apollo

Final Presentation

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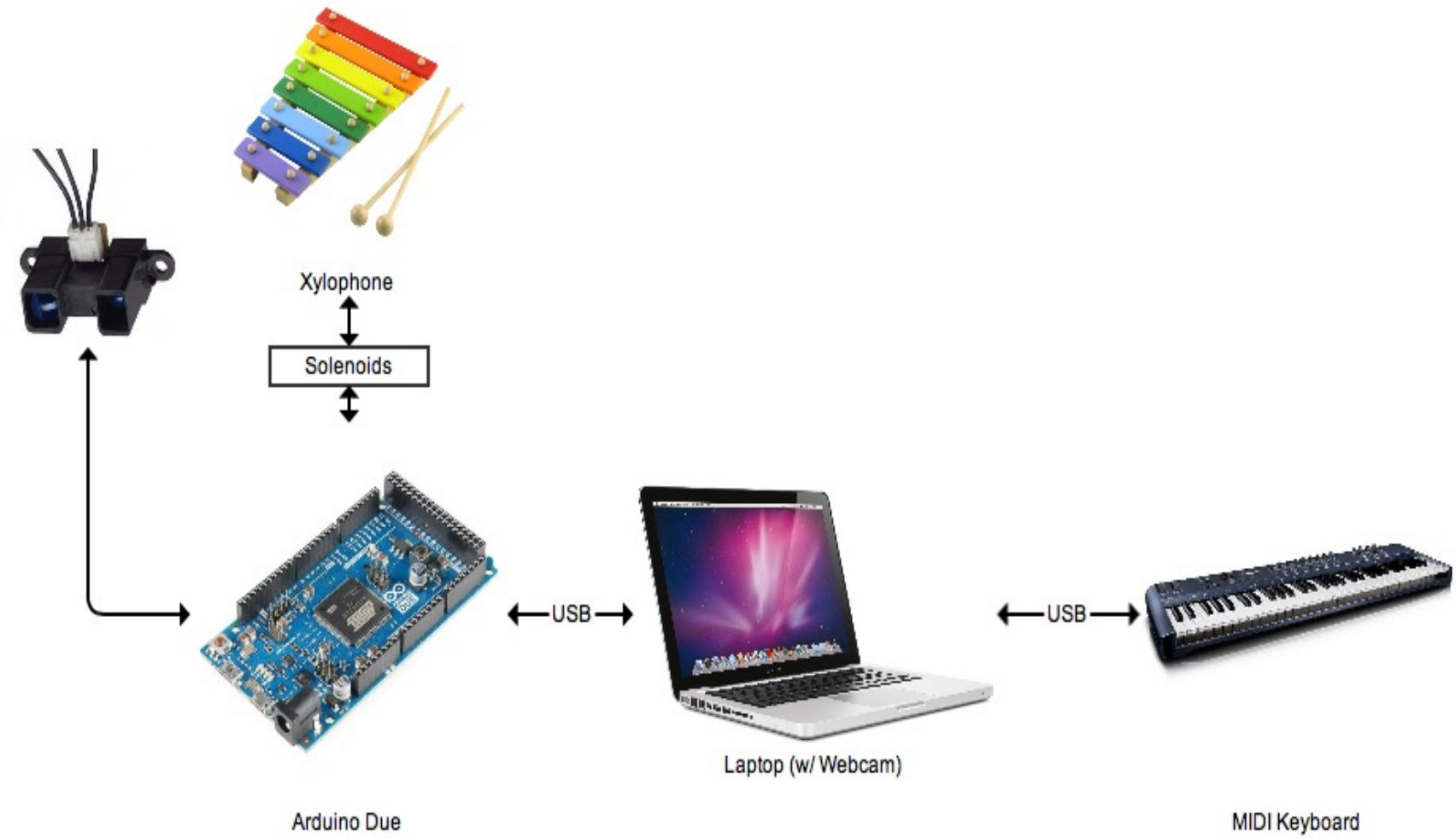
Outline

- Introduction
- Hardware
  - System
  - Sensors
- Software
  - Theory
  - Operation
- Conclusions
- Future Work

Introduction

- What does apollo do?
  - Algorithmic melody composition
  - Influenced by surroundings
- How is it done?
  - Hardware
  - Software

System


Xylophone
Solenoids
USB
USB
Laptop (w/ Webcam)
Arduino Due
MIDI Keyboard

Sensors

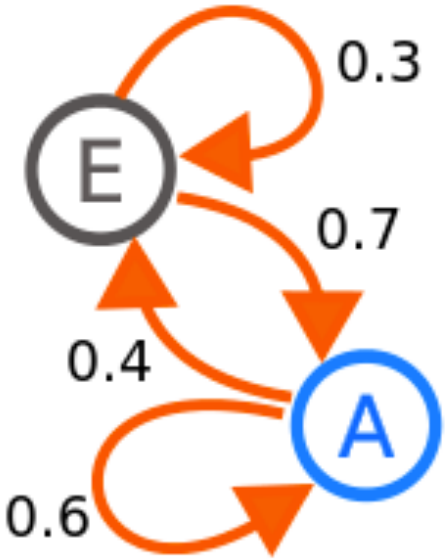
Sharp Long-Range IR Sensor

- The closer spectators get, the “faster” the robot will play.
- Accomplished by changing the tempo.
- Listed range of 20cm to 150cm.

