CAMP # 1 ACTIVITIES

REF : myFlowLab-1602-1

GETTING STARTED

MATROLL **M** myFlowlab

Day 1
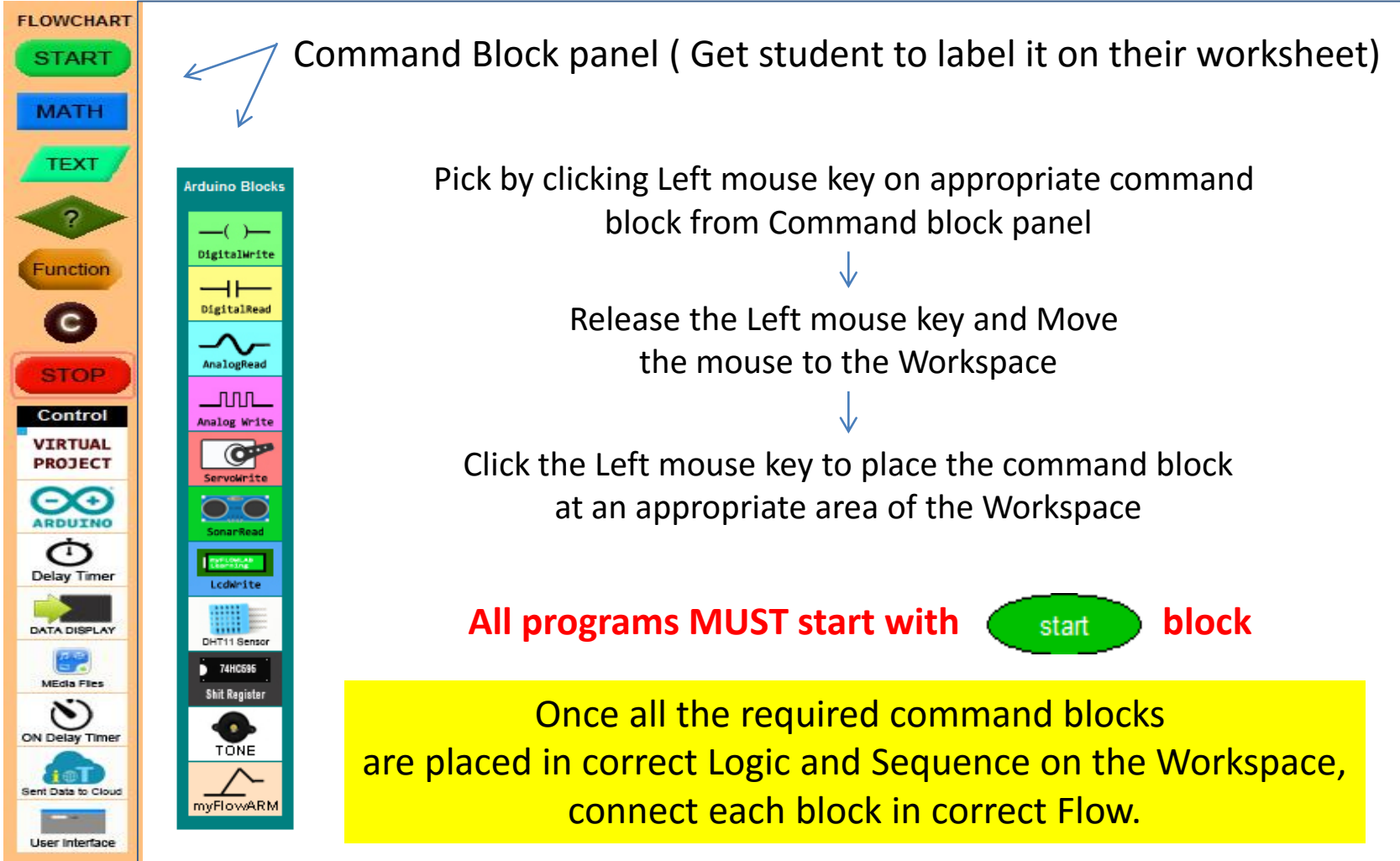
Mastering Coding Logic Skills

FlowLogic **6 Version 2.4**

Component Description

Lock/ Unlock Workspace

Workspace Center

Connect Line

Delete Line

Delete Block

Widgets (Screen, I/Os, Variable, Timer, Counter, Gauge, Chart Windows)

Control Panel(Arduino board Control and Monitoring Input and Output)

Virtual Project

Save As

Save

Open

New

Com Ports
Communication Interface with
Arduino board

Flowchart command panel
The blocks used to code
Flowprogram with user
defined properties

Flowprogram

Counter Window

Flowprogram Execution control
Play, Stop, pause, Continue

Execution speed
User can adjust the speed of the
Flowprogram execution.

**Command block colors
and size**

Virtual Project control
Commands

Control Command Panel
Command blocks to
Animate and control Input
/output of virtual projects
and Real-time projects via
controller boards

Recent Flowprogram
The Recent Flowprogram
shows the recent opened
Flowprograms, user can click
it to open

Workspace
Flowprogram development
and editing area

Virtual project (eg. Rocket launcher)
Animate and control virtual
project via Flowprogram

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Writing Program

FLOWCHART

START

MATH

TEXT

?

Function

C

STOP

Control

VIRTUAL PROJECT

ARDUINO

Delay Timer

DATA DISPLAY

MEdia Files

ON Delay Timer

Sent Data to Cloud

User Interface

Arduino Blocks

DigitalWrite

DigitalRead

AnalogRead

Analog Write

ServoWrite

SonarRead

LcdWrite

DHT11 Sensor

74HC595 Shit Register

TONE

myFlowARM

Command Block panel (Get student to label it on their worksheet)

Pick by clicking Left mouse key on appropriate command block from Command block panel

↓

Release the Left mouse key and Move the mouse to the Workspace

↓

Click the Left mouse key to place the command block at an appropriate area of the Workspace

All programs MUST start with start **block**

Once all the required command blocks
are placed in correct Logic and Sequence on the Workspace,
connect each block in correct Flow.

Editing Command Blocks

Get student to identify the Icons associated with Connect Line, Delete Line and Delete block And label it on their worksheet.
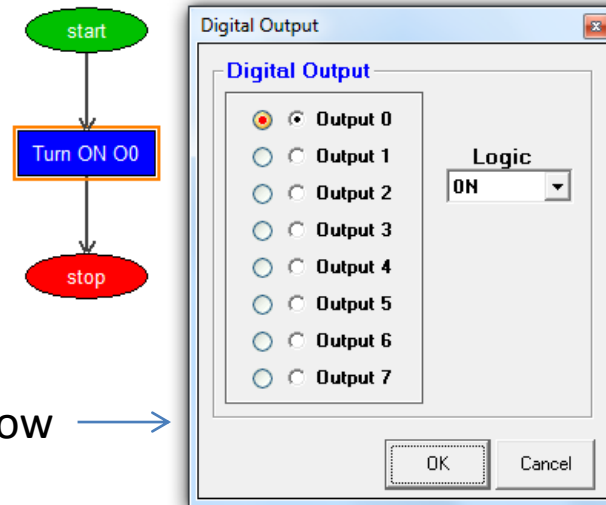
To delete Line and Blocks

To Edit blocks

Block 1

a

Block 2

b

Block 3

Property Window →
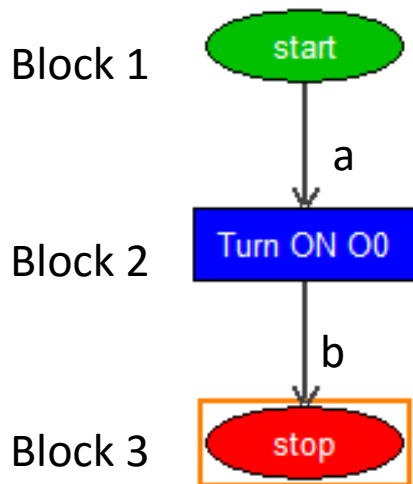
To delete line "a", click on Block 1
and then Block 2, while mouse pointer
on Block 2, right click and select "Delete Line"
option from the pop-up menu.
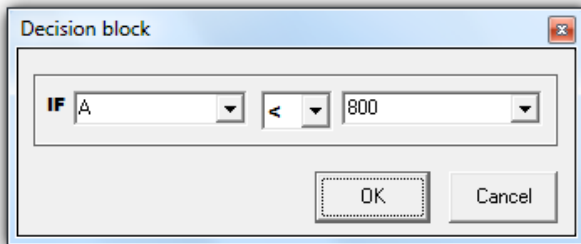To delete Blocks, delete all connecting line, right
Click on the block and select "Delete block"
option from the Pop-menu.

To edit blocks, double click on the block and
make the necessary changes on the pop-up
property Windows and click "Ok" when done.

Working with Decision Blocks

Decision block

IF [A] [<] [800]

OK   Cancel

Decision block
Property Window

Condition statement as specified
in the property window

IF
A < 800

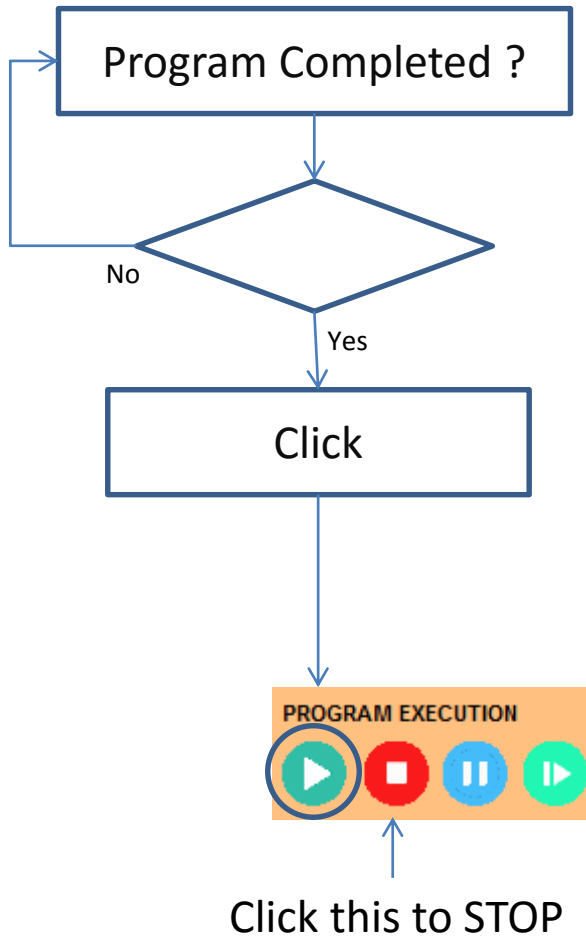NO → digitalWrite(8, OFF)

YES

digitalWrite(8, ON)
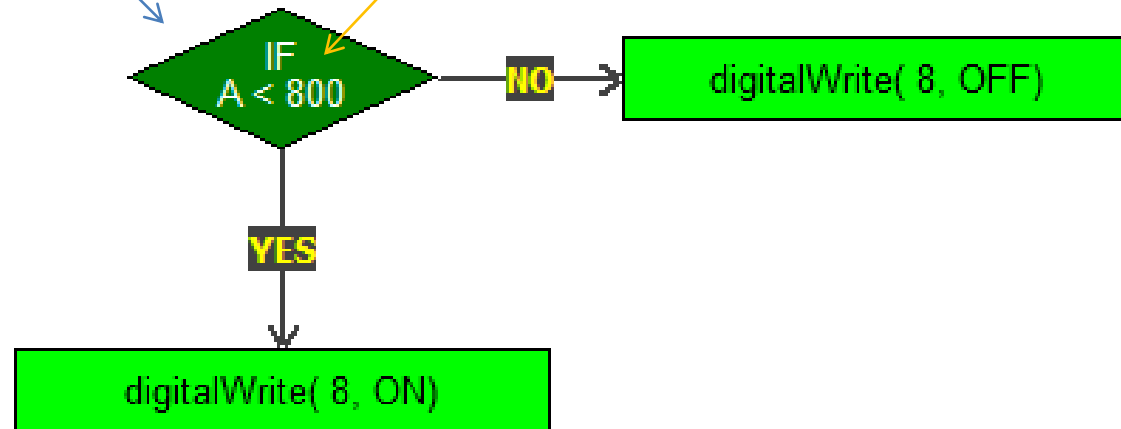
Decision block requires two (2) connecting point, the first connection to a block
will be "YES" and the next connection will be "NO".

Connect the lines at your discretion based on the condition statement on the decision block.

Program Execution

Virtual Projects

Program Completed ?

No

Yes

Click

PROGRAM EXECUTION

Click this to STOP

Project Connected to Brain-Board (Arduino)

Connection Tested?

Control Panel to Test

No

Yes

Program Completed?

Complete the Program

No

Yes

Com Port Opened?

