# Car Parking System using JK Flip Flop

## 1. Absract

This project proposes a 2-bit car parking system utilizing JK flip-flops and infrared (IR) sensors to monitor the occupancy status of two parking spaces. The system employs two JK flip-flops, each associated with an IR sensor that detects the presence or absence of a car. The logic design involves connecting the J and K inputs of the flip-flops to the corresponding IR sensor outputs, with the clock input synchronized to a regular pulse. The output of the flip-flops is then processed through an OR gate, producing a 2-bit binary code that indicates the parking status. The proposed system offers a simple and effective solution for monitoring two parking spaces, with potential applications in smart parking management systems. Further considerations, such as debouncing input signals and ensuring a stable clock source, may be incorporated for enhanced reliability in real-world implementations.

## 2. Table of Contents

# Chapter 1

## 1.1 Introduction

The escalating urbanization and the surge in vehicular populations have underscored the critical need for innovative solutions to manage parking spaces efficiently. As cityscapes evolve, traditional parking management systems often fall short in providing real-time insights into parking space availability. This project introduces a cutting-edge approach to address this challenge through the design and implementation of a 2-bit car parking system. Leveraging the power of JK flip-flops and infrared (IR) sensors, this system offers a dynamic and scalable solution to monitor the occupancy status of two parking spaces, providing a binary representation of their availability.

The ever-increasing demand for parking spaces in urban environments necessitates the development of intelligent systems that not only offer real-time information to drivers but also contribute to the effective utilization of available resources. In response to this need, our project focuses on combining the reliability of JK flip-flops with the precision of IR sensors to create a robust parking management system.

This introduction provides an overview of the components and design principles underlying the proposed system. We delve into the intricate connections between IR sensors and JK flip-flops, the role of a synchronized clock signal in updating flip-flop outputs, and the subsequent processing of these outputs through an OR gate to generate a binary representation of parking conditions. The simplicity and efficiency of this system make it an ideal candidate for a wide array of applications, from urban parking lots to smart city initiatives.

## 1.2 Methodology

### 1.2.1 Circuit Components

IC 7476, IC 7486

IR Sensors

LED

Breadboard

7805 - Voltage Regulator

9V power supply

### 1.2.2 Construction And Working

1. JK Flip-Flop Configuration
   - Two JK flip-flops are employed, each dedicated to monitoring the status of a parking space. These flip-flops have two inputs (J and K), an output (Q), and a clock input.

2. Infrared (IR) Sensor Inputs
   - IR sensors are utilized to detect the presence or absence of cars in the respective parking spaces. Each sensor provides a binary signal (0 or 1) based on the car detection status.

3. J and K Inputs of Flip-Flops
   - Connect the J input of each flip-flop to the output of the corresponding IR sensor. This establishes a direct connection between the sensor's detection status and the flip-flop's input.

4. Clock Input

- Connect the clock input of both flip-flops to a common clock source. The clock signal ensures synchronous updates, allowing the system to check the status of IR sensors and update flip-flop outputs at regular intervals.

5. Parking Status Interpretation

- The binary code generated by the OR gate is interpreted as follows:
  - '00': Both parking spaces are empty.
  - '01': The first parking space is occupied.
  - '10': The second parking space is occupied.
  - '11': Both parking spaces are occupied.

