

# “Deflexio” - IoT solution to monitor in real time the condition of buildings, engineering structures and bridges around the clock using data driven approach

1. Detailed description of the technology – **detailed-technology-description.pdf** (11.7 MB): contains detailed description about technologies functionality, main components and characteristics, structure and principle of operation. Information about the validation of the technology in real conditions. Also contains information about surface shape reconstruction algorithm and error analysis.
2. Schematic and PCB design as Altium Designer Project, for Raspberry Pi Hat, that provides data acquisition from sensor nodes. – **RPI4\_MasterBoard\_Hat** (11.6 MB). This device provides sensor data acquisition from sensor nodes.
3. Schematic and PCB design as Altium Designer Project for sensor nodes that are integrated on flexible PCB - **PCB\_flexible\_BMA456** (71.9 MB): These are sensor nodes that are integrated on flexible PCB to provide deformation measurements.
4. Schematic and PCB design as Altium Designer Project for sensor nodes that are embedded on rigid PCB - **PCB\_BMA456\_regulated** (29.4 MB): These are sensor nodes that are integrated on rigid PCB and provide deformation measurements.
5. Schematic and PCB design as Altium Designer Project for sensor nodes that are embedded on rigid PCB - **PCB\_BMA456\_regulated** (29.4 MB): These are sensor nodes that are integrated on rigid PCB and provide deformation measurements.
6. Schematic and PCB design as Altium Designer Project for sensor nodes with higher accuracy – **PCB\_IIS2ICLX\_regulated**: This sensor node contains sensor microchip with higher accuracy but with only 2 sensing axis.
7. Bill of materials for electronic components (BOM) – **BOMs\_for\_PCB\_Projects.xlsx** (8.3 kB): List with electronic components, that are used in hardware.
8. Schematic and PCB design for voltage converter as Altium Designer Project – **DC-DC\_converter\_board** (1.1 MB): This device provides voltage conversion from power supply of 12 V to 5 V to provide power to the raspberry pi, Wi-Fi router and Solar inclinometer.
9. Source code for curve reconstruction algorithm - **curve-reconstruction** (18.4 kB): Contains source code for Python programming language, that provides surface reconstruction from sensor data.
10. Source code for sensor data transmission through network — **Networking-Code** (171.7 kB). This software provides Client (Raspberry Pi) and Server (Central server) functionality. It provides data acquisition from Sensor nodes and transmission using Internet. ZeroMQ library is used for communication.
11. Source code for sensor system demonstrator – **plankDeformationDemo** (130.9 kB): Contains source code for MATLAB environment, that provides with visualization of deformations in real time.
12. Firmware source code for sensor node microcontrollers for BMA456 sensor board – **SensorNodeBMA456\_fixedSize** (66.1 kB): Code Composer Studio project for TI MSP430G2553 microcontroller, that provides sensor data transmission.
13. Firmware source code for sensor node microcontroller for IIS2ICLX sensor board – **SensorNodeIIS2ICLX\_fixedsized** (175.8 kB): Code Composer Studio project for TI MSP430G2553 microcontroller, that provides sensor data transmission.
14. Firmware source code for sensor node micro-controller LSM9DS0 sensor board - **SensorNodeLSM9DS0\_commTimeout** (33.2 kB): Code Composer Studio project for TI

MSP430G2553 micro-controller, that provides sensor data transmission. For this version there is no need to configure sensor count in the chain.

15. Firmware source code for sensor node micro-controller LSM9DS0 board - **SensorNodeLSM9DS0\_FixedSize** (30.7 kB): Code Composer Studio project for TI MSP430G2553 micro-controller, that provides sensor data transmission. For this version it is necessary to configure sensor count in the chain.
16. Firmware source code for sensor node micro-controller BMA456 sensor node, on flexible substrate - **SensorStripBMA456-FixedSize** (48,0 kB): Code Composer Studio project for TI MSP430G2553 micro-controller, that provides sensor data transmission. This version is for sensor nodes embedded on flexible substrate.
17. Firmware source code for sensor node micro-controller for master sensor acquisition node controller – **SinglebranchMaster-Classic** (23,5 kB). Code Composer Studio project for TI MSP430F5438A micro-controller, that provides sensor data acquisition from sensor nodes.
18. Prototype with sensor series, where sensor nodes are embedded on flexible substrate with LSM9DS0 sensors.
19. Prototype with sensor series where sensor nodes are embedded on flexible substrate with BMA456 sensors.
20. Prototype with sensor series with discrete sensor nodes, that are embedded in humidity resistant casings.
21. Prototype for central sensor data acquisition node in humidity resistant casing (Sensor Hub).