# Password Protected Smart Safe

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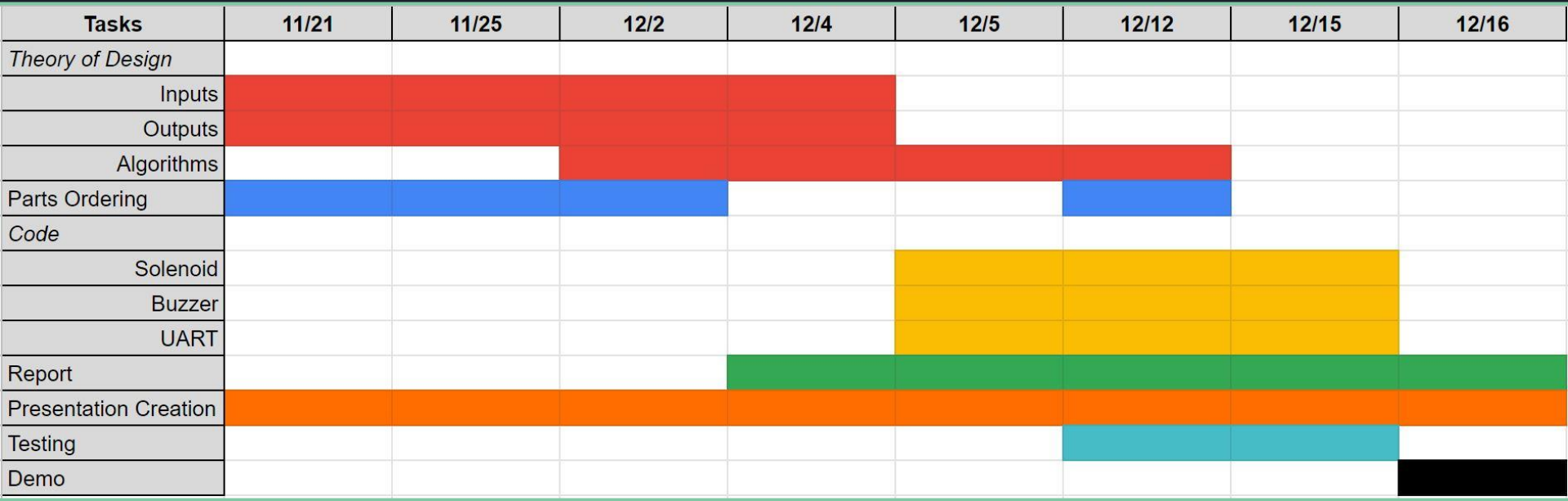
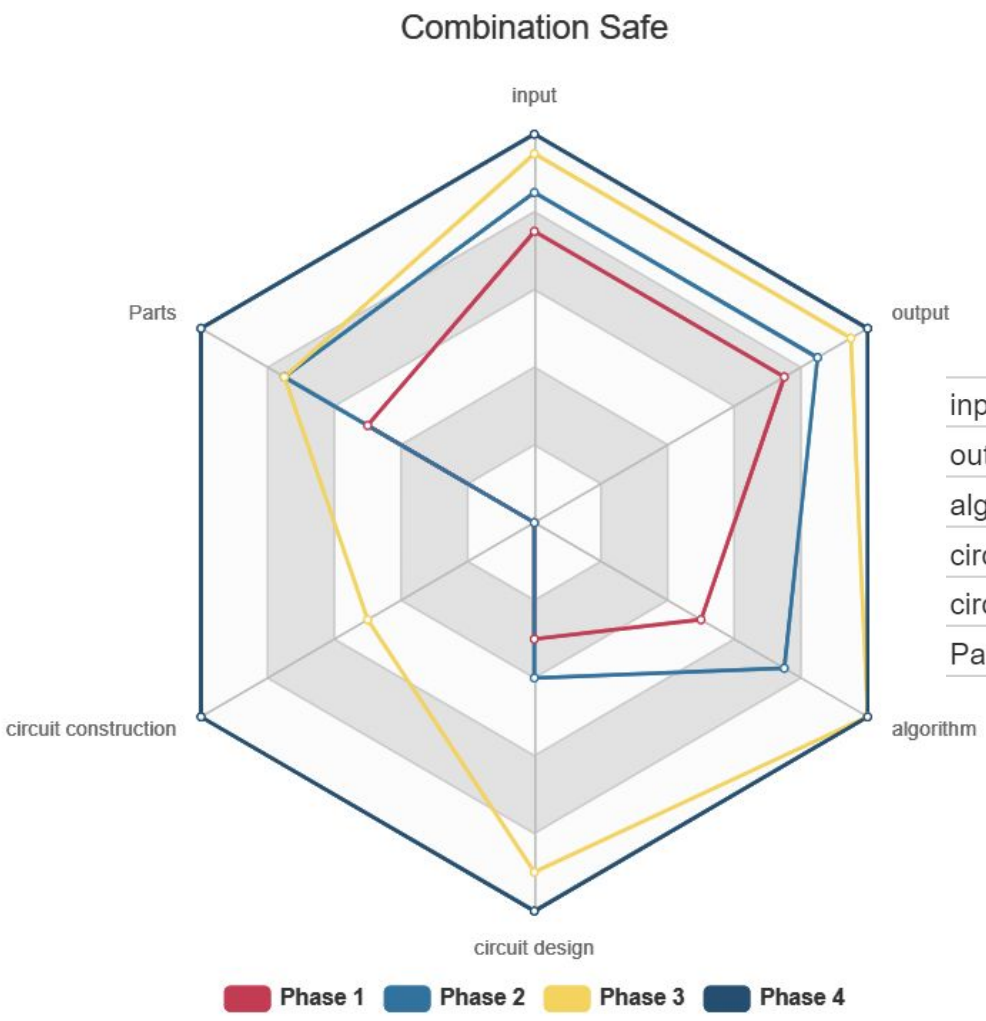
# Design Requirements