Apple iSight Webcam

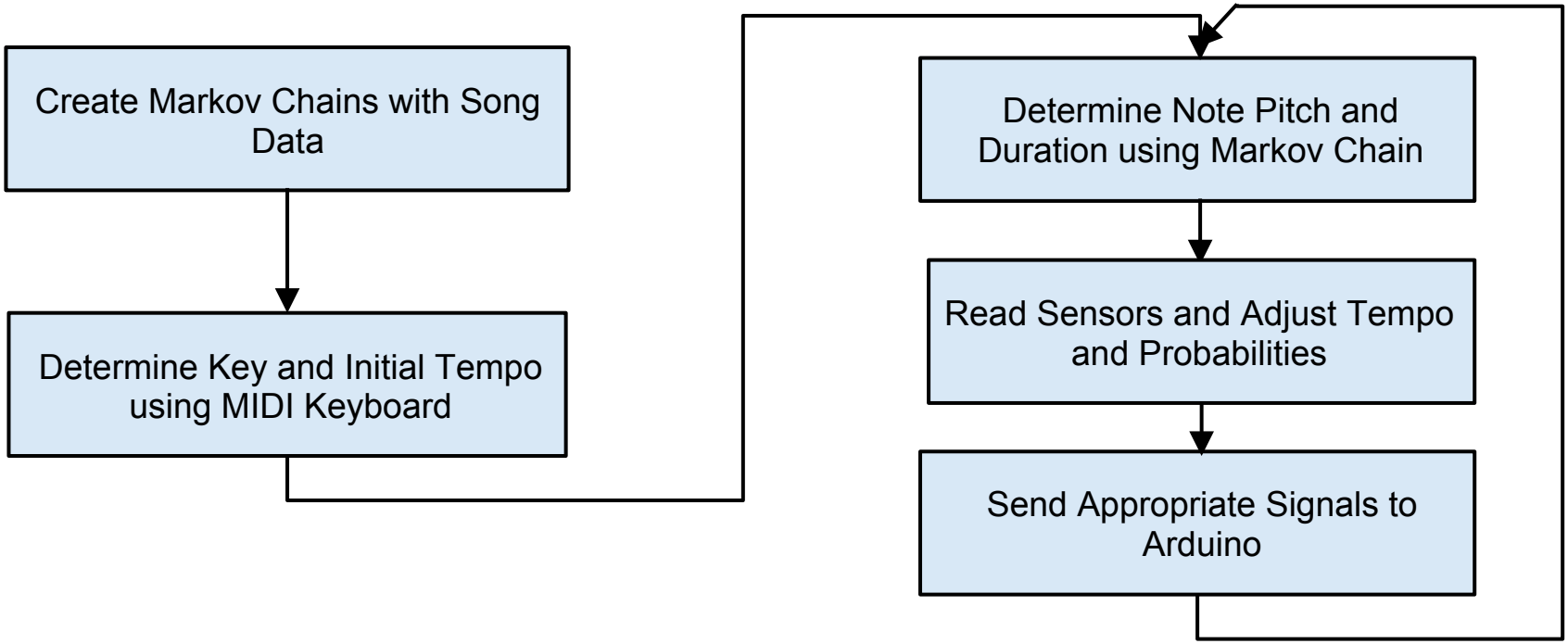
- Webcam determines main color.
- Modifies weights of note duration probabilities based on main color.

Theory



- Markov chains take an input state and compare it to a chain that gives a set of potential next states in the chain.
- Each potential next state has a different probability determined by a learning set.
- Room for improvement with more complex algorithm.

Operation


Create Markov Chains with Song Data
Determine Key and Initial Tempo using MIDI Keyboard
Determine Note Pitch and Duration using Markov Chain
Read Sensors and Adjust Tempo and Probabilities
Send Appropriate Signals to Arduino

Conclusions

- Current Functionality:
  - Unique melodies created from Markov chains
  - Melodies influenced in real-time by sensors
    - Color influences note lengths
    - Distance influences tempo
  - Can set tempo and key with MIDI keyboard
  - Melodies dependent on Markov chain

Future Work

Future work includes:

- Minor software improvements.
- Add songs to Markov chain.
- Improve platform/electrical appearance.

Potential Improvements:

- Implement more complex Markov chain.
- Impose verse-chorus structure.