

PBL presentation for Skills and Competency Evaluation(SCE)
Microcontroller And Applications (ETUA22202)(SY ETC SEM-II AY 23-24)

Object Detection and counting using IR Sensor in 8051 MIC

Div.: B

By: Group No. – B12

Roll No.	G.R. No.	Name of Student
212011	22210543	Venkatesh Deshmukh
212024	22211165	Deep Khandewlal
212025	22211552	Anuj Khatod

Name of instructor:

Pravin Gawande

Department of Electronics and Telecommunication Engineering



BRACT'S, Vishwakarma Institute of Information Technology, Pune-48

(An Autonomous Institute affiliated to Savitribai Phule Pune University)
(NBA and NAAC accredited, ISO 9001:2015 certified)

OUTLINE

1. AIM
2. OBJECTIVES
3. HARDWARE MATERIALS ARE REQUIRED AND
4. SPECIFICATIONS DESIGN (BLOCK DIAGRAM)
5. INTERFACING DIAGRAM ON PROTEUS
6. WORKING DESCRIPTION
7. ALGORITHM/FLOWCHART
8. PROGRAM IMPLEMENTATION
9. HARDWARE IMPLEMENTATION
10. RESULTS AND CONCLUSION
11. REFERENCES

AIM

The aim of this project is to develop a system for detecting and counting objects on a conveyor belt using an IR sensor and an 8051 microcontroller. The IR sensor will detect the presence of objects as they pass by, causing interruptions in the sensor's output. The microcontroller will process these signals, incrementing a counter each time an object is detected. Additionally, the system incorporates a display interface to visualize the count of objects. Efficiency and accuracy are crucial considerations, necessitating fine-tuning of sensor sensitivity and optimization of microcontroller code.

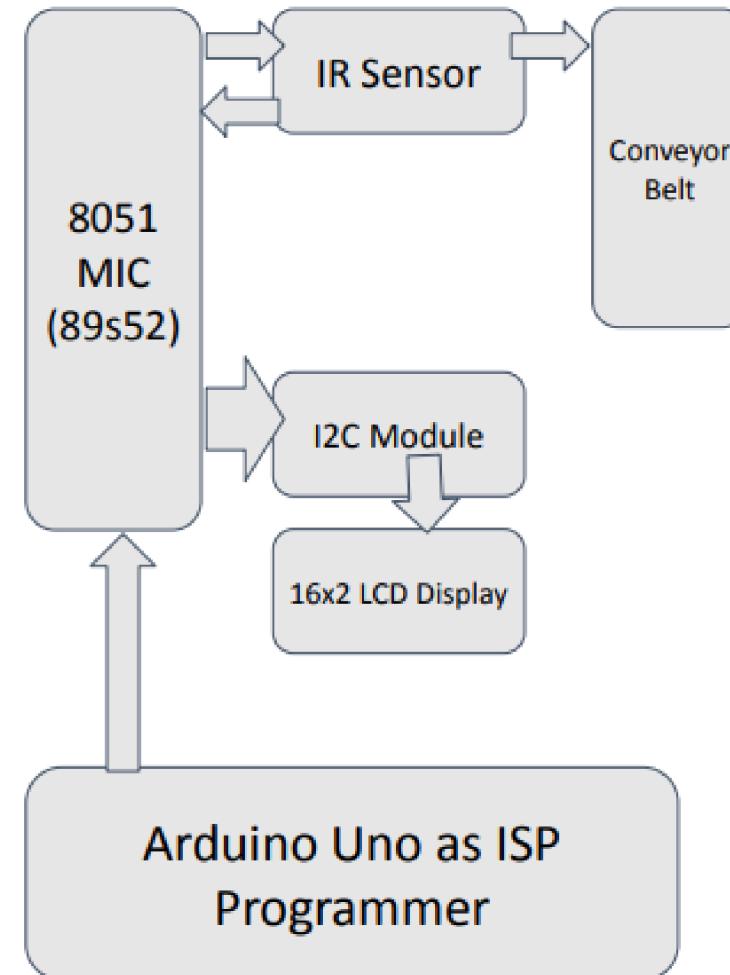
OBJECTIVES

- To detect object on conveyer belt
- To display the count on LCD
- To reset the count whenever necessary
- To make efficient and errorless system for counting objects
- To keep record of the count