- UART communication
- 4 digit passcode
- Passcode change capability
- Lock protection using solenoid
- Alarm system

# Project Management





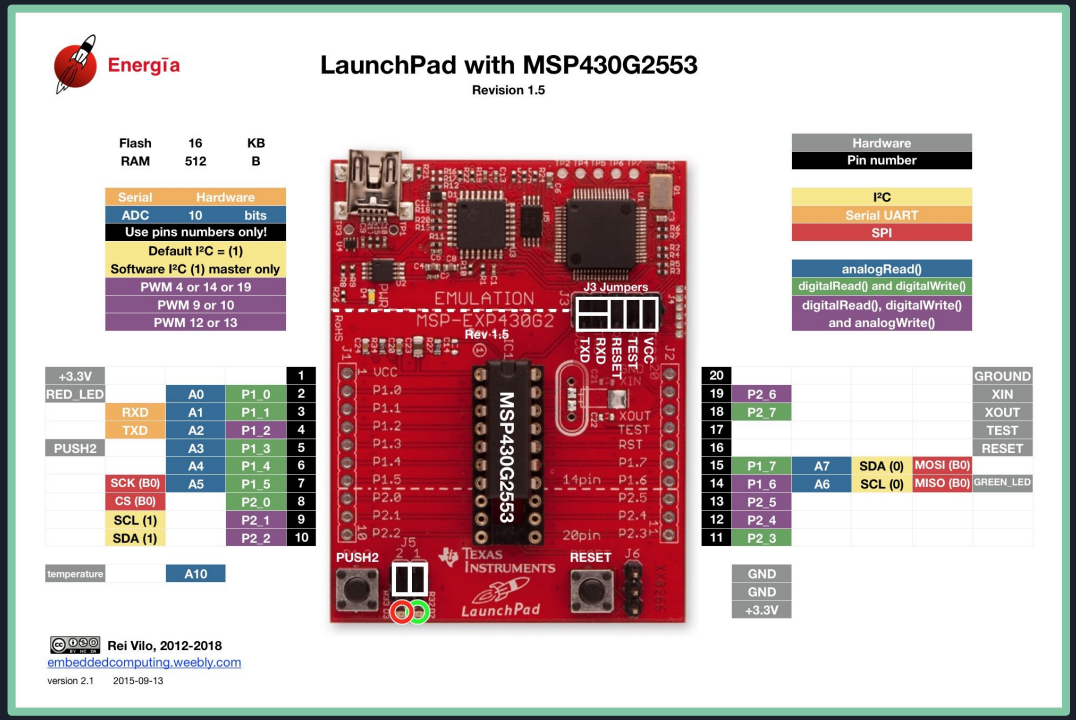

| | Phase 1 | Phase 2 | Phase 3 | Phase 4 |
|---|---|---|---|---|
| input | 75 | 85 | 95 | 100 |
| output | 75 | 85 | 95 | 100 |
| algorithm | 50 | 75 | 100 | 100 |
| circuit design | 30 | 40 | 90 | 100 |
| circuit construction | 0 | 0 | 50 | 100 |
| Parts | 50 | 75 | 75 | 100 |

# Design Specifications

- **MSP430G2553**: programmed using C code
- **Solenoid**: 6V, 800mA, 10mm stroke
- **Piezoelectric buzzer**: PS1420P02CT, 2kHz tone, 30V max voltage
- **4 digit passcode**: (0-9) communicated via UART
- **UART**: 9600 baud rate

