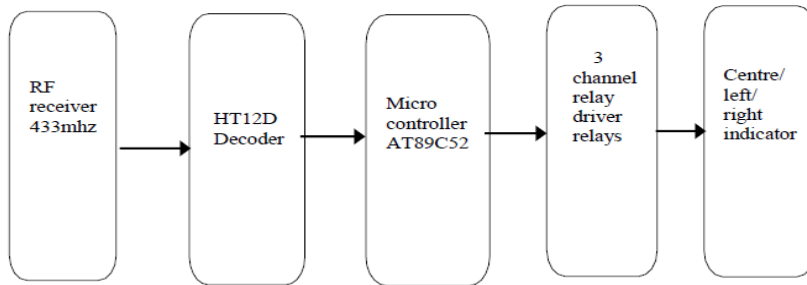


Figure 2. Block diagram of receiver steering side

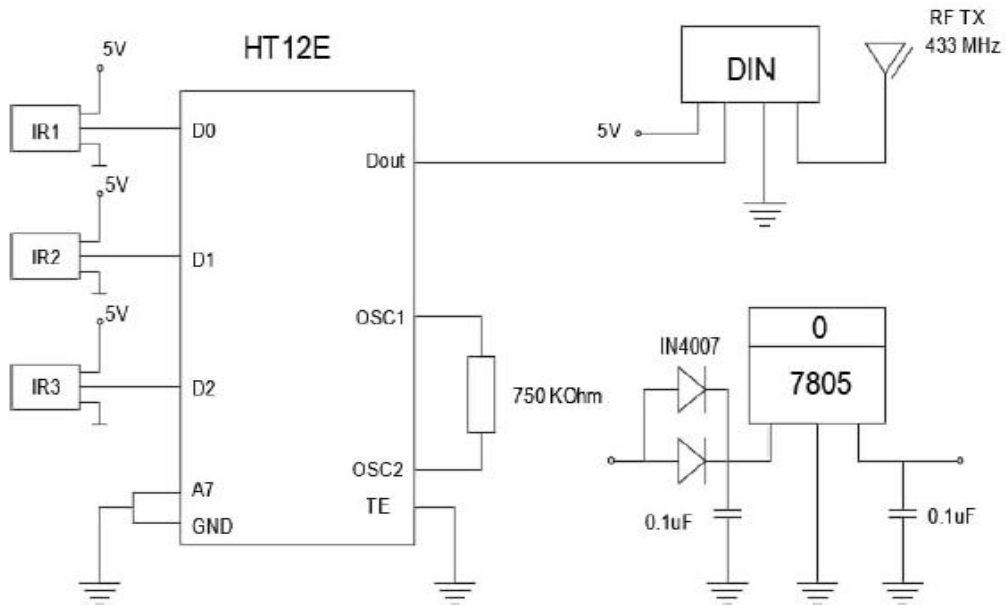


Figure 3. Circuit Diagram of Transmitter side

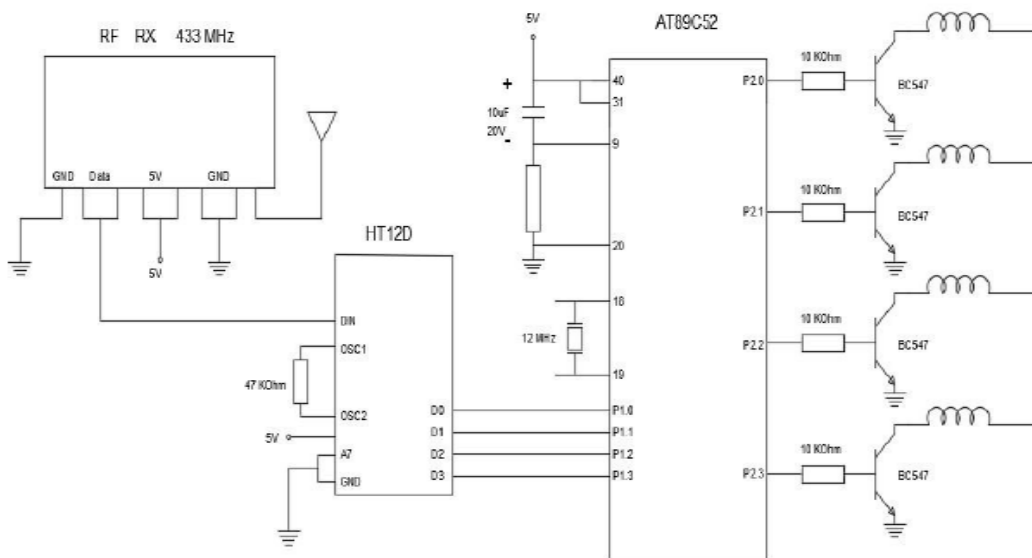


Figure 4. Circuit Diagram of Receiver side

RESULTS OF SOFTWARE

The motion of steering is sensed or recognized in this proposed system. While the steering is in the middle position, the middle indication will illuminate if indicator L1 and indicator L3 are low and indicator L2 receives a high input from the microcontroller. As the steering is turned to the left, the microcontroller's high

input to indicator L1 causes the left indicator to glow while the left position indicators L2 and L3 receive low input. When the steering is turned to the right, the right-side indicator will glow, indications L1 and L2 will have low input, and indicator L3 will have high input through the microcontroller.

Table 1. Result table

Sr.No	Steering Position	Indicator L1 (Left)	Indicator L2 (Middle)	Indicator L3 (Right)
1	Middle	Low	High	Low
2	Left	High	Low	Low
3	Right	Low	Low	High