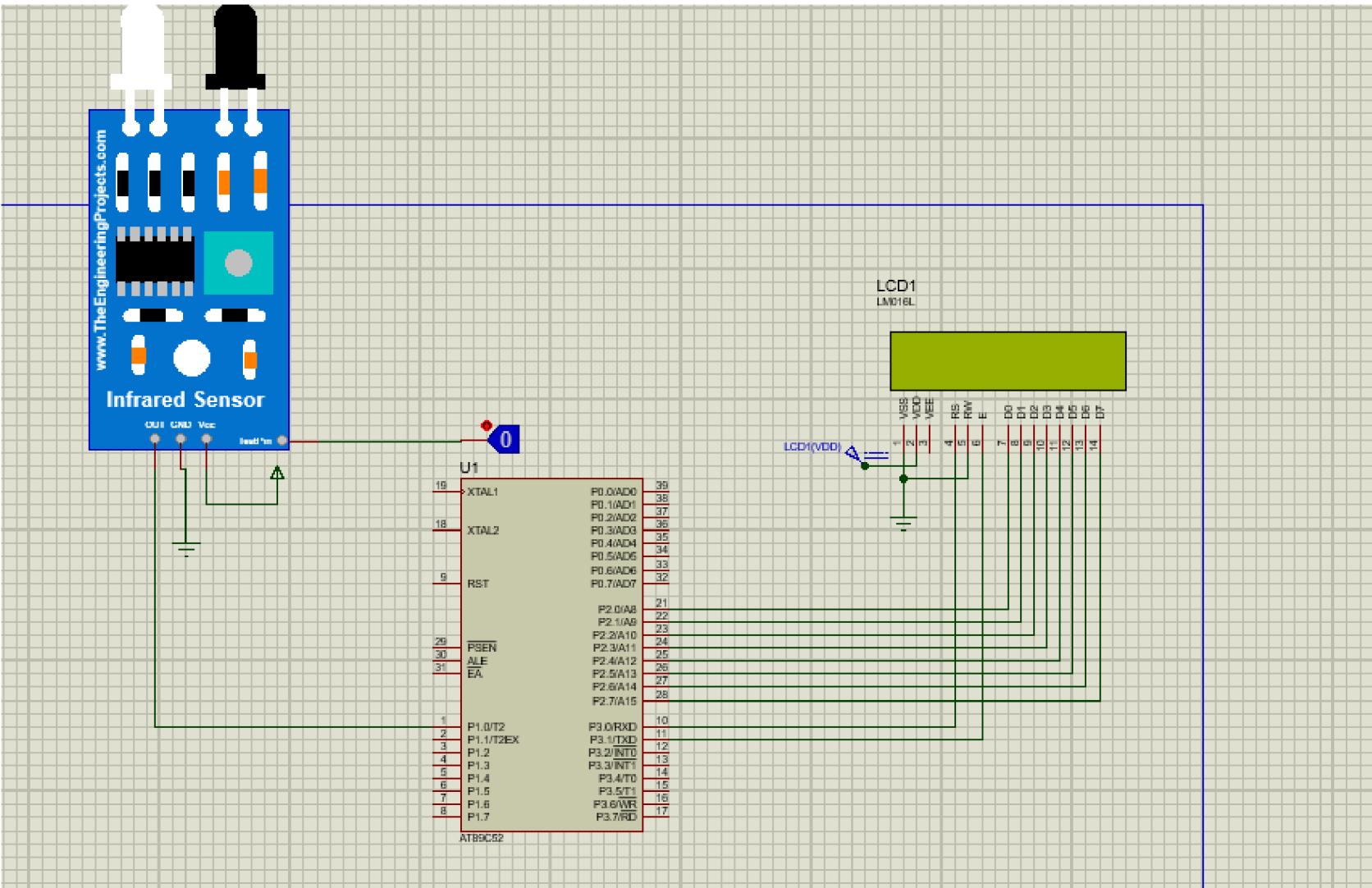
HARDWARE MATERIAL REQUIRED AND SPECIFICATIONS

1. IR Sensor Wiring: ● Connect the IR sensor to the Arduino board. Ensure proper connections for power and signal. Position the IR sensor along the conveyor belt for object detection.
2. ISP Connection: ● Connect the Arduino board to the 8051 microcontroller using ISP. Use a suitable interface SPI for communication.
3. Arduino Firmware Programming: ● Write firmware in the Arduino IDE for the Arduino board. ● Implement object detection and counting logic in the firmware.
4. 8051 Configuration: ● Configure the 8051 microcontroller to communicate with the Arduino board via ISP. Set up the microcontroller to receive firmware code from the Arduino. ● Enable functionality to count objects detected by the IR sensor.