# MSP430G2553

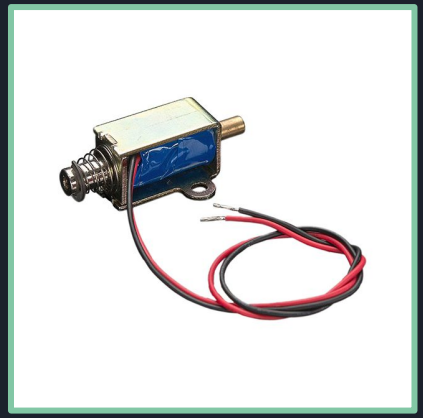
- Easily compatible systems
- Easy to work with
- 24 accessible pins
- UART communication capability



# Inputs and Outputs

**Inputs:**

- Passcode through UART
- Button locking



**Outputs:**

- Solenoid lock
- Piezoelectric buzzer alarm

# Algorithms

- If statements to compare correct passcode with UART input
- Code to determine whether the solenoid should be locked or unlocked
- Micro-controller button interfaced with solenoid to lock it when necessary
- Code to determine when to sound the alarm buzzer

# Case 1

User input matches correct passcode, change passcode not active

- Solenoid unlocks
- Buzzer stays off
- On board LEDs turn off
- Checks to make sure change passcode byte is not 0xFF

# Case 2

User input matches correct passcode, user elects to change passcode

- Solenoid unlocks
- Buzzer stays off
- On board LEDs turn off
- Checks to see that fifth byte is 0xFF
- Sets bytes 6-9 to new passcode

# Case 3

User input does not match correct passcode

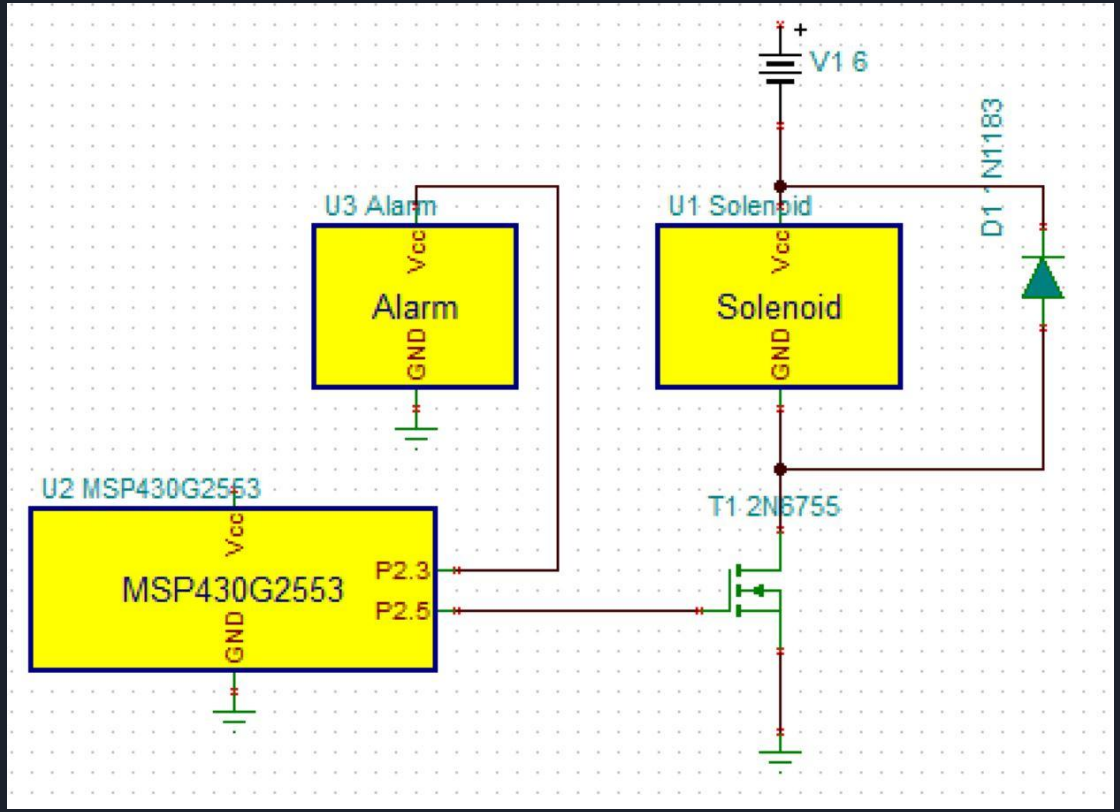
- Solenoid remains locked
- Blue on board LED remains on
- Buzzer emits a tone
- Cyan  on board LED turns on

# Case 4

Incorrect passcode is sent when safe is already unlocked

- Solenoid remains unlocked
- Buzzer emits a tone
- Cyan on board LED turns on

# Block Diagram



# Safety

- Low side switch for current control

- Catch Diode to counter induction from the solenoid