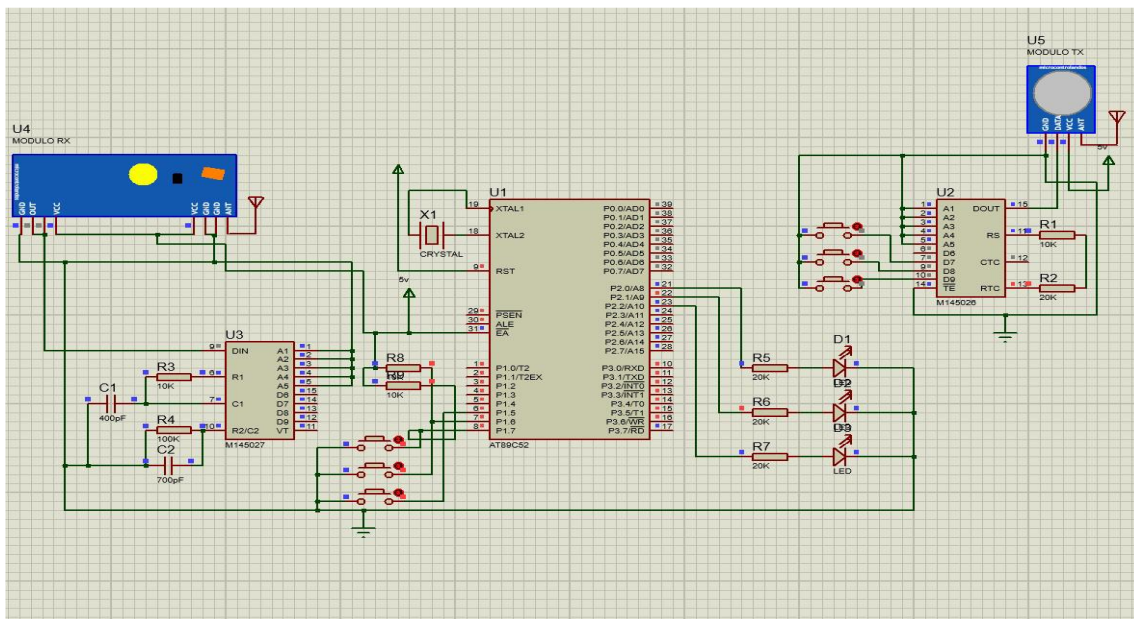


Figure 5. Steering at Middle Position

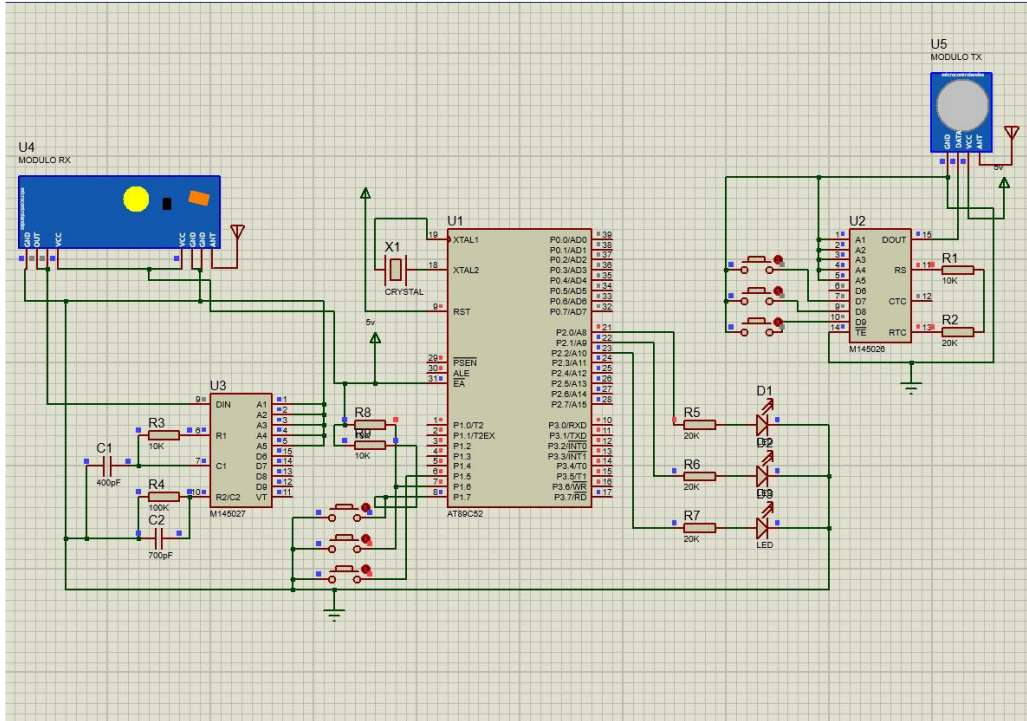