Click 'CLOSE" and 'RESET" to reset connection

PORT : COM 3   CLOSE   RESET

No

Yes

PROGRAM EXECUTION
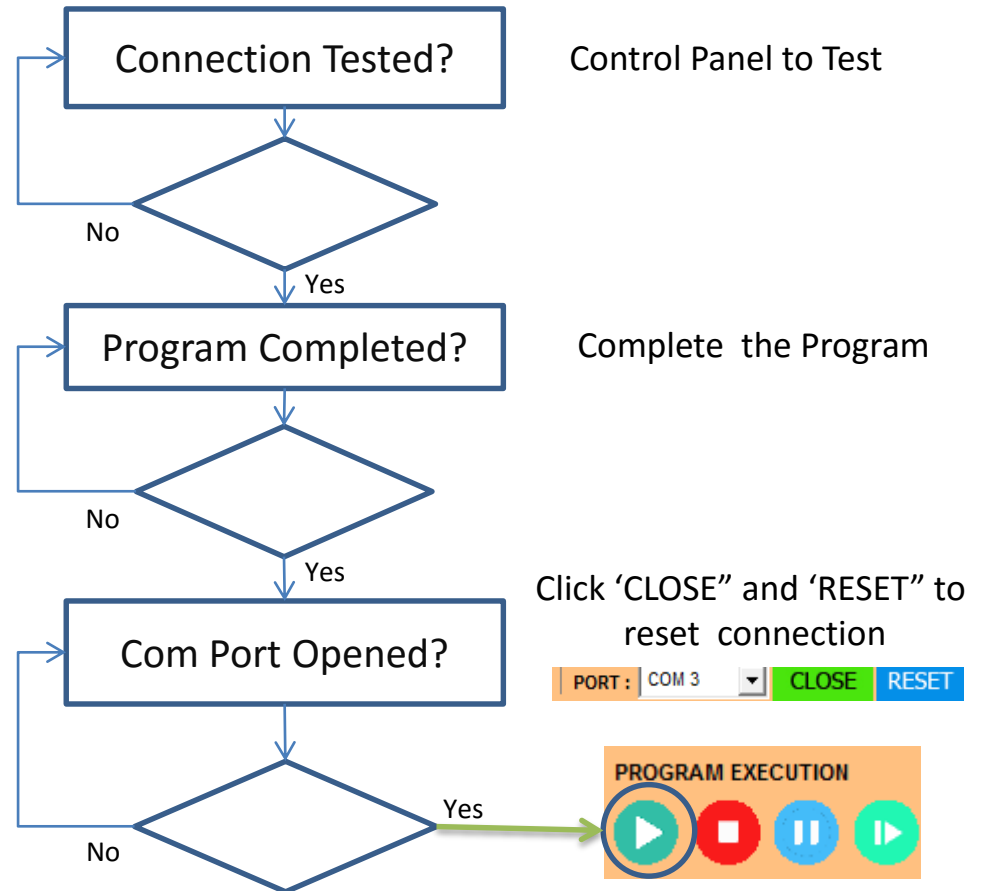
Virtual Projects

Is a on-screen mimics with Pre-assigned control pins and animations that can be programmed by using the virtual command blocks
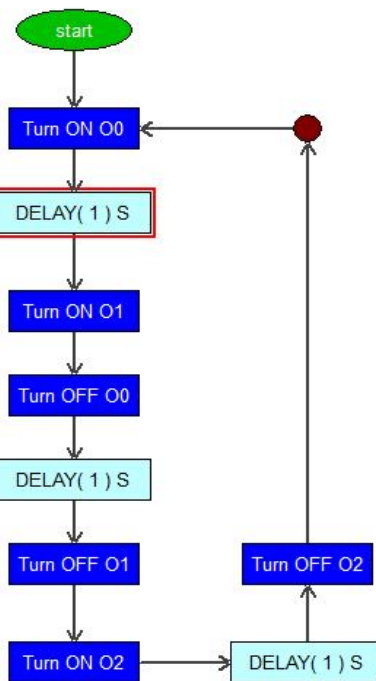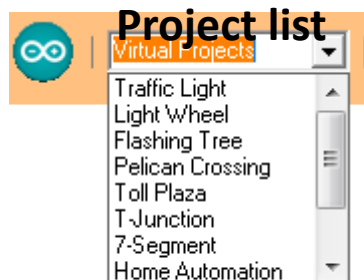
Command Block
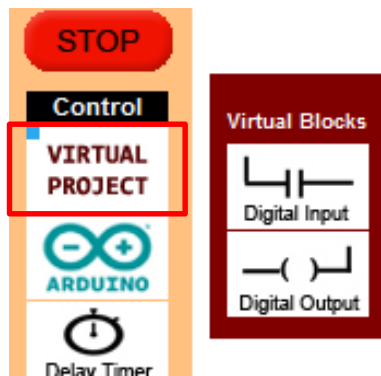
Example Code

Project list

Pre-assigned control pins

When running Virtual project programs, select the appropriate project from the list and place it on the Workspace.

Learn to Code
M1-S1 - Offline Coding

Explain to the class what is the definition of coding

Coding or Programming is a list of step-by-step instructions that get computers to do what you want them to do to achieve a desired Result.

In this lesson students will be paired to do role play of Computer and a Robot.
Each student will take turn to write a list of instructions on a paper and read out to his partner to carry the instructions.

The student who read out is the Computer and the student who carry the instructions is a Robot

Follow the Direction activity
Get the Computer to Execute a set of instructions (Coding) that directs the Robot to a destination

E.g.: 1. Start
    2. Move Forward 10 Steps
    3. Wait 2 Sec
    4. Turn Left
   5. Move Forward 5 Steps
    6. ---
    7. ---

Explains to students, if the Robot is NOT performing as per the coding written, there is a BUG in their code and they need to fix it and start again until the the desired Result is achieved.

Learn to Code
M1-S2 – Single LED Control

1. Load M1_S2_1 program and get student to write it on their worksheet and then using FlowLogic 6, Test it and Run it.

LED 0 ON/OFF   **LED 0 Blink**
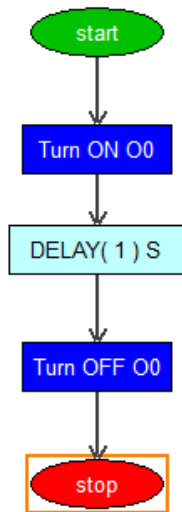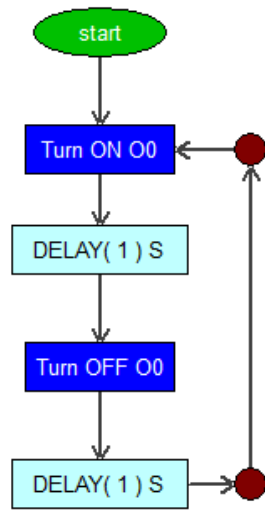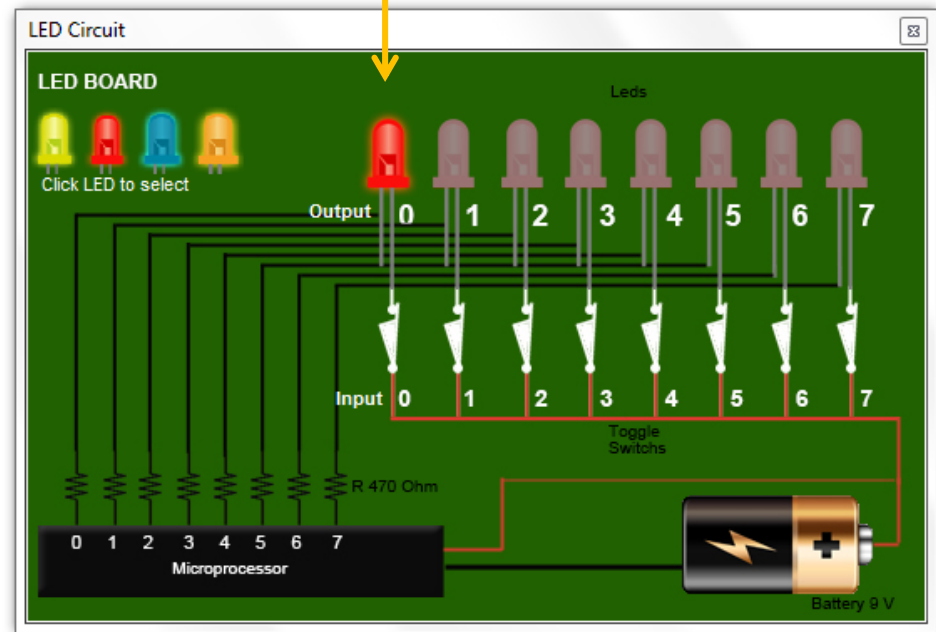
M1_S2-1

M1_S2-2

2. Once M1_S2_1 completed , Load the M1_S2-2 program and Explain. Get student to edit their LED ON/OFF code to make the LED blink and Delay timing as they desire.
3. Play the aircraft beacon strobe light video and Explain, get them to change the first delay value to 0.02 sec and second delay value to 2 sec and Run it.
4. Ensure they have successfully carried out their task for the session.

Day 2

Coding using Virtual projects 1

# Learn to Code
M1-S3 – 2 LED Control / Police car siren light project

1. Load M1_S2_1 program and get student to write it on their worksheet and then using FlowLogic 6, Test it and Run it.


M1_S3-1

2. Get them to play with timing value in the Delay Block to perfect it

3. Once its working fine, add the media Block "Police Siren 3" to complete the project.

Learn to Code
M1-S4 – 3 LED Control / Traffic Light project

STD Traffic Light Control

Traffic Light Control with Yellow light blink - Variations

M1_S4_1

M1_S4_2

Digital Output Signal: Red - 0   Yellow - 1   Green - 2

1. Load M1-S4_1 and get student to write the code on their Worksheet.
2. One done get them to write it the using FlowLogic 6, test it and run it.

3. Discuss the variations and upgrade the Program with Yellow light blinking effect.

Learn to Code
M1-S5 – Number Display project

M1_S5_0

```
start
  ↓
Turn ON O0
  ↓
Turn ON O1
  ↓
Turn ON O2
  ↓
Turn ON O3
  ↓
Turn ON O4
  ↓
Turn ON O5
  ↓
Turn OFF O6
  ↓
Media
0.wav
  ↓
stop
```

7 Segment

0
5   1
6
4   2
3

Off-line ☑

Input Button

START   STOP   RESET   UP   DOWN
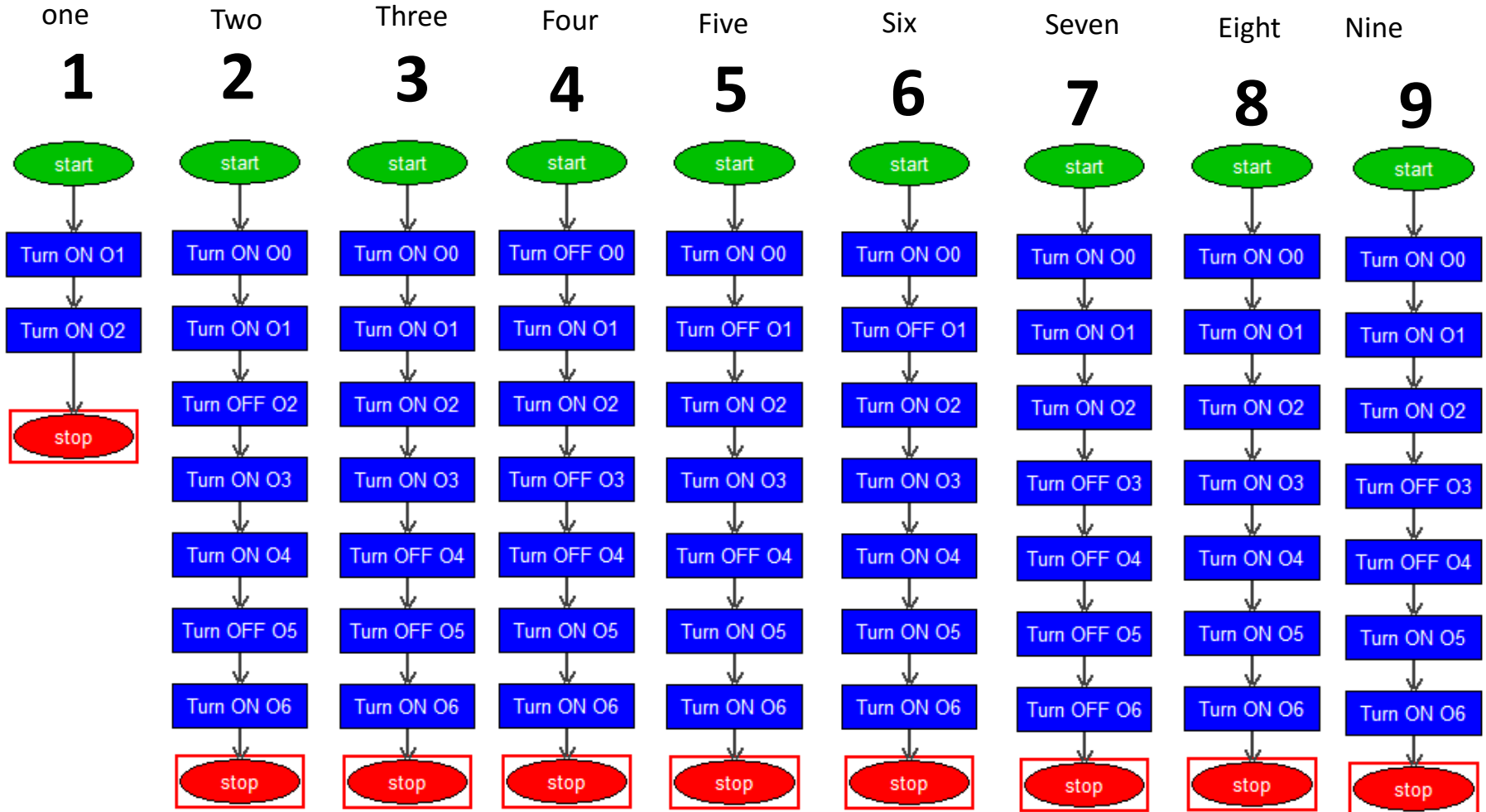 ○   ○   ○   ○   ○
  0   1   2   3   4
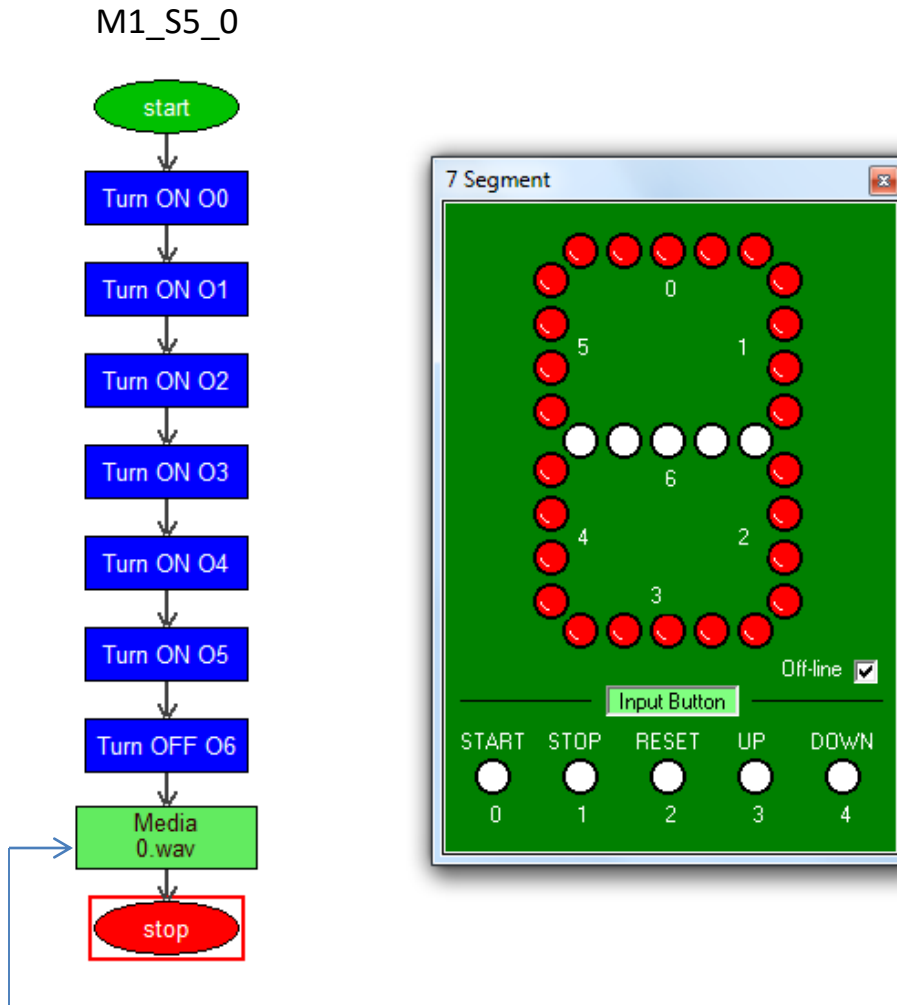
1. Load the M1_S5_0 and get student to write on their worksheet before writing, testing running it using FlowLogic 6

