Computing Project 2018

Design Engineering | Python | Micro:Bit

Smart School: Easy Attendance

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SMART SCHOOL: EASY ATTENDANCE

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1. Problem Specification

1.1. Problem Definition

Attendance is currently taken by teachers which is very troublesome and time consuming. Making a device that will have students mark their own attendance will lessen the load on the teachers and have students responsible for their own attendance.

1.2. Stakeholders

Teachers: taking of attendance is troublesome

Students: uncertainty of attendance accuracy

1.3. Project Purpose

Make a device for students to automatically make their attendance by transmitting a radio signal to another device that will record the attendance of all the students in a class.

2. Brainstorming

2.1. Research Findings

- Scan a QR code using a mobile app to take attendance
- Use a micro:bit to send a radio signal to another micro:bit that will transfer the attendance data into the school system to mark attendance.
- Fingerprint scanner to mark attendance.

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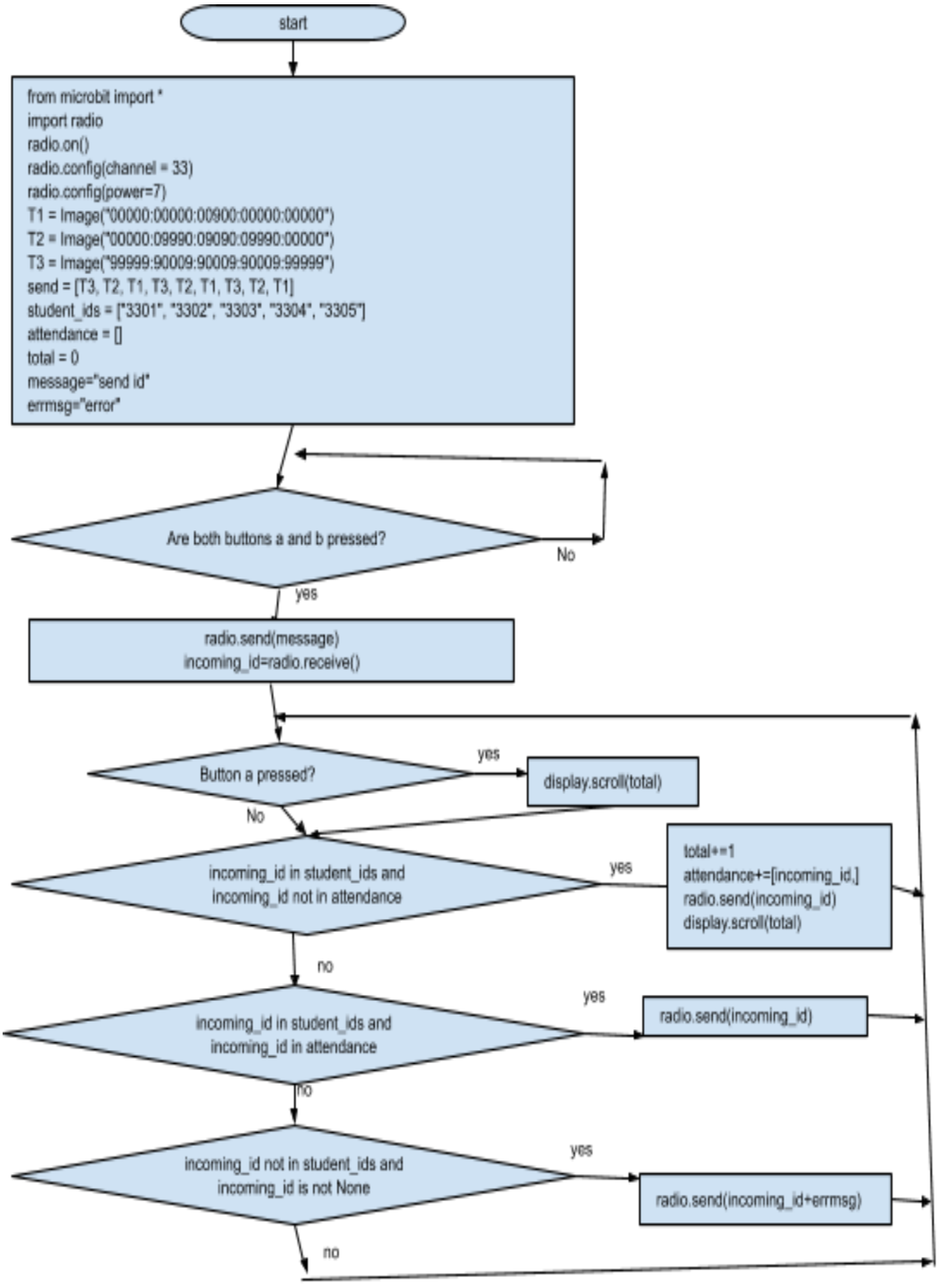
- Facial recognition scanner to mark attendance.
- ID card scanner to mark attendance.(EZ-link card)