Figure 6. Steering at Left Position

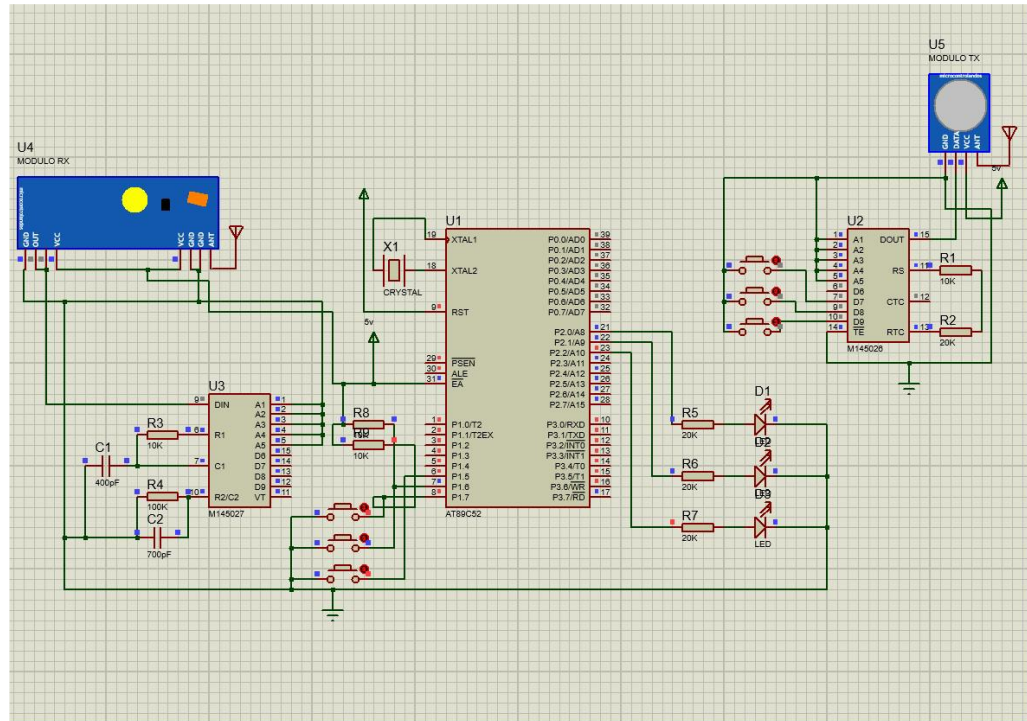


Figure 7. Steering at Right Position.