2. Get student to do the same for all the program in the next page, to display numbers from 1 to 9.

3. Get them to Include in their program. Media block to say out the number in each program

The media number audio files are available in Media file folder.

Day 3

Coding using Virtual projects 2

M1-S5 – Number Display project

one	Two	Three	Four	Five	Six	Seven	Eight	Nine
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**

start	start	start	start	start	start	start	start	start
Turn ON O1	Turn ON O0	Turn ON O0	Turn OFF O0	Turn ON O0	Turn ON O0	Turn ON O0	Turn ON O0	Turn ON O0
Turn ON O2	Turn ON O1	Turn ON O1	Turn ON O1	Turn OFF O1	Turn OFF O1	Turn ON O1	Turn ON O1	Turn ON O1
stop	Turn OFF O2	Turn ON O2	Turn ON O2	Turn ON O2	Turn ON O2	Turn ON O2	Turn ON O2	Turn ON O2
	Turn ON O3	Turn ON O3	Turn OFF O3	Turn ON O3	Turn ON O3	Turn OFF O3	Turn ON O3	Turn OFF O3
	Turn ON O4	Turn OFF O4	Turn OFF O4	Turn OFF O4	Turn ON O4	Turn OFF O4	Turn ON O4	Turn OFF O4
	Turn OFF O5	Turn OFF O5	Turn ON O5	Turn ON O5	Turn ON O5	Turn OFF O5	Turn ON O5	Turn ON O5
	Turn ON O6	Turn ON O6	Turn ON O6	Turn ON O6	Turn ON O6	Turn OFF O6	Turn ON O6	Turn ON O6
	stop	stop	stop	stop	stop	stop	stop	stop

Get students to edit each programs to include Media block to say out the number

Learn to Code
M1-S6 – Flashing Tree project

1. Load the M1_S6_1 program and get student to write on their worksheet before writing, testing running it using FlowLogic 6
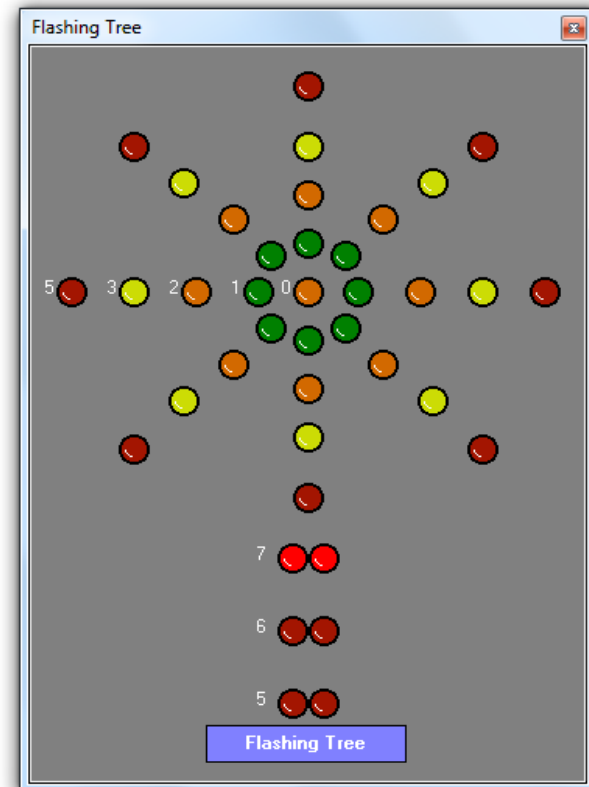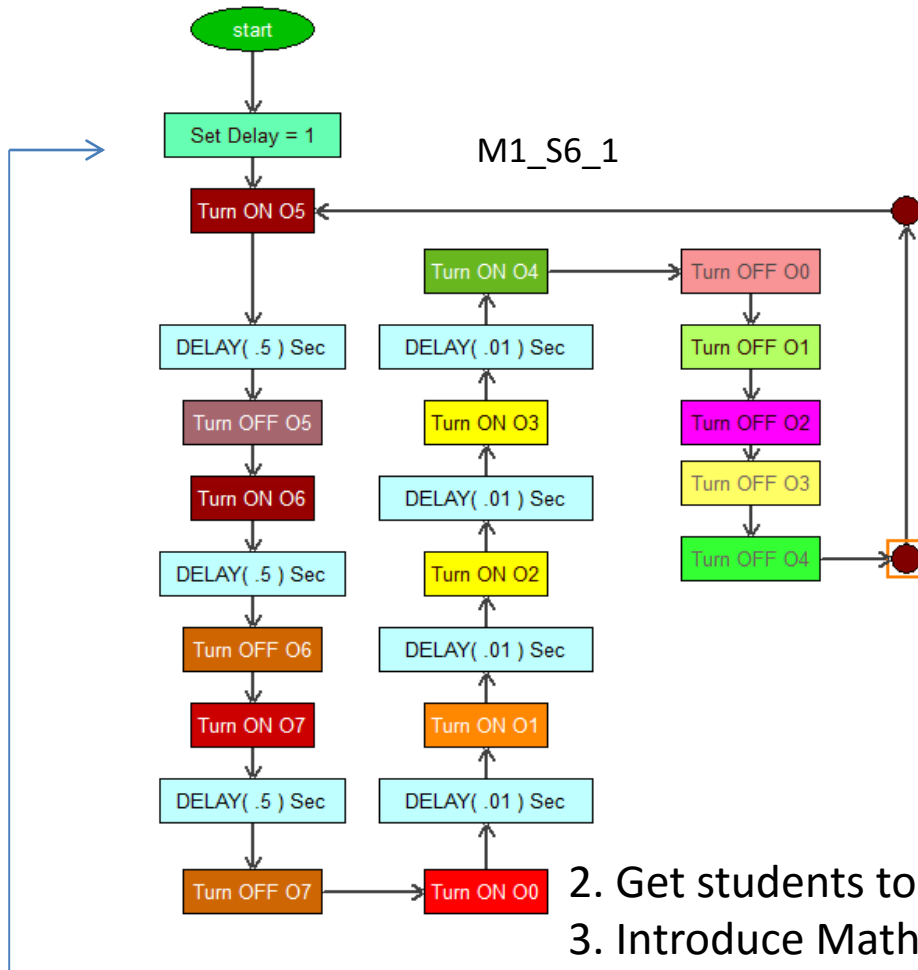

M1_S6_1

2. Get students to change color of the block and text .
3. Introduce Math SET command block to define variables

Learn to Code
M1-S7 – Knight Rider project

1. Load the M1_S6_1 program and get student to write on their worksheet before writing, testing running it using FlowLogic 6

2. Use Math command block SET to define variable for Delay (start with 1 sec then to 0.03 sec

M1_S7_1
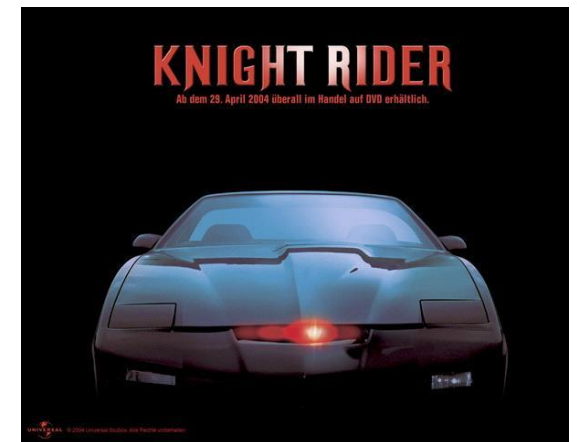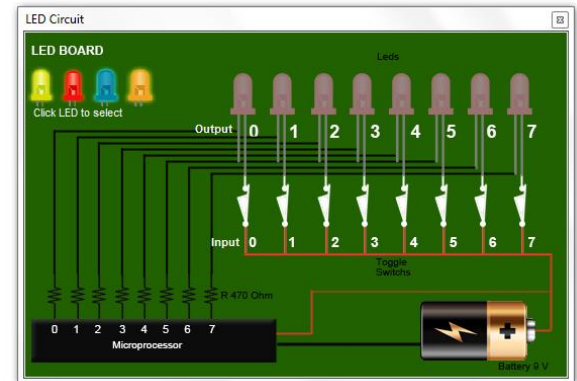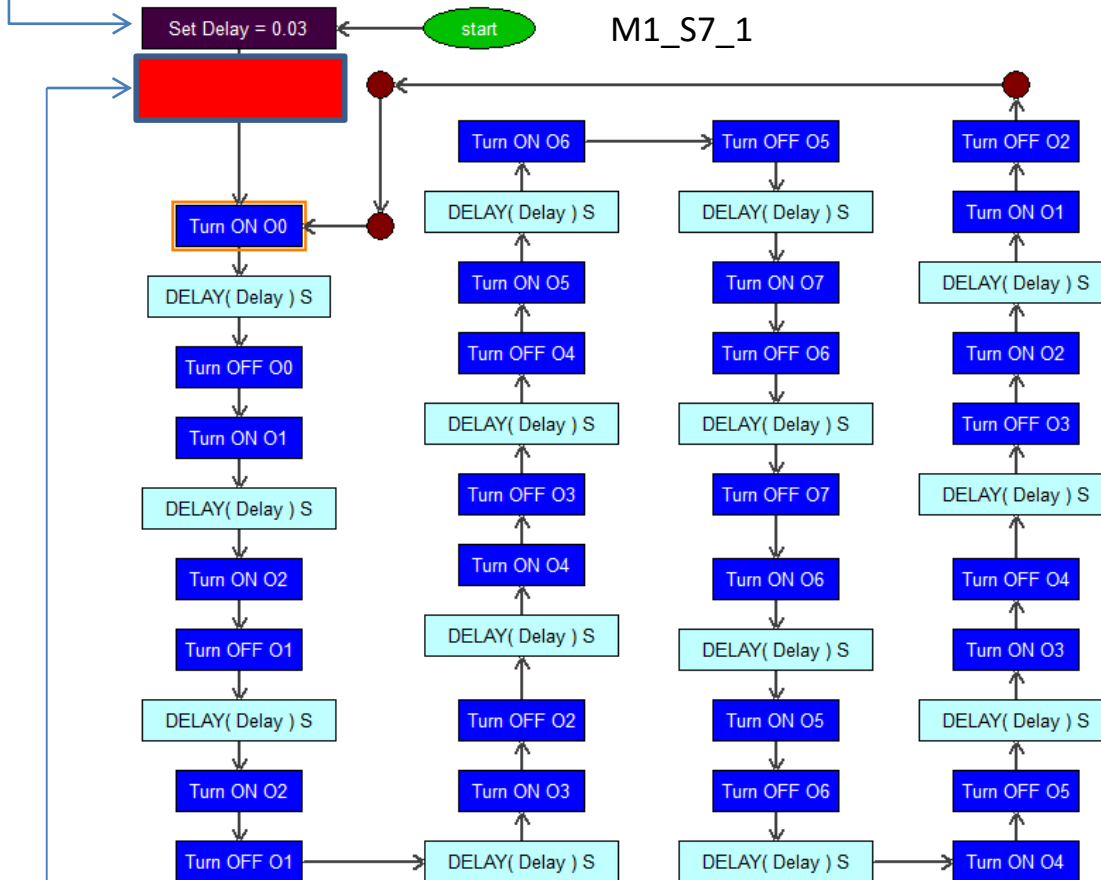
3. Get student to place the Media command block ("Knight-Rider" music) in a correct flow.