DESIGN (BLOCK DIAGRAM)



INTERFACING DIAGRAM ON PROTEUS



WORKING DESCRIPTION

- To implement the system for detecting and counting objects on a conveyor belt using an IR sensor and an 8051 microcontroller, begin by setting up the hardware components.
- Connect the IR sensor to the microcontroller, ensuring proper wiring and placement along the conveyor belt to capture passing objects. Then, proceed to program the 8051 microcontroller. Write firmware to initialize peripherals and configure interrupt handling for the IR sensor.
- Define variables to store the object count and set up timer interrupts for accurate counting. Develop an interrupt service routine (ISR) to detect interruptions in the IR sensor's output and increment the object count accordingly.

WORKING DESCRIPTION

- Calibrate the sensor's sensitivity and test the system with various objects to ensure accurate detection and counting. Optionally, integrate a display interface to visualize the object count in real-time and implement optimization techniques to enhance system efficiency, such as fine-tuning sensor sensitivity and error handling mechanisms to address potential issues like sensor malfunctions or object miscounts.
- Once complete, integrate all components, conduct thorough testing, and deploy the system onto the conveyor belt, monitoring its performance and making necessary adjustments for optimal functionality.

ALGORITHM/FLOWCHART

1. Initialize the LCD
2. Set buzzer to low
3. If Sensor output is low :
 1. Update Count
 2. Set buzzer to high
 3. Wait until output is high
4. Repeat step 3 continuously

PROGRAM IMPLEMENTATION

The code you've provided is for an object counter using an IR sensor and an LCD display on a microcontroller. Here's a brief explanation of the code:

- The program starts by defining the ports and pins for the LCD display, the IR sensor, and a buzzer.
- The delay function is used to create a delay in the program execution.
- The LCD_command and LCD_data functions are used to send commands and data to the LCD display.
- The LCD_init function initializes the LCD display with the necessary settings.
- The LCD_clear function clears the LCD display.
- The LCD_print function is used to print a string on the LCD display.

PROGRAM IMPLEMENTATION

- The **update_counter** function increments the count variable and updates the count on the LCD display.
- In the **main** function, the LCD display is initialized, a welcome message is printed, and the count is initialized. Then, in an infinite loop, the program checks if the IR sensor detects an object. If an object is detected, the buzzer is turned on, the count is updated, and the buzzer is turned off.

This code will count the number of objects that pass in front of the IR sensor and display the count on the LCD display. The buzzer will sound each time an object is detected. Please note that this code is written for the Keil µVision IDE and the 8051 microcontroller family (as indicated by the **#include <reg52.h>** directive at the beginning of the code). You may need to adjust the code for your specific

RESULTS AND CONCLUSION

- Upon deployment, the system effectively detects and counts objects on the conveyor belt using the IR sensor and 8051 microcontroller programmed via Arduino. The IR sensor accurately detects objects passing by, triggering the counting mechanism implemented in the firmware. The 8051 microcontroller reliably processes the sensor data, incrementing the count for each object detected. The system demonstrates robust performance, providing real-time object counting capabilities suitable for industrial or logistical applications.

RESULTS AND CONCLUSION

- The integration of an IR sensor, LCD and 8051 microcontroller offers a viable solution for object detection and counting on a conveyor belt. The successful implementation highlights the versatility and efficiency of using Arduino for programming the 8051 microcontroller, enabling seamless communication and reliable functionality. The system's accuracy and reliability make it a valuable tool for various industries requiring automated object counting, with potential for further optimization and expansion to meet specific application requirements.

REFERENCES

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- [https://www.ijerct.com/papers/01-01-old/object-sensor□and-counter-using-arduino-uno.pdf](https://www.ijerct.com/papers/01-01-old/object-sensor-and-counter-using-arduino-uno.pdf)
- <https://www.instructables.com/89S52-Programmer-Using-Arduino-Uno/>

TITLE OF PAPER IMPLEMENTED USING PBL

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