3. Building

3.1. The Plan

Receiver



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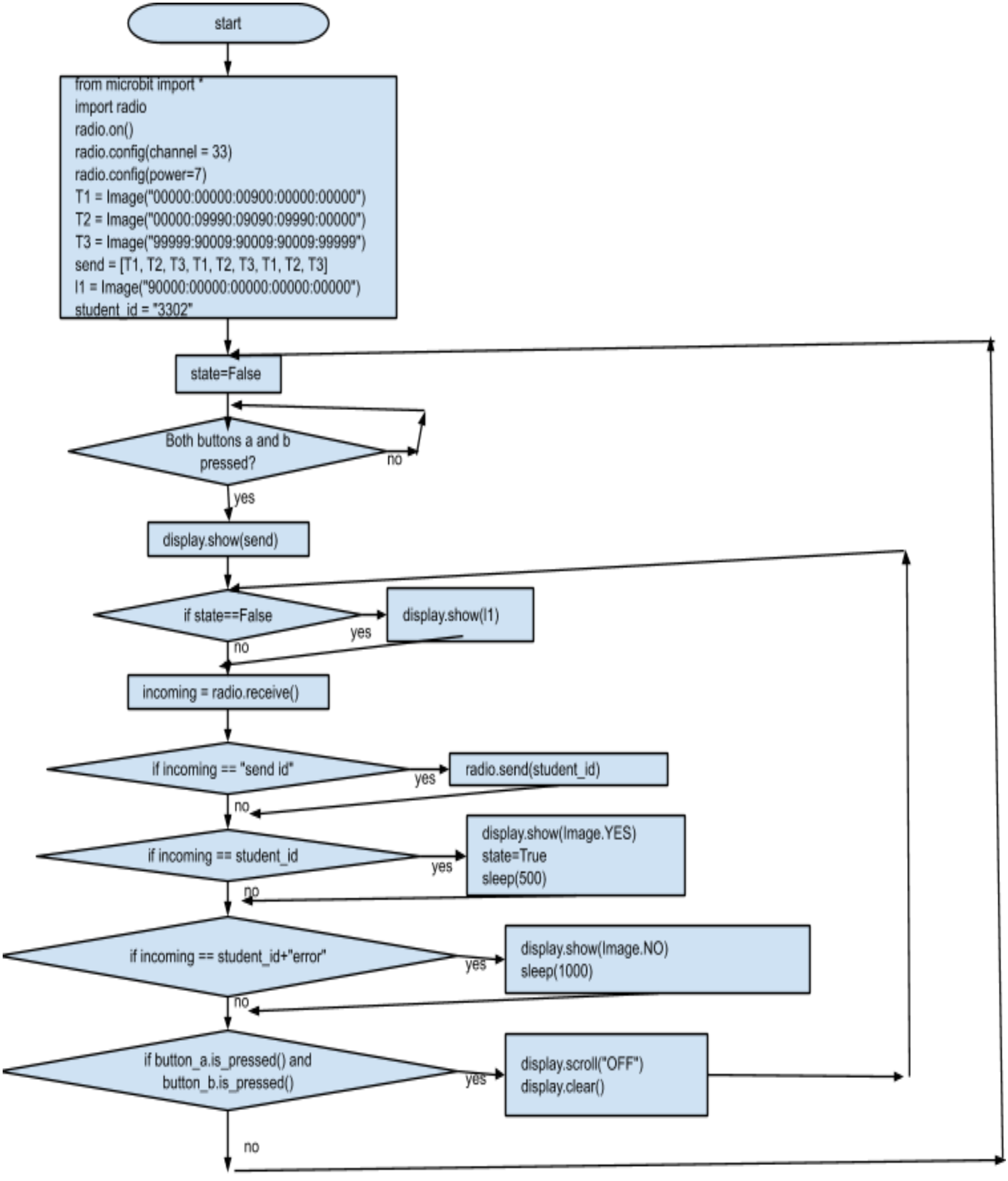
Sender



4. Testing and Analyzing

4.1. Test Cases

4.1.1. Normal Conditions

1. 2 students from the correct class turn on their micro:bit.
2. 23 more students from the correct class turn on their micro:bit.
3. Button a is pressed to check current number of students present(receiver).

4.1.2. Error Conditions

1. A student from the wrong class turns on his micro:bit.
2. Student micro:bits(sender) are on but the teacher's micro:bit(receiver) is not on.

4.1.3. Boundary Conditions

1. The teacher's micro:bit(receiver) is turned on but no students have turn their micro:bits(sender) on yet and button a(receiver) is pressed to check the attendance.
2. The last student of the class turns on his micro:bit, all 26 students are present.
3. All students are present and button a(receiver) is pressed to check the total number of students present in that class.

4.2. Analysis

4.2.1. Normal Condition Outcomes

1. Attendance is taken, displays tick as confirmation on each student's micro:bit(sender), displays the current total number of students present as each student's attendance is recorded: 1,2(receiver).
2. Attendance is taken, displays tick as confirmation on each student's micro:bit(sender), displays the current total number of students present as each student's attendance is recorded: 3,4,5,6,...,23,24,25(receiver).
3. Current total is displayed: 25(receiver).

4.2.2. Error Condition Outcomes

1. Attendance is not taken, a cross is displayed(sender) indicating that the student is not in the list of students for that class.
2. Attendance is yet to be taken and a loading screen is displayed(sender)

4.2.3. Boundary Condition Outcomes

1. No students' attendance has been marked yet, "0" is displayed(receiver) indicating that there are 0 students present.

2. The last student's attendance is taken, 26 is displayed follow by a smiley face(receiver) indicating that all students from that class are present.
3. All students are present, "ALL 26 PRESENT" is displayed(receiver).

5. Reviewing

5.1. Limitations

Each receiver is limited to only 1-2 classrooms due to the limited range of the micro:bit's radio.

5.2. Possible Improvements

The teachers' micro:bit(receiver) could be programmed in repeater fashion such that each class' attendance will be "transported" by going through every class until it finally reaches the central micro:bit where everything can be loaded into the school system so that it will be a fully automated system instead of each teacher having to load their class' attendance into the system themselves.