Learn to Code
M1-S8 – Rocket Launcher project

1. Load the M1_S8_1 program and get student to write on their worksheet before writing, ~~testing running it using FlowLogic 6~~

M1_S8_1 - Without Media blocks

M1_S8_2 - With Media blocks

Counter Window Widgets

For Media Block – "Countdown_3"

For Media Block – "BlastOff"
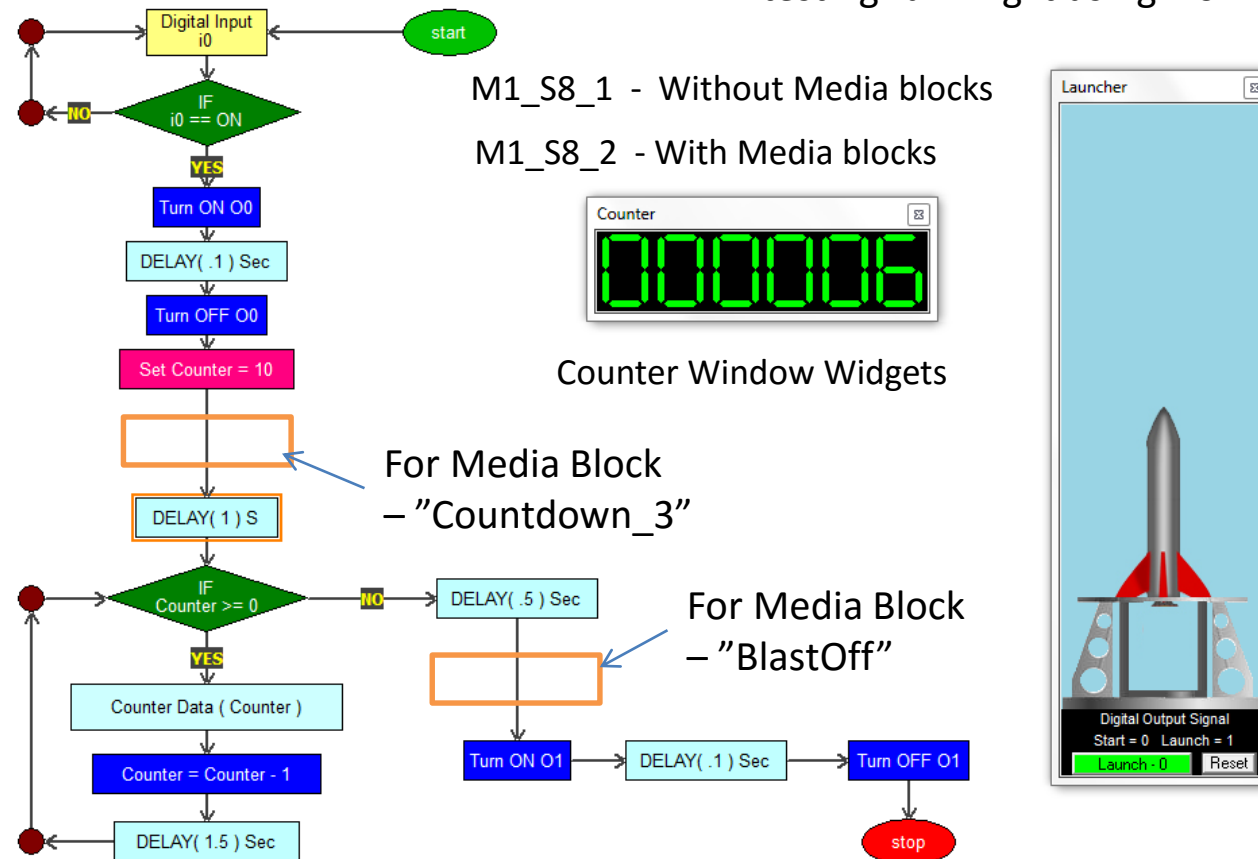
2. Explain to student about this project and guide them to write the above code using FlowLogic 6. Test it and Run it.

3. Load M1-S8_2 code and get student to add a Media Blocks audio as shown on your PC.

Day 4

Exploring Electronics

Resistor

Resistor value calculation

Resistor Identification

The end with more bands should point left when reading colors.

Inexpensive resistors usually have 4 bands and looser tolerance

560k Ω
with +/- 10% tolerance

Better resistors usually have 5 bands and narrower tolerance

237 Ω
with +/- 1% tolerance
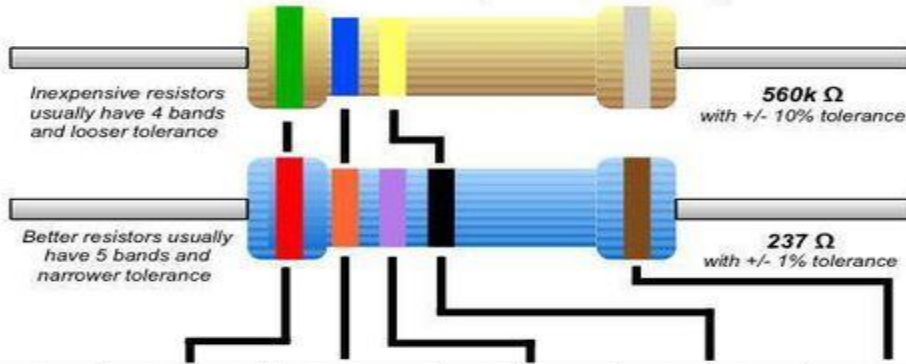
Color	1st Band	2nd Band	3rd Band	Multiplier	Tolerance
Black	0	0	0	x 1 Ω	
Brown	1	1	1	x 10 Ω	+/- 1%
Red	2	2	2	x 100 Ω	+/- 2%
Orange	3	3	3	x 1K Ω	
Yellow	4	4	4	x 10K Ω	
Green	5	5	5	x 100K Ω	+/- .5%
Blue	6	6	6	x 1M Ω	+/- .25%
Violet	7	7	7	x 10M Ω	+/- .1%
Grey	8	8	8		+/- .05%
White	9	9	9		
Gold				x .1 Ω	+/- 5%
Silver				x .01 Ω	+/- 10%

220 Ohm 4 band resistor

Red	Red	Brown	Ignore this band

2   2   x 10 = 220 ohm

10K Ohm 4 band resistor

Brown	Black	Orange	Ignore this band

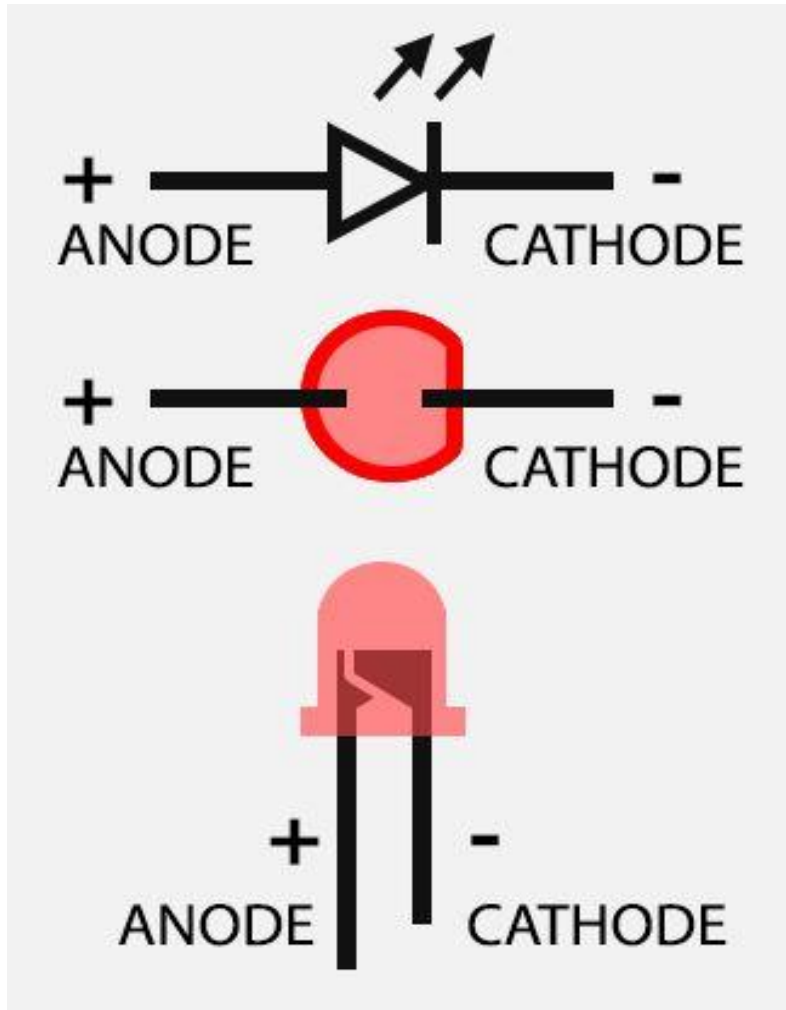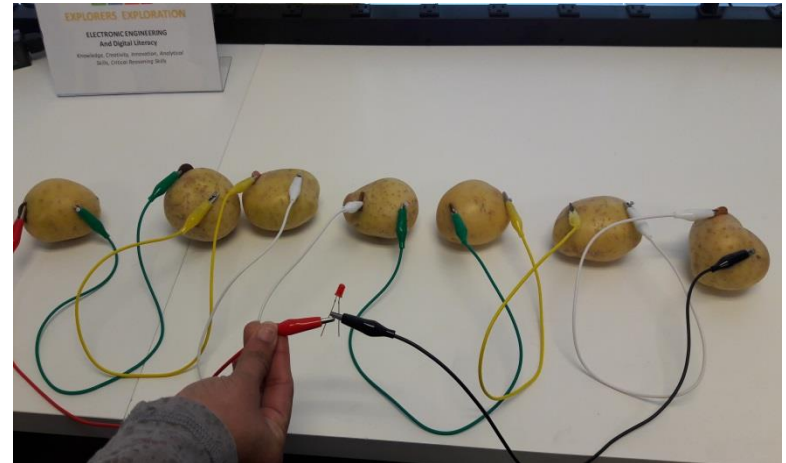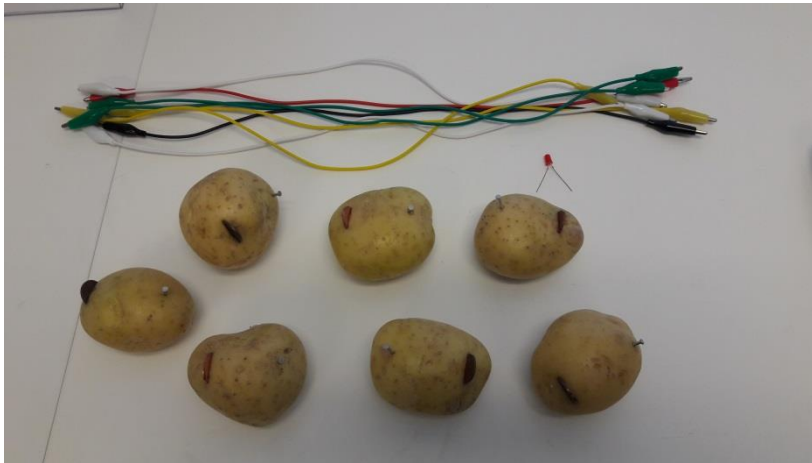1   0   x 1k = 10K ohm
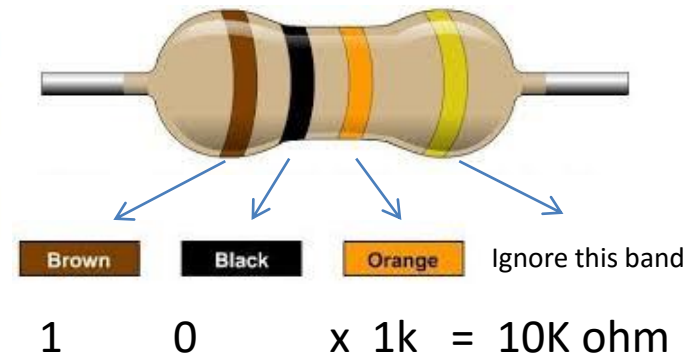
LEDs – Output Devices
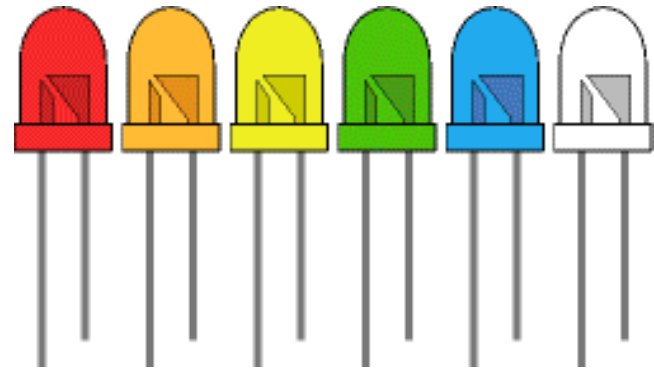
Electronic & Circuit
M2-S1 – Fruit Circuit

Explain to student about Conductivity with Potatoes or Fruits

**Requirements**
- 7 to 10 Potatoes
- Crocodile Clip wires
- 7 to 10 Dime (Copper Material +)
- 7 to 10 Nails (Zinc -)
- 1 5mm LED

- Get students to work in of pair of two (2).
- Insert the Dime and Nail to each of the Potatoes or fruits
- Use Crocodile clip wires to Connect the wires (Dime to nail) in Series
- The first and last potatoes or fruit connect to the LED (Dime is + and Nails is -)