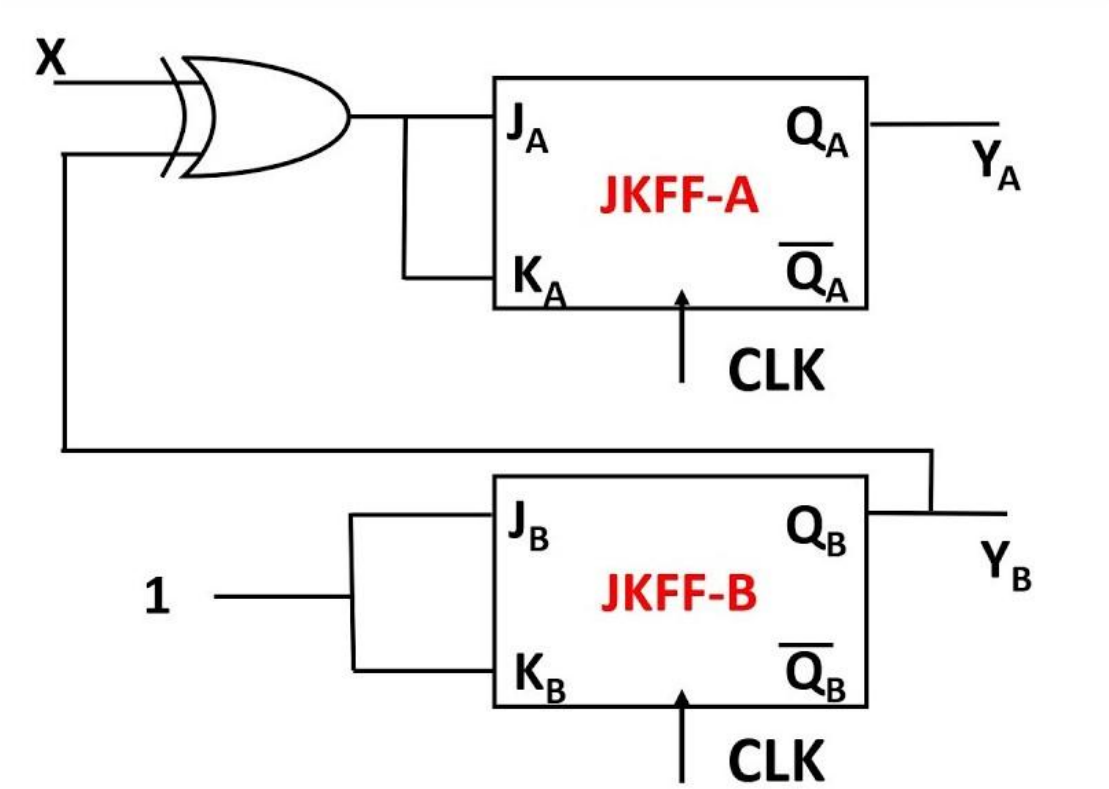
6. Clocking Mechanism

- The clock signal controls the timing of updates. Synchronization ensures that the system checks the status of IR sensors and updates flip-flop outputs at regular intervals.

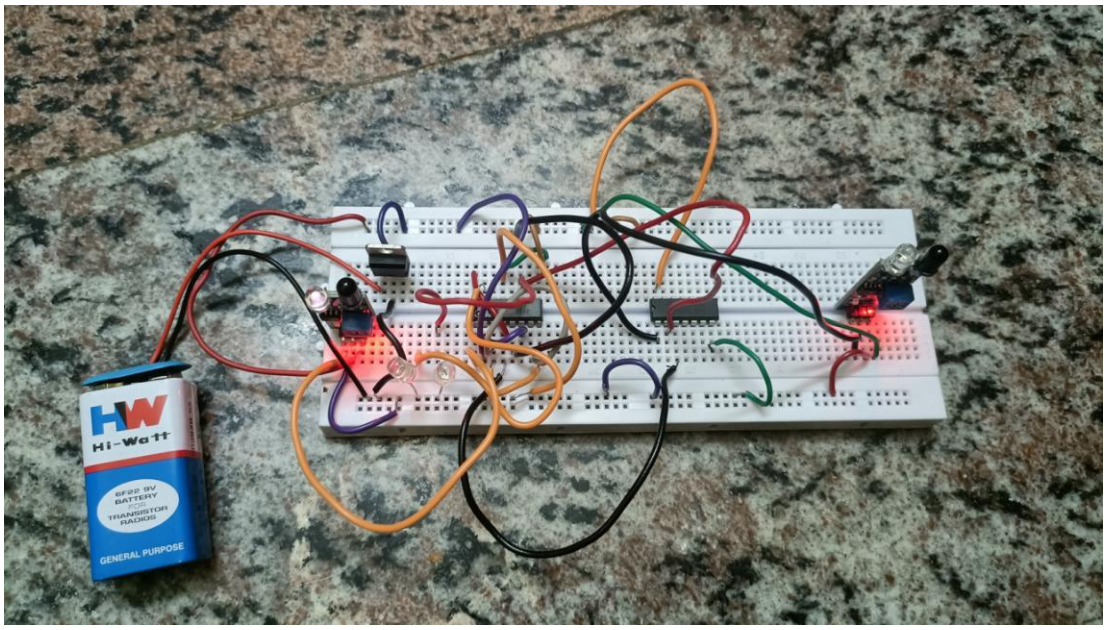
This circuit principle outlines the interconnection of JK flip-flops, IR sensors, and logic gates to create a dynamic and responsive 2-bit car parking system. The modular design facilitates easy scalability for applications involving more parking spaces. Additionally, synchronization through a clock signal ensures systematic and periodic monitoring of parking status.

## 1.3 Result And Discussion

### 1.3.1 Circuit Diagram



### 1.3.2 Hardware Circuit



1.3.3 Hardware Output / QR code for Output

# Chapter 2

## 2.1 Conclusion

In conclusion, the design and implementation of the 2-bit car parking system using JK flip-flops and IR sensors represent a promising solution for addressing the challenges associated with modern urban parking management. This project introduces a versatile and scalable approach to monitoring the occupancy status of two parking spaces, providing a binary representation that simplifies interpretation for both drivers and parking management systems.

This 2-bit car parking system contributes to the optimization of urban infrastructure by providing valuable information to drivers and parking management systems. Its simplicity, effectiveness, and scalability make it a viable solution for addressing the evolving challenges of urban parking, ultimately enhancing the overall parking experience and contributing to the development of smarter and more efficient urban environments.