Test and Result

This system is implemented step-by-step, and each step has undergone experimental testing to ensure that there are no errors. The achievement of an exact and

anticipated result is crucial to the system. Below is a description of the system's primary implementation steps, tests, and outcomes.

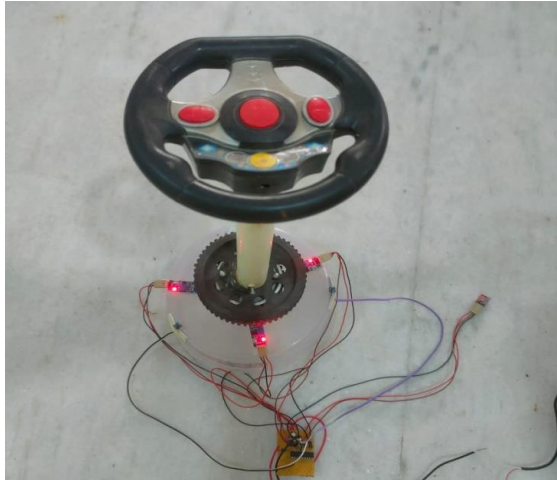


Figure 8. Testing of Transmission Side

Three IR sensors, an RF transmitter module Three IR sensors, an RF transmitter module operating at 433 MHz, and an HT12E encoder make up the majority of the transmitter section in this case. The IR Sensors are positioned around the wheel as illustrated, and one wheel can be mounted to the lower portion of the steering rod. To reduce the amount of wiring on the steering, this configuration must be made. When the steering wheel is detected by an IR sensor, a signal is sent from the transmitter to the receiver, which is located on the back of the trolley.

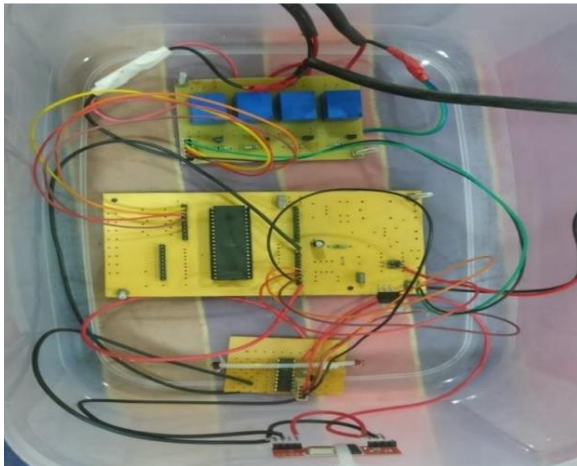


Figure 9. Testing of Receiving Side

The major components of the receiver section are an RF receiver module operating at 433 MHz, an HT12D decoder, and an AT89C52 microcontroller. With a 3-channel relay, indicators can be linked here. The transmitter sends a signal, which the RF receiver module receives and passes to the decoder. Decoder sends the signal to the microcontroller, and the microcontroller is connected to the relay through

which three indicators get the signal. The indicators glow by the signal.

Conclusion

An innovative technique to substitute the use of wire is the implementation of a wireless transmitter and receiver. When IR sensors are used, steering motion detection is extremely accurate. Here, a 433Mhz RF transmitter and receiver module are utilized, allowing for long-distance transmission and reception of the signal. This method requires less maintenance, is more effective, and is simpler. There's no need to keep an eye on the wire connecting them while they're moving. Because of how small the transmitter part is, it can be mounted on the steering rod right next to the steering wheel with ease. In summary, unnecessary cables and wires, which might save considerably time and money.

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