Fruit Circuit Worksheet

LED

+

-

Copper
Dime (+)

Zinc
Nail (-)

Crocodile
Clip wires
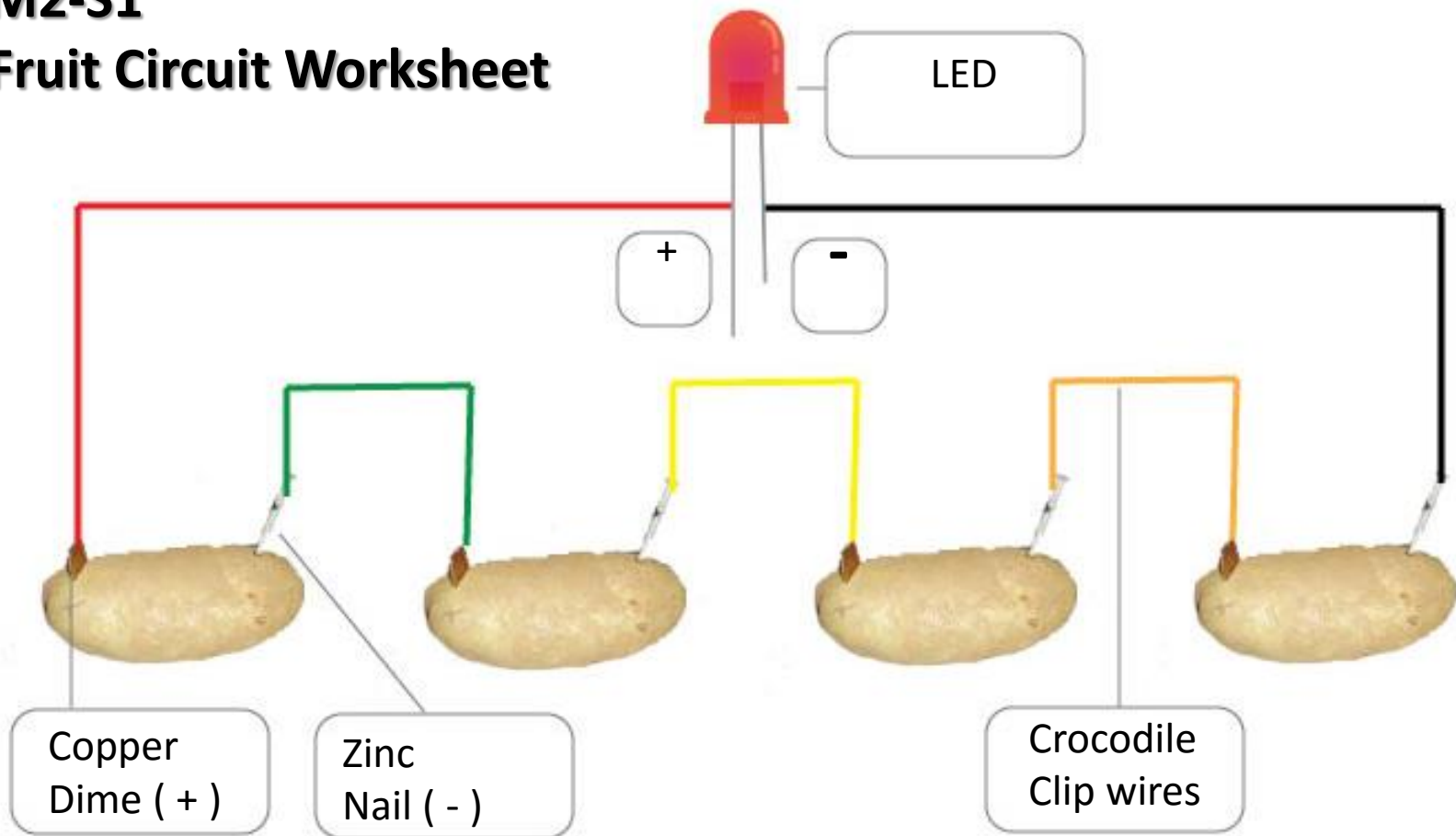
1. Help student to insert the Dime and Nails (For safety reason). Tell them to ask their parent's help if they want to try out this experiment at Home.

2. Get student to connect the terminal (Dime & Nails) and the LED in series as shown using crocodile clip (Use appropriate colors)
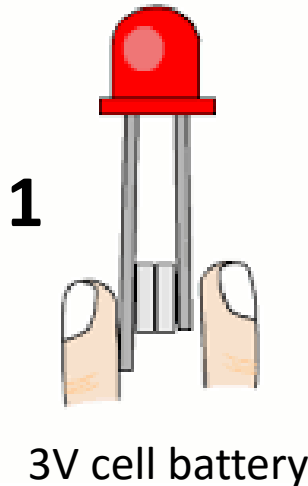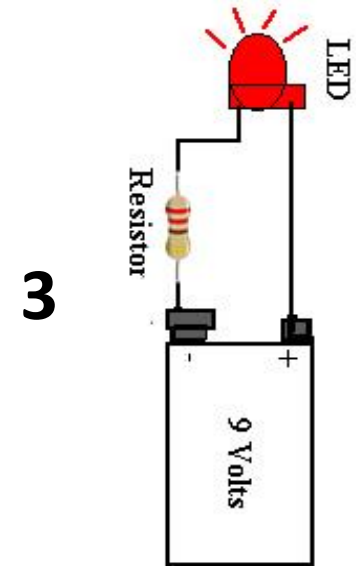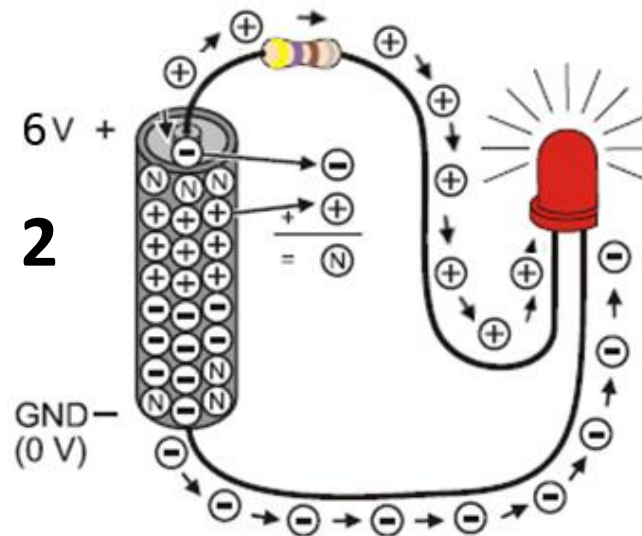
Electronic & Circuit
M2-S1 – Power Source

Explain to student about Power Source and Resistance

Use 1 and 2
3 V Cell Battery

1

3V cell battery

Use 2 3 V Cell Battery

6V +

GND
(0 V)

2

3

LED

Resistor

9 Volts

Get student to experiment turning the LED with different Battery (3V, 6V, 9V) and Resistor Value s(220 ohm, 10K ohm)

Requirements
-   2 - 3V Cell Battery
-   1 - 9 Volt Battery
-   1 - LED

Explain to students the different Power source that are used in this activities. **Use TESLA Examples.**

Get students to connect the LED to the power source as in sequence above and Explain why resistors are required. (To protect the LED from burn out).
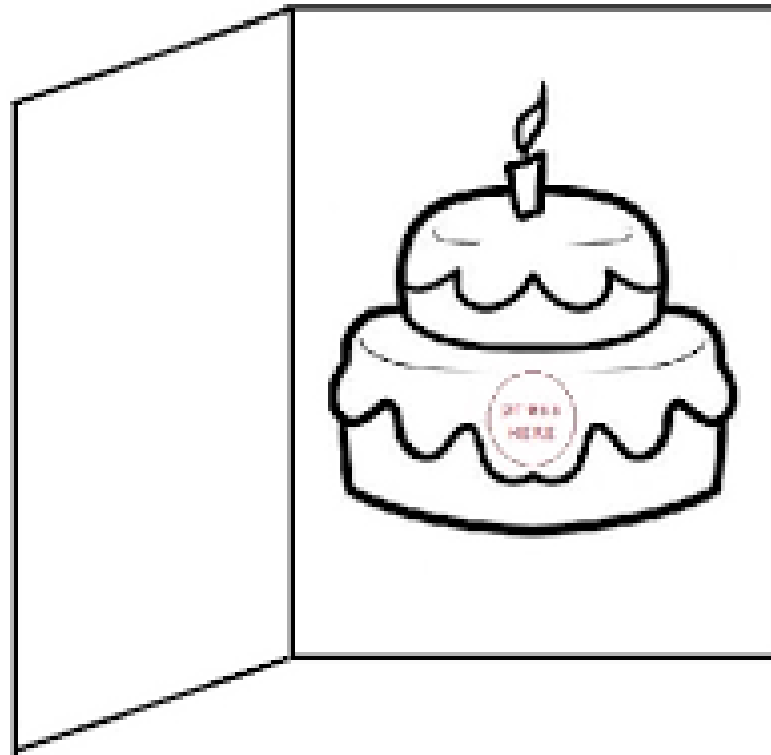
Electronic & Circuit
M2-S3 – Single LED Circuit
Using Copper tape

LED

– +

1. First Build Circuit without a Resistor
   After testing it, Modify the Circuit to add the Resistor

2. Show variations by including Artworks

220 ohm

Use cell battery - +ve facing up

3V Battery

+

Fold Here

Electronic & Circuit
M2-S4 Greeting card project

Using Copper tape

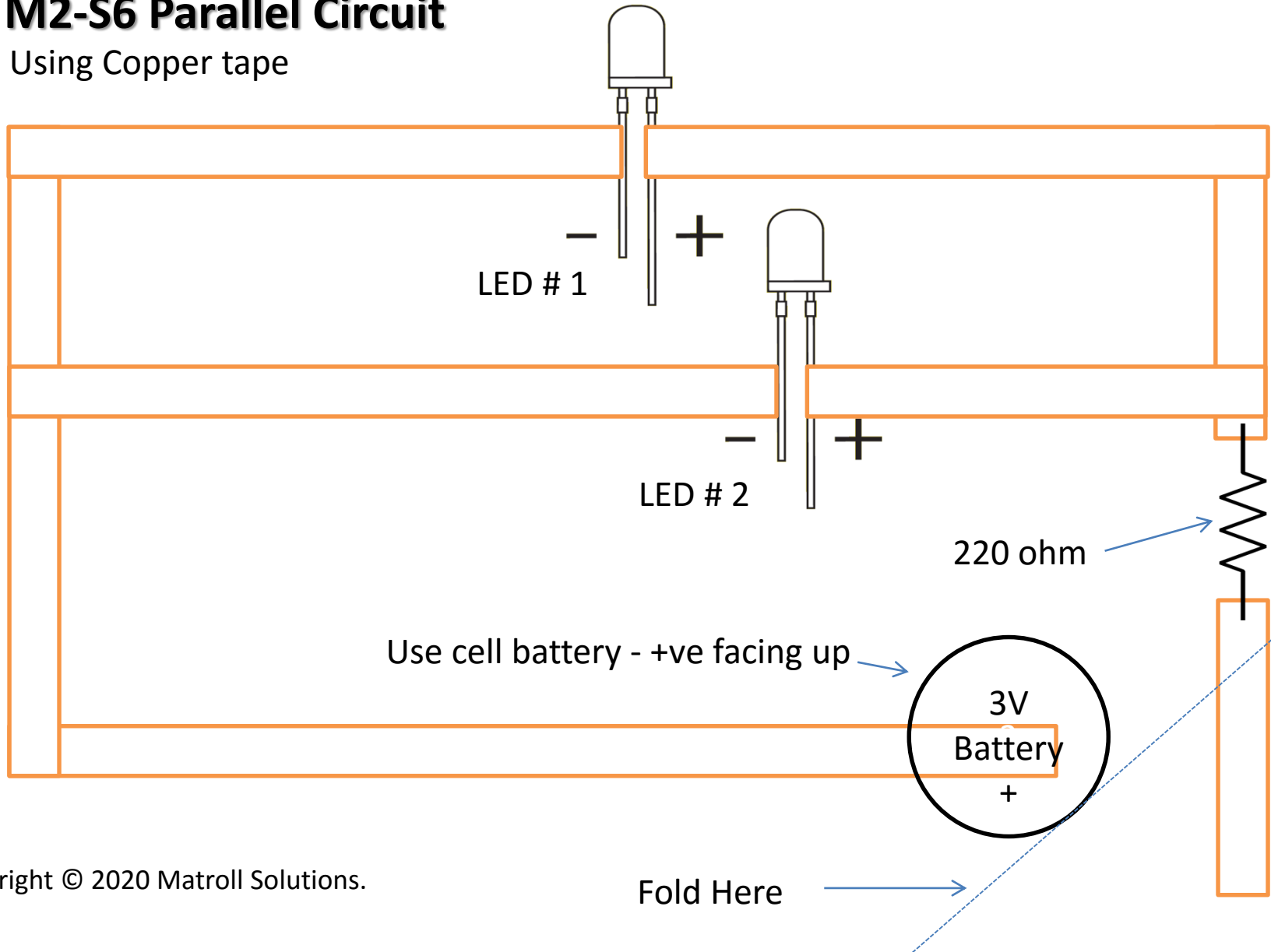Guide student to design a Greeting card for an occasion with a single LED circuit

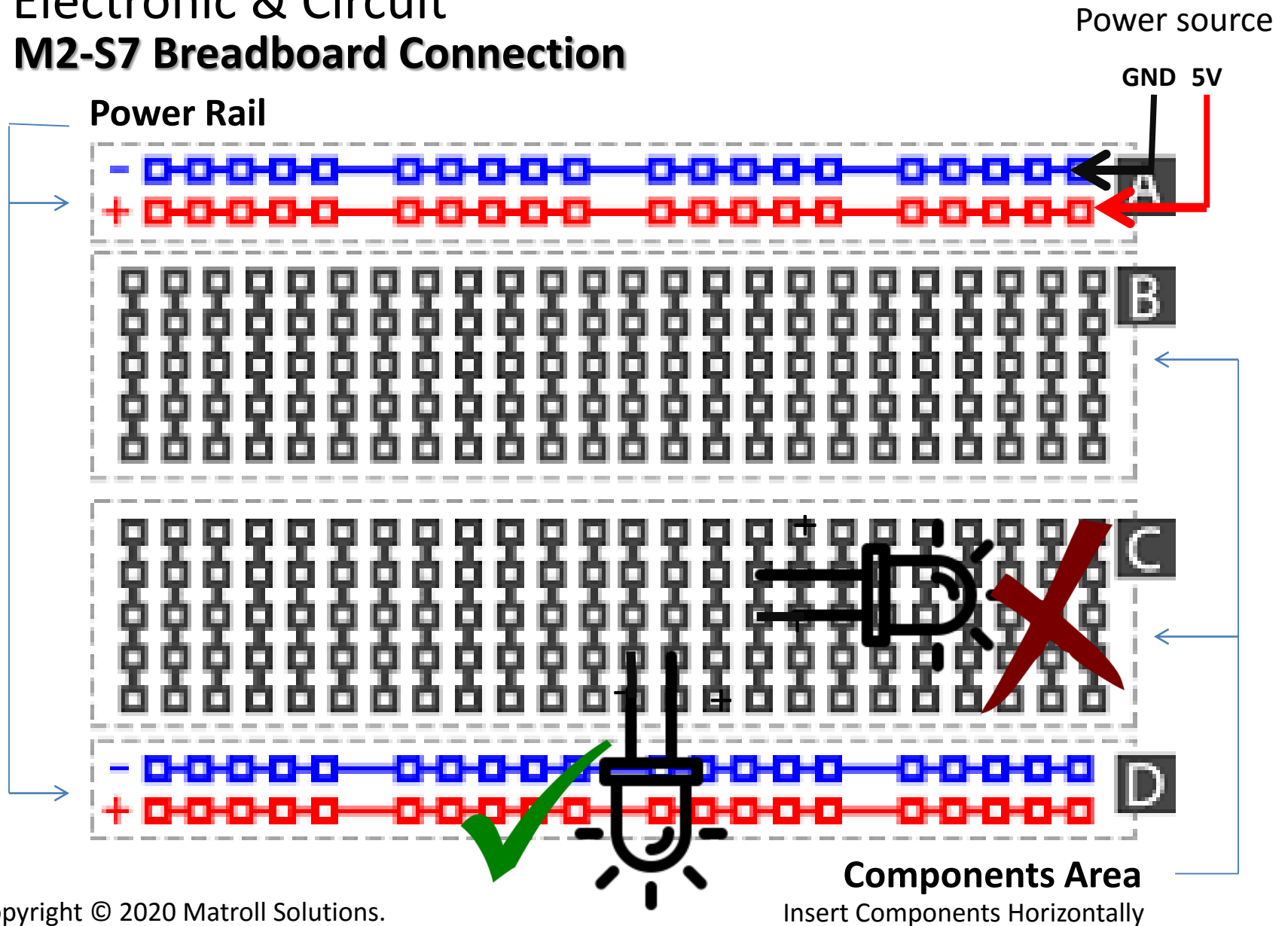# Electronic & Circuit
M2-S5 Series Circuit
Using Copper tape

LED # 1

LED # 2

− + − +

1. First Build Circuit without a Resistor
   After testing it, Modify the Circuit to add
   the Resistor and additional battery for more power

2. Explain to student why additional power required
   to lit the LED in series

3. Show variations by including Artworks

220 ohm

Use cell battery - +ve facing up

3V/6V
Battery
+

Fold Here
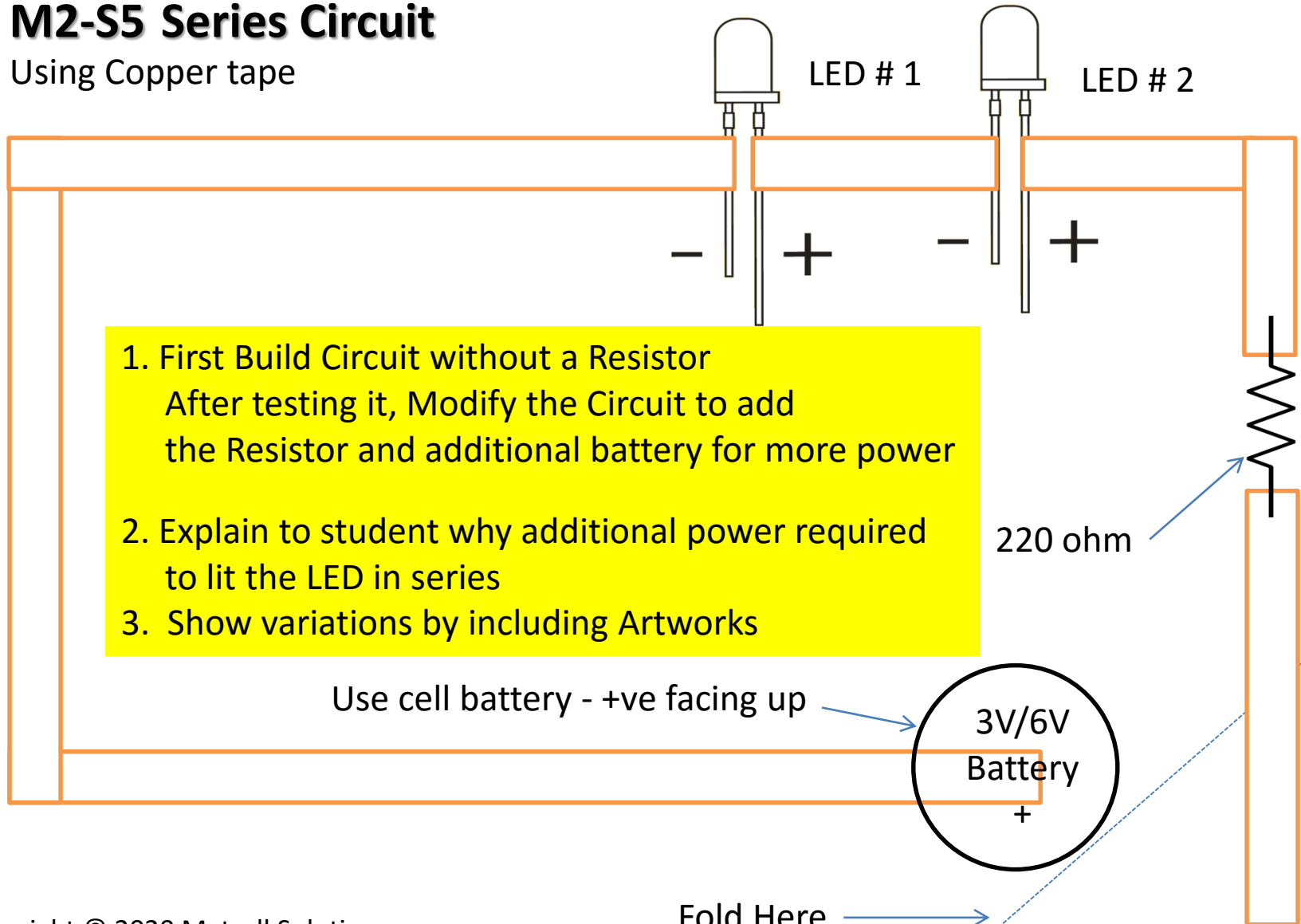
Electronic & Circuit
M2-S6 Parallel Circuit
Using Copper tape

− +

LED # 1

− +

LED # 2

220 ohm

Use cell battery - +ve facing up

3V
Battery
+

Fold Here

Electronic & Circuit
M2-S7 Breadboard Connection

Power source

GND 5V

Power Rail

A

B

C

D

Components Area

Insert Components Horizontally

Electronic & Circuit
M2-S7 Circuit on Breadboard

Power source from
Battery (3V, 5V & 9V)

GND 5V

A

B

C

D

Change resistor based on Power Source
220 Ohm for 3V, 470 Ohm for 5V, 1k for 9V

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Day 5

Exploring The brain board –
The microcontroller

Electronic & Circuit
M2-S8 Single LED Connection

Led

Resistor 220 ohm
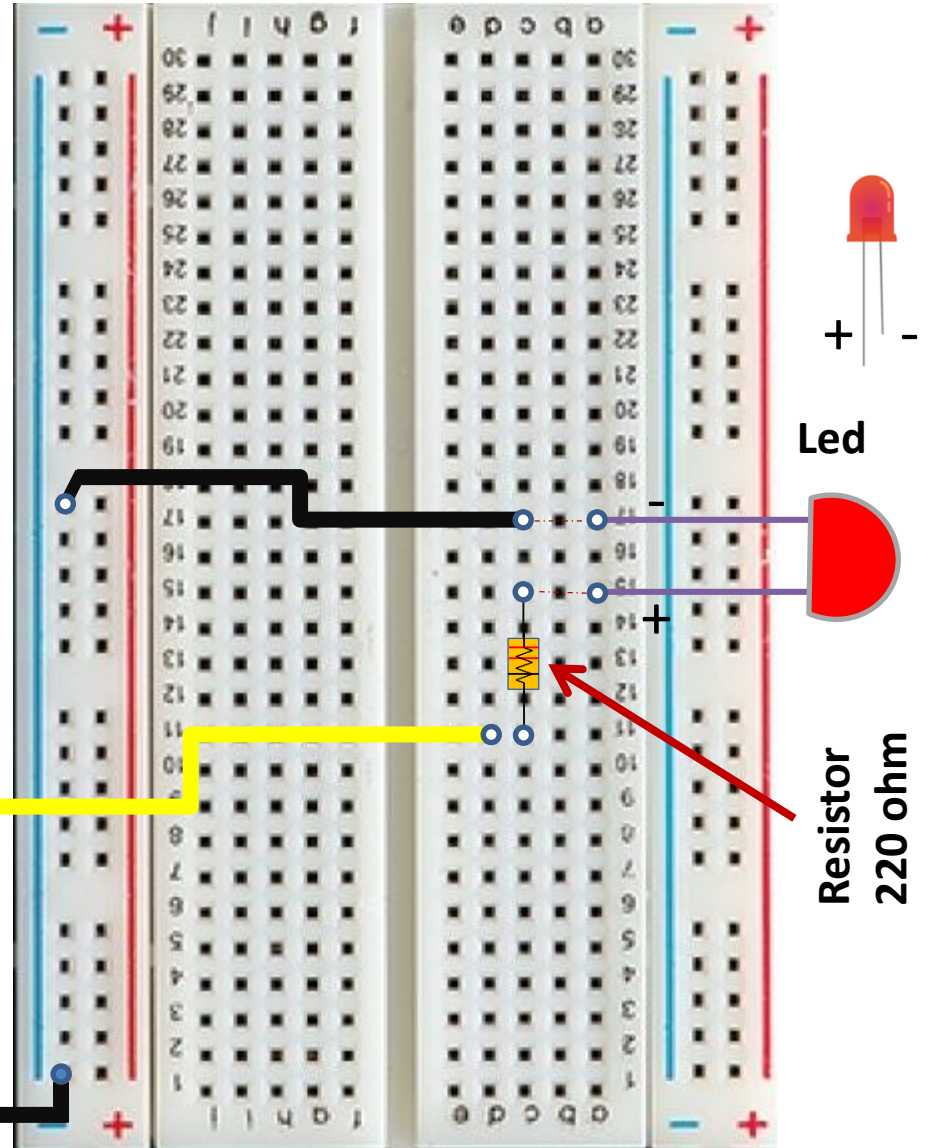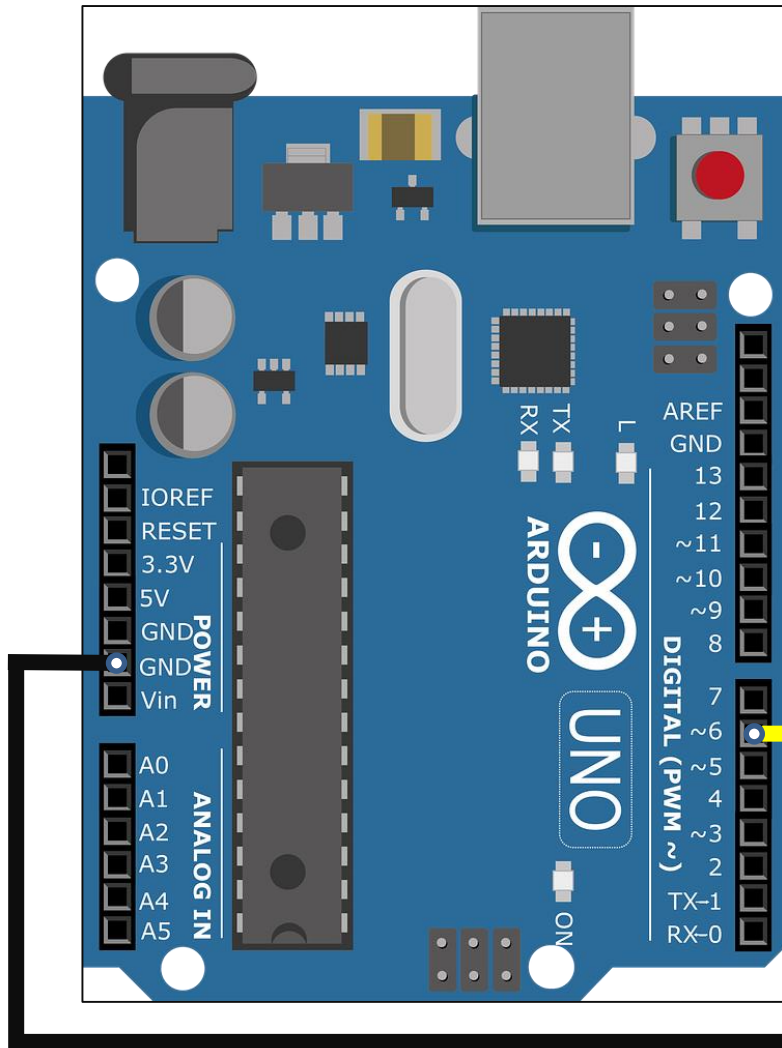
Programming Samples

LED ON/OFF
(Digital Output)
Single Loop

Arduino Command blocks
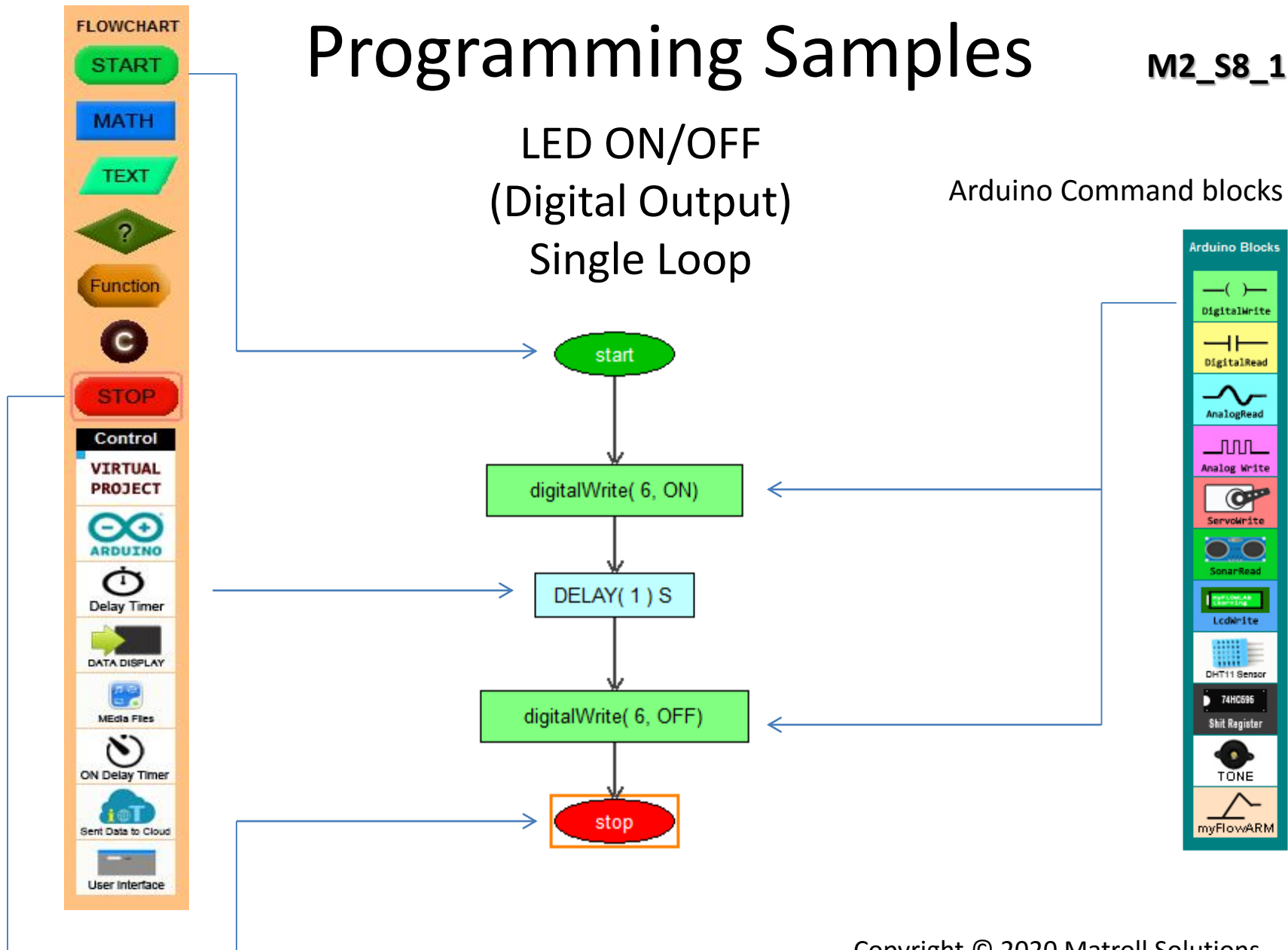
FLOWCHART

- START
- MATH
- TEXT
- ?
- Function
- C
- STOP

Control

VIRTUAL PROJECT

- ARDUINO
- Delay Timer
- DATA DISPLAY
- MEdia Files
- ON Delay Timer
- Sent Data to Cloud
- User Interface

Arduino Blocks

- DigitalWrite
- DigitalRead
- AnalogRead
- Analog Write
- ServoWrite
- SonarRead
- LcdWrite
- DHT11 Sensor
- 74HC595 Shit Register
- TONE
- myFlowARM

```
start
   |
   v
digitalWrite( 6, ON)
   |
   v
DELAY( 1 ) S
   |
   v
digitalWrite( 6, OFF)
   |
   v
stop
```

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Programming Samples

LED Blink
(Digital Output)
Continuous Loop

M2_S8_2

Arduino Command blocks

Programming Samples

M2_S8_3

LED Blink (Fading Effect)
(Analog Output - Value 0 to 255)
Continuous Loop

Arduino Command blocks
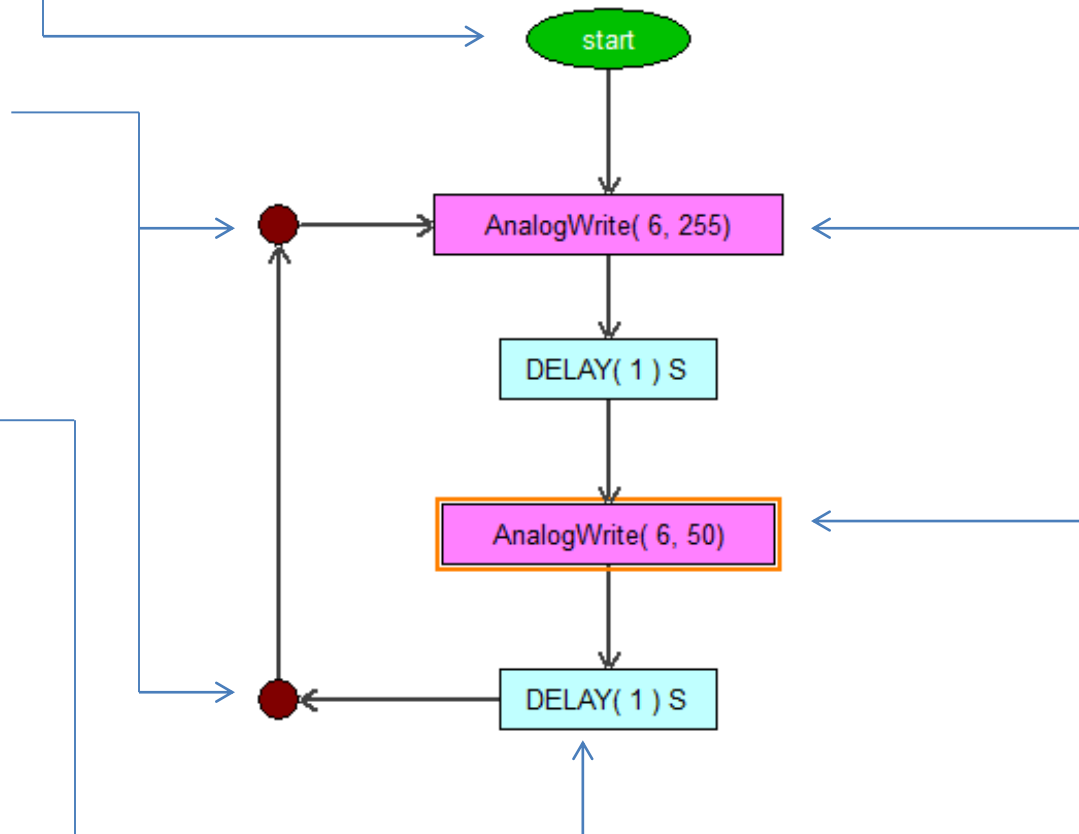
Real-World Prototype Project
M3-S1 Aircraft anti collision light

Led

Resistor
220 ohm
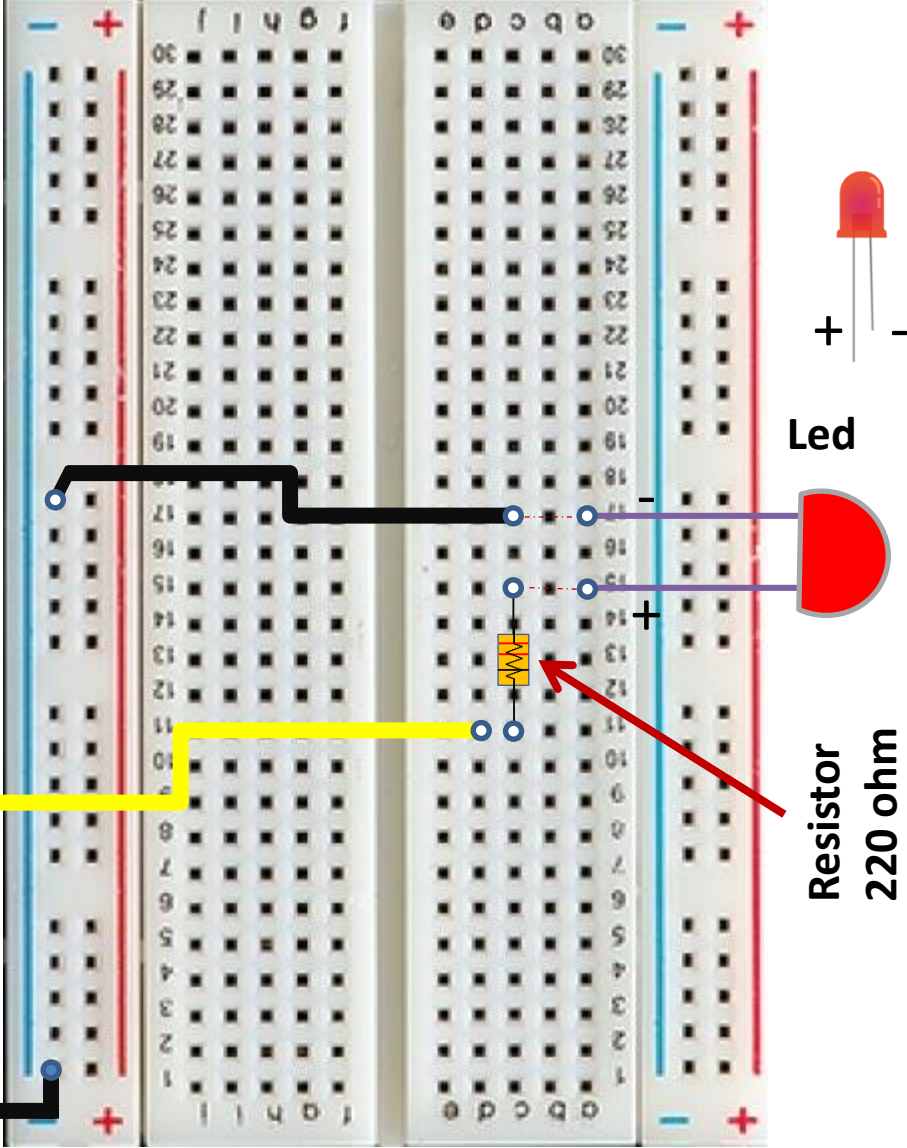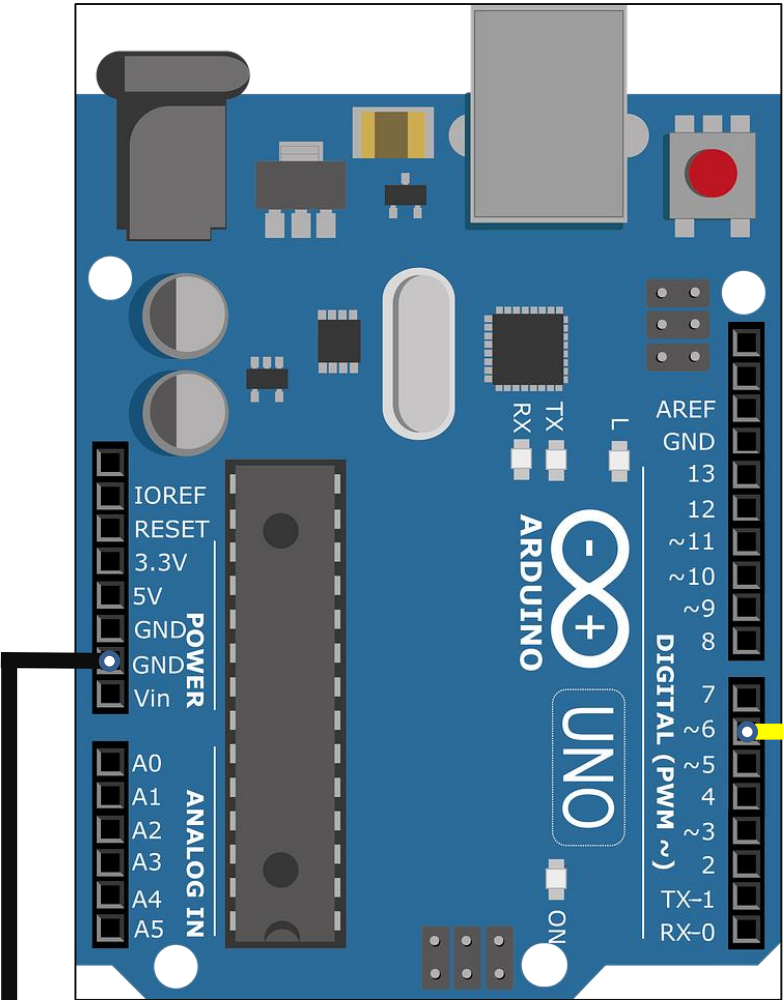
Programming Samples
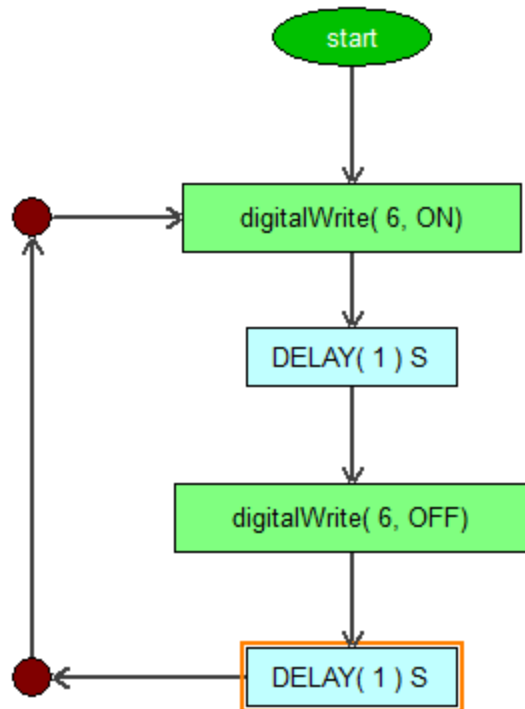
M3_S1_1

LED Blink
(Digital Output)
Continuous Loop

Arduino Command blocks

FLOWCHART

- START
- MATH
- TEXT
- ?
- Function
- C
- STOP
- Control
- VIRTUAL PROJECT
- ARDUINO
- Delay Timer
- DATA DISPLAY
- MEdia Files
- ON Delay Timer
- Sent Data to Cloud
- User Interface

Arduino Blocks

- DigitalWrite
- DigitalRead
- AnalogRead
- Analog Write
- ServoWrite
- SonarRead
- LcdWrite
- DHT11 Sensor
- 74HC595 Shit Register
- TONE
- myFlowARM

start

digitalWrite(6, ON)

DELAY(1) S

digitalWrite(6, OFF)

DELAY(1) S
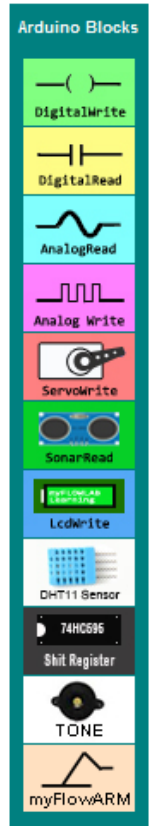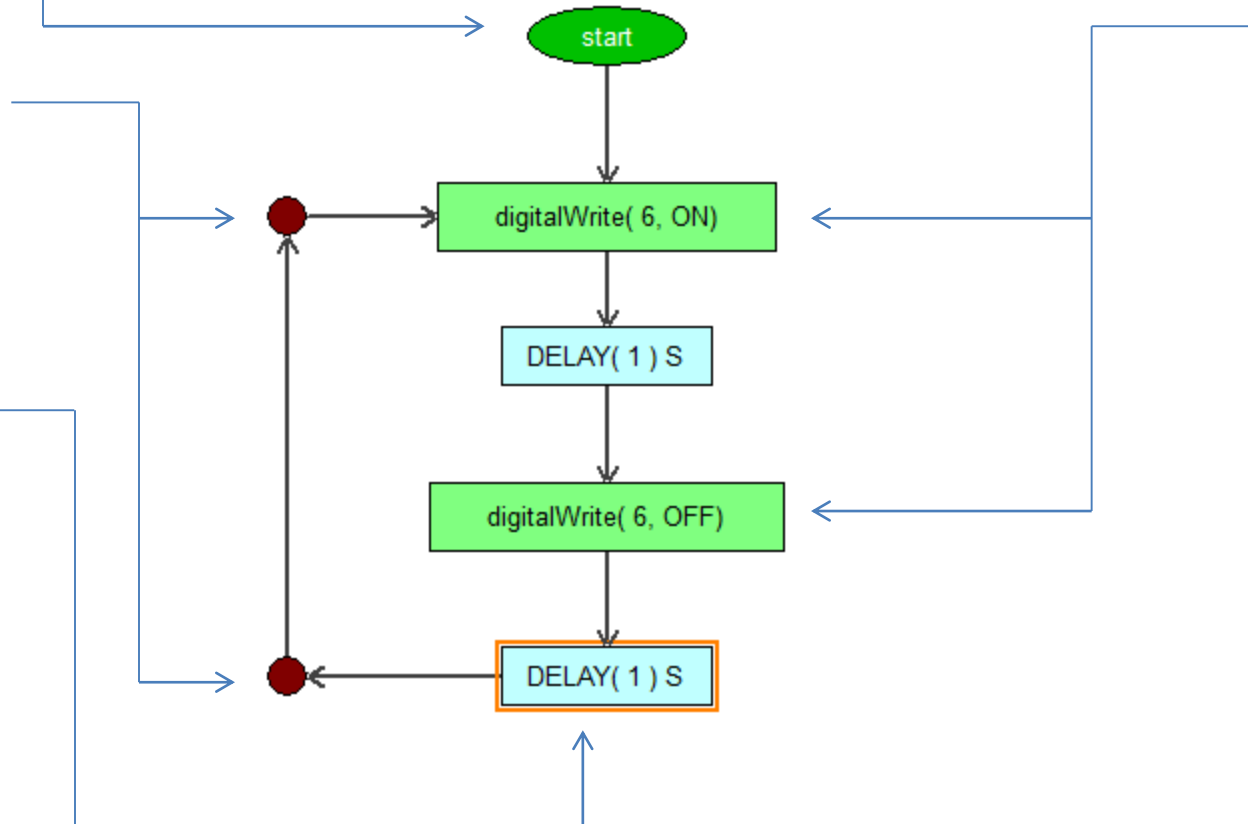
Programming Project

Aircraft Anti-Collision Lights

Anti-Collision Lights (Red)
- Top and bottom of aircraft
- Often called rotating beacons

Let the students watch the Aircraft Beacon strobe light video before attempting this project
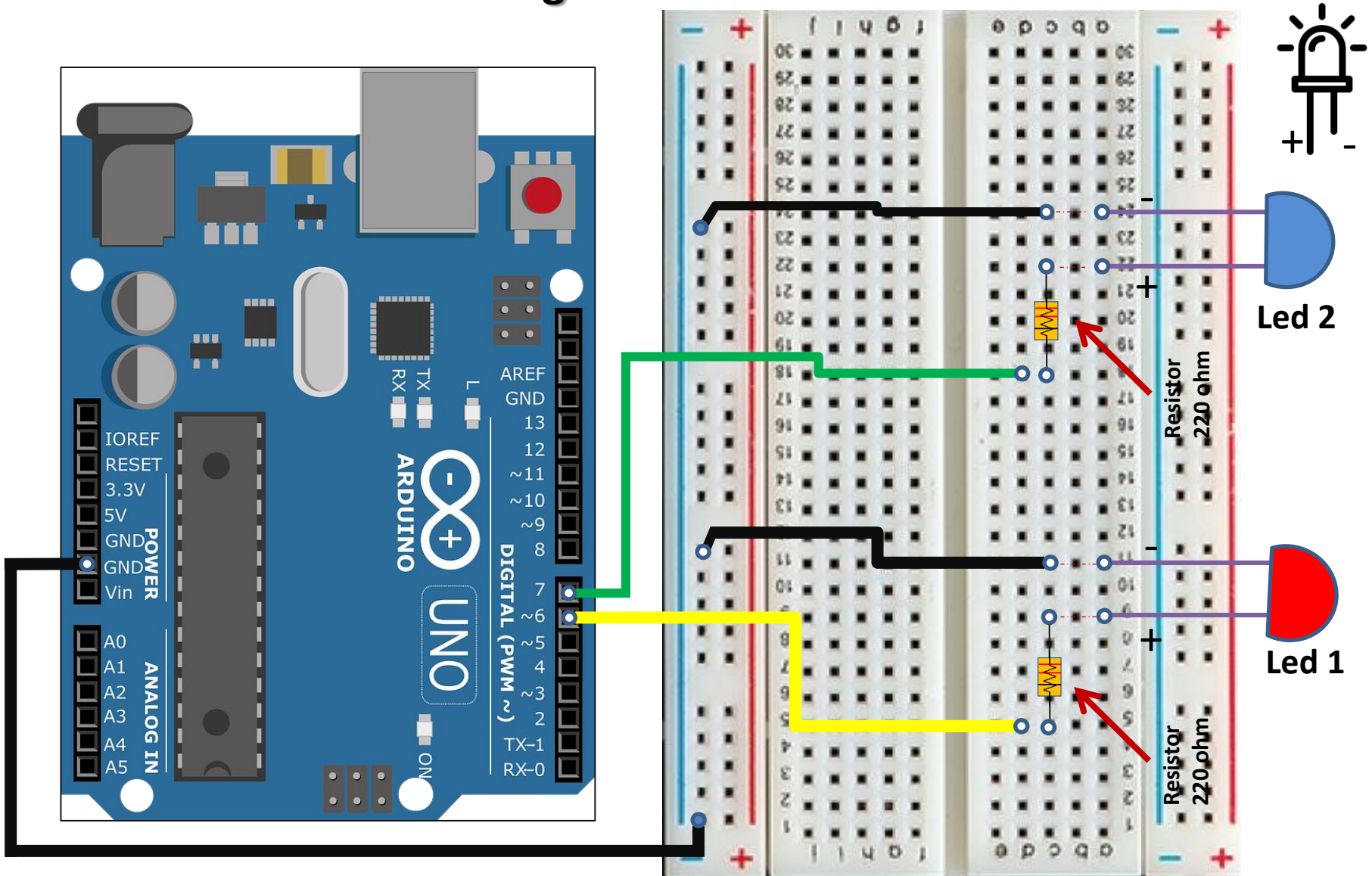
Explain the aircraft anti-collision light project, get them to change the first delay value to 0.02 sec and second delay value to 2 sec and Run it.

Variations : Create the same effect with 2 Led

Real-World Prototype Project
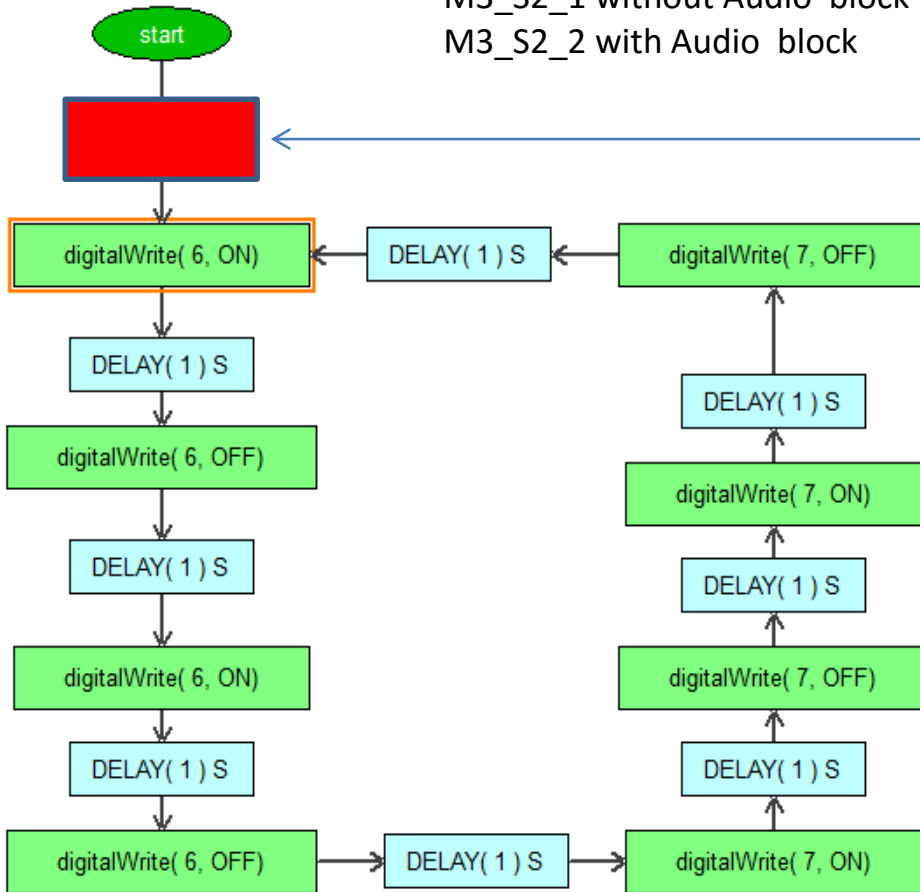## M3-S2 Police car Siren light

Led 2

Resistor 220 ohm

Led 1

Resistor 220 ohm

Police Car Siren Light Project

M3_S2_1 without Audio block
M3_S2_2 with Audio block

Guide student to write a program to double blink each LED with slow delay

Edit the Delay for the LEDs to blink like Police car siren light.

Get them to place the Media command block (Police-Siren) in a correct flow.

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END OF
CAMP # 1
ACTIVITIES